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# Chapter 4

## Environmental Consequences



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# CHAPTER 4

## ENVIRONMENTAL CONSEQUENCES

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### 4.1 CHANGES BETWEEN THE DRAFT LUPA/EIS AND PROPOSED LUPA/FINAL EIS

As a result of public comments, cooperating agency coordination, and internal review of the Draft LUPA/EIS, the BLM and Forest Service have made several changes to this chapter. Changes include the following:

- A baseline disturbance inventory has been completed and the impact analysis has been revised to incorporate the results of that inventory. The baseline disturbance inventory is provided in **Appendix L**, Baseline Disturbance Inventory.
- The likely direct and indirect impacts on the human and natural environment that could occur from implementing the BLM and Forest Service Proposed Plans presented in **Chapter 2**, Alternatives, were incorporated.
- Analyses for the draft alternatives (Alternatives A – E) were adjusted based on public and internal comments, as well as the identification of additional literature in public comments.
- In response to public comments, a more detailed, quantitative analysis of the impacts from implementing the disturbance cap for the various alternatives was included.
- Calculations have been updated and new information since the Draft LUPA/EIS has been incorporated to reflect better or more current information, where available and germane to the current conditions and analysis.

### 4.2 INTRODUCTION

This chapter presents the anticipated direct and indirect impacts on the human and natural environment that could result from implementing the alternatives presented in **Chapter 2**. 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 and to aid in the decision of which LUPA, if any, to adopt.

**Section 4.3**, Special Status Species – Greater Sage-Grouse, discloses the environmental consequences associated with the impacts on GRSG and its habitat from activities carried out in conformance with this plan, in addition to BLM and Forest Service management actions. In undertaking BLM and Forest Service management actions and, consistent with valid existing rights and applicable laws, in authorizing third party actions that result in habitat loss and degradation, the BLM and Forest Service will require mitigation that provides a net conservation gain to the species, including accounting for any uncertainty associated with the effectiveness of such mitigation. This will be achieved by avoiding, minimizing, and compensating for impacts by applying beneficial mitigation actions (conservation measures). In addition, to help implement the LUPA, a WAFWA MZ regional mitigation strategy will be developed within one year of the issuance of the ROD (see **Appendix D**, Mitigation Strategy Utah Greater Sage-Grouse LUPA). The regional mitigation strategy will elaborate on the components identified in **Chapter 2** (avoidance, minimization, compensation, additionality, timeliness, and durability), and will be considered for BLM and Forest Service management actions and third party actions that result in habitat loss and degradation. The implementation of a regional mitigation strategy will benefit GRSG, the public, and land-users by providing a reduction in threats, increased public transparency and confidence, and a predictable permit process for land-use authorization applicants.

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 five alternatives. For resources of particular concern that have been identified as a threat to GRSG, the analysis of impacts has been broken down by alternative. For the remaining resource topics, the types of impacts would be similar across the alternatives but the magnitude may vary by alternative. In these cases, the analysis has been combined and the differences in the magnitude of impact called out.

Management actions proposed in **Chapter 2** are primarily planning-level decisions that do not result in direct on-the-ground changes. However, the analysis in this chapter focuses on impacts that could eventually result in on-the-ground changes as the decisions in this plan are implemented.

Some management actions may affect only certain resources and alternatives. This impact analysis identifies impacts that may benefit, enhance, or improve a resource because of management actions, as well as those impacts that have the potential to impair a resource. 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. 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 process. At times, impacts are described using ranges of potential impacts or in qualitative terms.

#### **4.2.1 Analytical Assumptions**

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

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

- Sufficient funding and personnel would be available for implementing the final decision.
- Implementing actions from any of the LUPA alternatives would comply with all valid existing rights, federal regulations, BLM and Forest Service policies, and other requirements.
- Implementation-level actions necessary to execute the decisions in this LUPA would be subject to further environmental review, including that under the NEPA, as appropriate.
- Direct and indirect impacts of implementing the LUPA would primarily occur on BLM-administered and National Forest System lands 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.
- 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 and Forest Service may be required to reevaluate decisions made as part of this planning process and to adjust management accordingly.
- 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 National Forest System lands.
- New information may lead to changes in delineated GRSG 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 LUPA. Modifications to GRSG habitat would be updated in the existing data inventory through LUP maintenance.
- The term ROW includes BLM ROWs, land leases, and permits, and Forest Service SUAs, as applicable. Under the Proposed Plans, the Forest Service would not make new decisions for SUAs (i.e., any decisions from Alternative A would be carried forward to the Proposed Plans). As such, acreages associated with ROW exclusion and avoidance are specific to BLM-administered lands except where current Forest Service decisions are carried forward.
- Acreage figures and other numbers used in the analyses are approximate projections for comparison and analytic purposes only. Readers should not infer that they reflect exact measurements or precise calculations.
- GHMA on National Forest System lands is approximately 5.6 percent of the Forest Service decision area in Utah.

#### 4.2.2 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*—The analysis discloses impacts, both beneficial and adverse. Because types of impacts can be interpreted differently by different people, this chapter seeks to avoid differentiation between beneficial and adverse impacts. Notable exceptions are cases where such characterization is required by law, regulation, or policy. The presentation of impacts for key planning issues is intended to provide the BLM and 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 Utah, and regional impacts would extend beyond the planning area boundaries.

For the Utah Greater Sage-Grouse LUPA/EIS the planning area includes all of Utah, except for Washington, San Juan, Davis, and Salt Lake Counties, which contain no mapped occupied GRSG habitat. Portions of Box Elder County that are managed by the Sawtooth National Forest are not included in the planning area, but are part of the planning area for the Idaho Sub-region. In addition, the planning area includes the portions of the Uinta-Wasatch-Cache and Ashley National Forests that extend into the State of Wyoming. Within the planning area, the GRSG analysis area is the sum of the population areas (which overlap all the above referenced

counties), regardless of land ownership (11,386,670 acres). **Table 1.1** provides a detailed breakdown of landownership status in the planning area.

The decision area is the portions of the GRSG analysis area that are comprised of BLM, Forest Service, and Bankhead Jones surface estates, as well as the mineral estates administered by the BLM. Though the planning area includes private lands, management direction and actions outlined in this EIS apply only to the BLM-administered and National Forest System lands in the planning area and to federal mineral estate under BLM jurisdiction that may lie beneath other surface ownership.

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

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

*Direct, indirect, and cumulative impacts*—Direct impacts are caused by an action or implementation of an alternative and occur at the same time and place; indirect impacts result from implementing an action or alternative but usually occur later in time or are removed in distance and are reasonably certain to occur. Cumulative impacts are effects on the environment that result from the impact of implementing any one of the alternatives in combination with other actions, either within the planning area or adjacent to it. Cumulative effects analysis is provided in **Chapter 5**, Cumulative Impacts.

RDFs have been incorporated into the Forest Service Proposed Plans as planning-level Guidelines, which will be implemented during site-specific project analysis, or are existing standard operating procedures.

The Anthro Mountain area, while not specifically designated as PHMA, includes the same management allocations and actions as PHMA (see **Section 2.6.3**, Forest Service Proposed Plan Amendment – Utah Portions of the Planning Area). When referring to impacts from applying management associated with PHMA throughout **Chapters 4** and **5**, the identified impacts and acreages include Anthro Mountain unless specifically noted otherwise, even though the 41,200 acres of National Forest System lands on Anthro Mountain are not formally PHMA.

#### **4.2.3 Incomplete or Unavailable Information**

The CEQ established implementing regulations for NEPA that require federal agencies to identify relevant information that may be incomplete or unavailable for evaluating reasonably foreseeable significant adverse impacts in an EIS (40 CFR Part 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 and from outside sources.

Under the 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 are the following:

- Comprehensive statewide inventory of wildlife and special status species occurrence and condition.
- A comprehensive inventory of sagebrush lands which meet the guidelines as recommended by the scientific community. This information is not monitored on a statewide level.
- Forage allocations for livestock, wild horses, and wildlife.
- PFC data are presented in **Chapter 3**, but further details regarding acreages, distances, and causal factors on a sub-regional or population area basis are not available.

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 LUPA.

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

## **4.3 SPECIAL STATUS SPECIES – GREATER SAGE-GROUSE**

### **4.3.1 Methods and Assumptions**

#### ***Methodology***

There is very little peer-reviewed published research discussing the impacts of various land uses on GRSG habitat or populations in Utah. For this impact analysis, the BLM and Forest Service have used the best available information, which often includes references to research related to impacts on GRSG and GRSG habitat outside of Utah. For example, there is no published research conducted in Utah that specifically addresses disturbance or oil and gas development

impacts on GRSG. However, numerous GRSG research projects evaluating impacts of energy development have been conducted in Wyoming and Montana. Anticipated impacts on GRSG and GRSG habitat in this analysis are based on existing research, regardless of where it was conducted.

In preparation of this EIS, the BLM and Forest Service used ESSA DDT to evaluate and compare the estimated effects of each alternative's vegetation, invasive species, grazing, and wildfire management decisions on GRSG habitat. As described in **Appendix V**, Great Basin Vegetation Modeling using Vegetation Dynamics Development Tool, the modeling effort was used to determine general habitat trends at a landscape scale considering a variety of habitat influences (e.g., wildfire, risk of overgrazing, insects and disease, conifer encroachment, and vegetation treatments).

Based on these inputs and the natural rates of succession in sagebrush systems, modeling was conducted to quantify the direction and magnitude of non-geospatial acreage trends in relation to sagebrush conditions most likely to provide GRSG habitat.

Information derived from the VDDT model provides valuable information on estimated trends; however, the model also has a number of limitations, including the following:

- The modeling effort did not include changes in habitat conditions associated with permitted activities such as infrastructure development, travel management, or mineral development. The effects of these actions, including habitat loss or habitat degradation (e.g., introduction or spread of invasive plant species), are taken into account in other sections of the analysis.
- The inputs for existing sagebrush conditions are the result of a combination of LANDFIRE and ReGap data sets, which are based on satellite imagery and other inputs. Events that have occurred since the data were collected (e.g., juniper removal, prescribed fire, and wildfire) are not reflected in the acreage. These data sets reflect the best available vegetation data available across both BLM-administered and National Forest System lands; however, they include some inaccuracies and errors.
- Vegetation modeling focuses on the amount of sagebrush in mid- to late-seral classes. Sagebrush in these classes tends to provide the percent sagebrush canopy cover needed for GRSG (10 to 35 percent); however, GRSG may also use other vegetation (e.g., sagebrush in the early seral stage, mesic areas, and aspen stands with suitable herbaceous understory). Vegetation modeling data presents an approximation of expected conditions in 50 years. In areas where a high percentage of the sagebrush is in the mid- to late-seral condition (e.g., 80 to 90 percent), it is not unexpected to see a declining trend in habitat conditions. These conditions can be either a result of overestimating existing conditions or vegetation dynamics driving the trends.
- Model results are based, in part, on assumptions regarding the number of acres of vegetation treated (conifer encroachment treatments and annual grass restoration treatments). It was assumed that treatments would continue to occur at

approximately the same rate as over the past 7 years unless the alternative restricts the type or location of treatment. Expanding the amount of treatment beyond modeled/current levels or considering the same levels of treatment distributed among the modeled areas differently could change the estimated percent of habitat in mid- to late-seral condition at 50 years.

- Each individual population area was not modeled separately, and in some instances, multiple population areas were combined for this modeling exercise. For example, the Rich, Uintah, Wyoming-Uinta, Wyoming-Blacks Fork, and Lucerne Population Areas were modeled as an individual unit. As such, the model does not account for site-specific variation in conditions (e.g., soil, elevation, and precipitation). Model units are closely associated with the general GRSG populations identified by Connelly and others (2004).
- All alternatives were modeled using GRSG mapped occupied habitat, which provides a consistent baseline for impact analysis. However, under Alternatives B, D, and E not all areas would be managed as PHMA. Some occupied GRSG habitat located in the Carbon, Uintah, Sheeprocks, Panguitch, Box Elder, Wyoming-Uinta, and Wyoming-Blacks Fork Population Areas would be managed as GHMA. GHMA are areas that have been determined to have less conservation value than PHMA. The identification of PHMA and GHMA was based on multiple variables, including quality of habitat, existing development, and number of birds. Management of PHMA and GHMA also varies by alternative. Removal of GHMA from the model area would likely decrease the percent of juniper and annual grasses and increase the percent of sagebrush in the mid- to late-seral stage.

### **Indicators**

Indicators of impacts on GRSG are as follows:

- Habitat Loss – Likelihood of habitat avoidance due to human presence or habitat alteration
- Habitat degradation – Likelihood for habitat impacts caused by the loss of habitat function or value
- Disruption – Likelihood of impacts on survival or reproduction due to direct or indirect effects

### **Assumptions**

In addition to the assumptions in **Section 4.2.1**, Analytical Assumptions, this analysis includes the following assumptions:

- When referring to impacts on GRSG habitats, this also incorporates the indirect impacts on GRSG. However, where appropriate, direct impacts on GRSG are discussed.
- Three general categories of anthropogenic disturbance/disruption or habitat loss/degradation would most influence GRSG and their habitat: 1)

disturbance/disruption from casual use; 2) disturbance/disruption from permitted activity; and 3) changes in habitat condition, such as from fire or weed invasion.

- BMPs, COAs, and standard operating procedures are used for analysis and would be implemented to reduce impacts on GRSG. These are subject to modification based on subsequent guidance and new science.
- Ground-disturbing activities could positively or negatively modify habitat or cause loss or gain of individuals, depending on the amount of area disturbed, the nature of the disturbance, the species affected, and the location of the disturbance.
- Roads, transmission lines, pipelines, and other infrastructure generally cause fragmentation of habitat that can impact lek persistence, lek attendance, winter habitat use, recruitment, chick survival, yearling annual survival rate, and female nest site choice (Holloran 2005; Aldridge and Boyce 2007, Walker et al. 2007a; Doherty et al. 2008; Holloran et al. 2010; Hagen et al. 2011; Johnson et al. 2011; Taylor et al. 2012).
- Most oil and gas development will be in areas with high development potential and from existing leases.
- The agencies may place restrictions on development of existing oil and gas leases to protect other surface resources, as long as the restrictions do not unreasonably interfere with the lessees' right to explore for and produce oil and gas resources.

#### ***Programs, Decisions, and Threats Addressed***

BLM and Forest Service LUPAs focus on increasing GRSG conservation for programs and activities under BLM and Forest Service management authority. Therefore, threats occurring on private and state lands (e.g., agricultural conversion and urbanization), threats addressed by other state or federal programs (e.g., predator management or pesticide application), or climate change may continue to impact GRSG populations. To the extent possible, the BLM and the Forest Service address management decisions that may indirectly address some of these threats. For example, restricting or prohibiting certain land uses in an area could reduce the likelihood of human-caused fire ignitions and decrease the spread of invasive plant species.

Similarly, while the BLM and Forest Service can restrict or prohibit future energy development on unleased land within GRSG habitat, there is limited ability to restrict or prohibit development in areas where there are valid and existing rights or existing mining claims within GRSG habitat.

The analysis of impacts on GRSG is organized by the threats identified in USFWS's 12-Month Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered. Predation was not identified as a primary range-wide threat, and therefore, was not analyzed separately in the alternative impact analysis. However, during the Draft EIS public comment period, BLM and Forest Service received extensive public comments that provided information on predation and hunting and their impacts on GRSG. In response to those comments, and recognizing that the USFWS noted that predation might be a threat at local levels, the BLM and Forest Service have included more detailed discussion regarding these issues in **Chapter I**, Introduction, and in **Appendix M**, Predation of Greater Sage-Grouse in the

Utah Sub-regional Planning Area. Though the BLM and Forest Service do not have the regulatory authority to conduct direct predator management, such management can provide short-term relief to localized GRSG populations where predation has been identified as a limiting factor for population stability. Under the Proposed Plans and other alternatives, the BLM and Forest Service would collaborate with appropriate agencies (e.g., Animal and Plant Health Inspection Service, UDWR in regards to predation) to temporarily address predation in specific areas, as necessary.

For those threats that were analyzed in detail within the alternatives analysis, impacts are analyzed by the following indicators: habitat loss, habitat degradation, and disruption to the birds. While these indicators are discussed separately, the impacts on GRSG frequently overlap and are interconnected. Similarly, the implementation of various program decisions may have similar effects on GRSG, and those effects may be repeated in each section.

#### **4.3.2 Alternative A**

##### ***GRSG Habitat and Disturbance Thresholds***

Based on the assumptions mentioned at the beginning of this section, disturbances to GRSG habitats can impact GRSG, and those impacts can vary depending on the proximity to important GRSG seasonal habitats, type and quality of the habitat disturbed (e.g., good quality nesting habitat), type of disturbance (e.g., road, oil and gas wells, mining operation, wind turbines, and pipeline), associated indirect impacts (e.g., one-time human presence and noise disturbance or on-going maintenance and human presence), how the disturbance is distributed on the landscape (e.g., spread out or consolidated), other existing threats, and disturbance density. In general, any impacts that decrease nesting success and chick survival can impact population growth (Taylor et al. 2012). Relative to specific thresholds of disturbance, Kiriol (2012) found that GRSG began negatively responding to disturbances at approximately 4.5 percent disturbance and did not use habitats when surface disturbance exceeded 8 percent. Analyzing western GRSG populations and factors related to occupied versus extirpated leks, Knick and others (2013) found that almost all occupied leks (99 percent) in the western portion of the range had less than 3 percent disturbance within 3.1 miles of the lek. Similarly, range-wide lek trend analyses suggest that the aggregated human influences on the landscape are associated with negative GRSG lek count trends (Johnson et al. 2011) and population persistence (Aldridge et al. 2008, Wisdom et al. 2011).

Under Alternative A, there are no established threshold levels limiting the aggregated amount of disturbance in GRSG habitat. However, in some cases existing LUPs include stipulations meant to minimize impacts on GRSG (**Table 4.1**). These stipulations vary and may include limitations on surface occupancy near leks and impart timing limitations. In general, these stipulations were developed primarily to protect GRSG from fluid minerals development, though in some cases the stipulations may be applied to all surface-disturbing activities. Within the planning area, there are surface occupancy limitations ranging from within 0.25 mile of a lek buffer to all GRSG habitat. For example, BLM-administered lands in the Uintah Population Area have an NSO stipulation that creates a 0.25-mile lek buffer, while all occupied GRSG habitat on National Forest System lands in the Strawberry and Sheeprocks Population Areas are managed with an

**Table 4.1**  
**Surface Disturbance Restrictions for GRSG in Existing Land Use Plans**

<b>Land Use Plan</b>	<b>Proximity Restrictions</b>	<b>Timing Restrictions</b>
<b>Bureau of Land Management Land Use Plans</b>		
Grand Staircase-Escalante National Monument	None.	None.
Richfield	<ul style="list-style-type: none"> <li>• Within <b>0.5 mile</b> of leks, no surface disturbance. Oil and gas leasing open subject to major constraints.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>March 15 – July 15:</b> No surface disturbance or disruptive activities within 2 miles of leks.</li> <li>• <b>December 15 – March 14:</b> No surface-disturbing or disruptive activities in winter habitat.</li> </ul>
Vernal	<ul style="list-style-type: none"> <li>• Within <b>0.25 mile</b> of an active lek, no surface-disturbing activities.</li> <li>• Within <b>2 miles</b> of a lek, no permanent facilities will be allowed, when possible.</li> <li>• Within <b>0.5 mile</b> of known active leks, the best available technology will be used to reduce noise (e.g., installation of multi-cylinder pumps, hospital sound-reducing mufflers, and placement of exhaust systems).</li> </ul>	<ul style="list-style-type: none"> <li>• <b>March 1 – June 15:</b> No surface-disturbing activities within 2 miles of active GRSG leks allowed.</li> </ul>
Price	<ul style="list-style-type: none"> <li>• Within <b>0.5 mile</b> of a lek, there will be no surface disturbance. Oil and gas leasing open subject to major constraints. Subject to E<sup>1</sup>, M<sup>1</sup>, W<sup>1</sup></li> </ul>	<ul style="list-style-type: none"> <li>• <b>March 15 – July 15:</b> No surface disturbance or otherwise disruptive activities within 2 miles of leks (nesting). E<sup>1</sup>, M<sup>3</sup>, W<sup>2</sup></li> <li>• <b>December 15 – March 14:</b> No surface-disturbing or otherwise disruptive activities in winter habitat. E<sup>3</sup>, W<sup>2</sup></li> </ul>
Kanab	<ul style="list-style-type: none"> <li>• Within <b>0.5 miles</b> of a lek, no surface disturbance. Oil and gas leasing open subject to major constraints. E<sup>2</sup>, M<sup>2</sup>, W<sup>1</sup></li> </ul>	<ul style="list-style-type: none"> <li>• <b>March 15 – July 15:</b> No surface-disturbing or otherwise disruptive activities allowed within 2 miles of leks to protect nesting and brood-rearing habitat. Oil and gas leasing would be open subject to CSU and TL stipulations. E<sup>2</sup>, E<sup>4</sup>, M<sup>4</sup>, W<sup>1</sup></li> <li>• <b>December 1 – March 14:</b> No surface-disturbing or otherwise disruptive activities allowed in GRSG winter habitat. Oil and gas leasing would be open subject to CSU and TL stipulations. E<sup>5</sup>, E<sup>6</sup>, M<sup>4</sup>, W<sup>1</sup></li> </ul>
Pinyon		<ul style="list-style-type: none"> <li>• <b>March 1 – May 15:</b> No drilling or exploration on strutting grounds (720 acres).</li> </ul>

**Table 4.1**  
**Surface Disturbance Restrictions for GRSG in Existing Land Use Plans**

<b>Land Use Plan</b>	<b>Proximity Restrictions</b>	<b>Timing Restrictions</b>
Cedar Beaver Garfield Antimony	<ul style="list-style-type: none"> <li>• Within <b>200 yards</b> from a nests or roosting sites, no ground-disturbing activities would occur. [GRSG strutting grounds <b>March 15 – May 1</b> for Sigurd to Paragonah]</li> <li>• During critical periods, transmission line construction would cease in GRSG habitat along the transmission lines.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>March 15 – May 1:</b> No ground-disturbing activities (roads, railroads, towers, and ROWs for transmission line construction) within 200 yards of leks, nests, or roosting sites.</li> <li>• During critical periods, transmission construction would cease in GRSG habitat along transmission lines.</li> </ul>
Randolph	<ul style="list-style-type: none"> <li>• Within <b>2 miles</b> of a lek from <b>March 1 – June 15</b>, no exploration, drilling, and any other development activity allowed. There are no exceptions to this stipulation.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>April 1 – June 15:</b> No exploration, drilling, and other development activity allowed. E<sup>7</sup></li> <li>• <b>December 1 – February 28:</b> No exploration, drilling, and other development activity allowed in winter habitat. This limitation does not apply to maintenance and operation of producing wells. This limitation does not apply to maintenance and operation of producing wells. E<sup>7</sup></li> <li>• <b>March 1 – June 15:</b> No exploration, drilling, and other developmental activity will be allowed within 2 miles of a lek. This limitation does not apply to maintenance and operation of producing wells. There are no exceptions to this stipulation.</li> </ul>
Pony Express	<ul style="list-style-type: none"> <li>• Within <b>0.5 mile</b> of a lek, avoid placing ROWs if the disturbance would adversely impact the effectiveness of the lek.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>March 15 – June 15:</b> No seismic work, well development, new road construction, ROWs, organized recreational activities within 0.5 mile of leks and crucial nesting habitat. This does not limit maintenance activities. E<sup>8</sup></li> <li>• <b>December 1 – March 1:</b> No seismic work, well development, new road construction, ROWs, organized recreational activities in crucial wintering habitat areas. This does not limit maintenance activities. E<sup>8</sup></li> </ul>
Box Elder	<ul style="list-style-type: none"> <li>• Within <b>0.5 mile</b> of a lek, ROWs will, to the maximum extent possible, be avoided if the disturbance would adversely impact the effectiveness of the lek.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>March 15 – June 15:</b> No exploration, seismic work, drilling, well development, ROWs, new road construction, and other development activity within 0.5 mile of a lek. If activities may impact the effectiveness of the lek, a yearlong avoidance may apply. This limitation does</li> </ul>

**Table 4.1**  
**Surface Disturbance Restrictions for GRSG in Existing Land Use Plans**

Land Use Plan	Proximity Restrictions	Timing Restrictions
		not apply to maintenance and operation of producing wells. This stipulation does not pertain to maintenance activities. E <sup>8</sup>
House	None.	None.
Park City	None.	None.
IsoTracts	None.	None.
Forest Service Land Use Plans		
Dixie	<ul style="list-style-type: none"> <li>• Within <b>1 mile</b> of a leks (all habitats), and between <b>1 and 2 miles</b> of a lek within sagebrush habitat only, prohibit all surface-disturbing activities such as roads, well pads, and other facilities.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>May 1 – July 15:</b> No activities allowed. Outside these dates, surface disturbance for oil and gas operations is limited to no more than 1 percent of total habitat (1 percent=130 acres), including the areas of avoidance due to human activity (i.e., roads and well pads) with radius/buffer to be determined by the Dixie National Forest. Reclaimed oil and gas disturbance that has met reclamation requirements is not included in the disturbed / avoidance area calculation.</li> <li>• <b>March 1 – May 15:</b> Seismic activities, including blasting, would be limited during the lekking period</li> </ul>
Uinta	<ul style="list-style-type: none"> <li>• Within <b>2 miles</b> of a lek, do not locate energy transmission, mining, or other large structures and facilities that could be used as perch sites for raptors</li> <li>• Within <b>2 miles</b> of GRSG habitats (nesting, brood-rearing, and winter) in the Vernon and Strawberry Reservoir Management Areas, avoid building power lines and other tall structures that could become potential perch sites for raptors. Bury power lines or, if structures must be built or currently exist, modify the structures to prevent raptors from using the structures.</li> <li>• Within <b>4 miles</b> of a lek, no well sites or production facilities such as tank batteries and compressor stations may be constructed on these lands. Construction of roads, pipelines and other similar facilities must comply with direction in the 2003 Uinta National Forest LRMP,</li> </ul>	<ul style="list-style-type: none"> <li>• <b>March 1 – June 1</b> in the Vernon Management Area  <b>March 1 – June 15</b> in the Strawberry Reservoir and Currant Creek Management Areas: preclude activities that could cause increased stress, displacement, and or breeding failures during the critical time period.</li> <li>• <b>November 15 – March 1</b> in the Vernon Management Area  <b>November 1 – March 15</b> in the Strawberry Reservoir and Currant Creek Management Areas: Preclude activities that could cause increased stress, displacement, and or breeding failures during the critical time period.</li> <li>• <b>March 1 – June 1</b> in the Vernon Management Area  <b>March 1 – June 15</b> in the Strawberry Management Area: Adjust timing and location of management and public activities to minimize disturbance of breeding sites.</li> </ul>

**Table 4.1**  
**Surface Disturbance Restrictions for GRSG in Existing Land Use Plans**

<b>Land Use Plan</b>	<b>Proximity Restrictions</b>	<b>Timing Restrictions</b>
	<p>and involve consultation with the USFWS and coordination with the UDWR. M<sup>5</sup>, W<sup>3</sup></p> <ul style="list-style-type: none"> <li>• Within <b>3.1 miles</b> of known active leks use the best available technology such as installation of multi-cylinder pumps, hospital sound reducing mufflers, and placement of exhaust systems to reduce noise.</li> <li>• Within <b>4 miles</b> of an active lek in breeding or brood-rearing habitat, no permanent (i.e., lasting more than 1 year) structures or facilities. E<sup>9</sup>, M<sup>5</sup>, W<sup>3</sup></li> <li>• Within sight distance or <b>0.5 miles</b> of a lek, adjust timing and location of management and public activities to minimize disturbance of breeding sites.</li> <li>• Within <b>300 yards</b> of GRSG foraging areas along riparian zones, meadows, lakebeds, and farmland, avoid removing sagebrush unless such removal is necessary to achieve GRSG habitat management objectives.</li> </ul>	
Wasatch-Cache	None.	None.
Manti La Sal	<ul style="list-style-type: none"> <li>• NSO stipulations will be used as appropriate in leases, licenses, or permits on GRSG leks/nesting/brooding areas.</li> </ul>	None.
Fishlake	<ul style="list-style-type: none"> <li>• NSO within <b>4 miles</b> of GRSG leks delineated and mapped by the Forest Service. E<sup>10</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Within GRSG brood-rearing habitat delineated and mapped by UDWR, no activities would be allowed during the period from <b>May 1 – July 5</b>. E<sup>10</sup>, M<sup>5</sup>, W<sup>3</sup>.</li> <li>• No surface disturbance during the critical period from <b>December 1 – March 15</b> in GRSG winter habitat delineated and mapped by UDWR. E<sup>10</sup>, M<sup>5</sup>, W<sup>3</sup>.</li> </ul>
Ashley	None.	None.

**Notes:**

**E<sup>1</sup>** An exception may be granted by the BLM Authorized Officer if an environmental analysis demonstrates that the action would not impair the function or utility of the site for current or subsequent reproductive display, including daytime loafing/staging activities, and/or would not result in development of a permanent aboveground structure within 0.5 mile of a lek.

**E<sup>2</sup>** An exception may be granted by the Field Manager if the operator submits a plan that demonstrates that

**Table 4.1**  
**Surface Disturbance Restrictions for GRSG in Existing Land Use Plans**

Land Use Plan	Proximity Restrictions	Timing Restrictions
	impacts from the proposed action can be adequately mitigated.	
	<b>E<sup>3</sup></b> For the December 15 – March 14 TL, upon review and monitoring, the BLM Authorized Officer may grant exceptions because of climatic and/or habitat conditions if certain criteria are met and if activities would not cause undue stress to wintering GRSG.	
	<b>E<sup>4</sup></b> Exception: An exception could be granted if surveys determine that the lek in nesting and brood-rearing habitat is not occupied.	
	<b>E<sup>5</sup></b> Exception: An exception could be granted if surveys determine that the winter habitat is not occupied, and that snow depths in the area allow continued GRSG use.	
	<b>E<sup>6</sup></b> Exception: An exception may also be granted by the Field Manager if the operator submits a plan that demonstrates that impacts from the proposed action can be avoided, sufficiently minimized, or adequately mitigated.	
	<b>E<sup>7</sup></b> Exceptions may be specifically approved in writing by the BLM Authorized Officer.	
	<b>E<sup>8</sup></b> Exceptions may be granted by the BLM if the proposed activity will not seriously disturb wildlife habitat values being protected. This determination will be made by a BLM wildlife biologist in coordination with the UDWR and, if appropriate, the USFWS. Such a determination may result if the GRSG complex has remained inactive over a period of years and it is determined by the BLM and UDWR that the population no longer used the complex and no longer requires protection from disturbing activities for fluid mineral leasing and exploration.	
	<b>E<sup>9</sup></b> An exception may be granted if the BLM Authorized Officer, in consultation with the USFWS and coordination with the UDWR, determines through analysis that the nature of the actions, as proposed or conditioned, could be fully mitigated. This might occur if topography and/or vegetation are present that would effectively screen the structure or facility from the breeding habitat.	
	<b>E<sup>10</sup></b> An exception may be granted if the Forest Supervisor in coordination with UDWR determines through analysis that the nature of the actions as proposed or conditioned could be fully mitigated.	
	<b>M<sup>1</sup></b> Modification: The BLM Authorized Officer may modify the area managed with NSO stipulations in extent if an environmental analysis finds that a portion of the area managed with NSO stipulations is nonessential to site utility or function, or if further analysis shows that the size or location of the lek has changed, or that the proposed action could be conditioned to not impair the function or utility of the site for current or subsequent reproductive display including daytime loafing/staging activities.	
	<b>M<sup>2</sup></b> Modification: The Field Manager may modify the boundaries of the stipulation area if (1) portions of the area do not include lek sites, (2) the lek site(s) have been completely abandoned or destroyed, or (3) occupied lek site(s) occur outside the current defined area, as determined by the BLM.	
	<b>M<sup>3</sup></b> Modification: Season may be adjusted depending on climatic and habitat conditions. Disturbance could occur if the activity were proposed to occur within the buffer, but would occur in non-sagebrush habitat, i.e., the activity could be allowed if it was not in GRSG habitat and did not in some other way disturb nesting or brood-rearing activity.	
	<b>M<sup>4</sup></b> Modification: The Field Manager may modify the boundaries of the stipulation area if portions of the area do not include habitat or are outside the current defined area, as determined by the BLM.	
	<b>M<sup>5</sup></b> Modification: A modification may be granted if the authorizing official determines, through consultation with the USFWS and coordination with the UDWR, that new habitat studies demonstrate a portion of the lease area affected by this stipulation no longer contains brood-rearing or winter habitat.	
	<b>W<sup>1</sup></b> A waiver may be granted if there are no active lek sites and it is determined the sites have been completely abandoned or destroyed or occur outside the initial identified area, as determined by the BLM.	
	<b>W<sup>2</sup></b> This stipulation may be waived if, in cooperation with UDWR, it is determined that the site has been permanently abandoned or unoccupied for a minimum of 5 years.	
	<b>W<sup>3</sup></b> A waiver may be granted if the authorizing official determines through consultation with the USFWS and coordination with the UDWR, that new habitat studies demonstrate the entire lease area affected by this stipulation no longer contains brood-rearing or winter habitat.	

NSO stipulation. Despite the existence of NSO and TL stipulations, current lek buffers (including those that preclude disturbance 0.25 to 0.5 mile from a lek) included in most LUPs are insufficient to adequately maintain persisting GRSG populations (Walker et al. 2007a; Taylor et al. 2012). In addition, disturbances would be allowed in GRSG habitats outside of those lek buffers. Therefore, under this alternative, disturbance would likely continue and, as discussed above, may surpass GRSG tolerance levels of disturbance. As a result, there would be increased direct and functional habitat loss, habitat degradation, and disturbance to GRSG. By combining these unlimited disturbance levels in GRSG habitat with other threats on the landscape, there would be a decreased likelihood that GRSG populations would be maintained and an increased likelihood that GRSG populations would decline.

### **Minerals**

Surface and underground mining for mineral resources (e.g., coal, uranium, copper, phosphate, and aggregate) can result in GRSG habitat loss caused by construction of infrastructure, surface or underground mines, and other associated facilities. However, not all of these impacts would occur in every situation, especially where potential adverse impacts are avoided, minimized, and/or mitigated. Sagebrush communities that are lost or modified may not regain vegetation character suitable for GRSG use for 20 to 30 years or longer following interim or final reclamation.

Surface disturbance from aboveground infrastructure related to underground mining (e.g., coal, uranium, copper, and phosphate) results in direct loss of habitat if it occurs in GRSG habitat. In contrast, surface mining has a greater impact than underground activity due to the amount of direct habitat loss. Direct habitat loss from mining can occur from removing vegetation and soil to access mineral resources and storage of overburden (soil removed from mining activities or the formation of mine shafts) in undisturbed habitat. In addition, construction of ancillary facilities (e.g., air vents, fans, and shafts), staging areas, roads, railroad tracks, and structures such as buildings and power lines can result in direct habitat loss. In addition to direct habitat loss, indirect impacts associated with mining can result in indirect impacts on GRSG. For example, an increase in human presence can expose GRSG to pathogens introduced from septic systems and waste disposal (Moore and Mills 1977). GRSG could also be indirectly impacted by increased dust from heavy equipment use on unpaved roads, which could decrease adjacent plant community photosynthesis and insect populations.

The interaction and intensity of effects from habitat loss could cumulatively or individually lead to habitat fragmentation in the long term (Connelly et al. 2004; Holloran 2005). Several studies have documented negative effects of fragmentation as a result of oil and gas development and its associated infrastructure on lek persistence, lek attendance, winter habitat use, recruitment, decreased chick survival, yearling annual survival rate, and female nest site choice (Holloran 2005; Aldridge and Boyce 2007; Walker et al. 2007a; Doherty et al. 2008). The presence of visible energy wells has been associated with increased risk to chick survival (Aldridge and Boyce 2007). Impacts on male lek attendance have been noted as far as 12 miles from leks (Taylor et al. 2012). In lieu of GRSG research evaluating the impacts of mineral developments, the BLM and Forest Service anticipate that mineral developments that include infrastructure similar to that of oil and gas development (e.g., roads, high levels of sound, and clearing soils) would have similar impacts on GRSG. Infrastructure requirements vary between different mineral developments.

Impacts from various types of infrastructure listed above are discussed in further detail in the infrastructure section of the GRSG analysis.

In addition, human alterations, uses, and impacts, coupled with natural variability (e.g., drought), have changed the extent, condition, and distribution of sagebrush-steppe and the ecosystem services these biomes provide (Meinke et al. 2009). Underground mining could cause subsidence, which could alter surface water availability for vegetation communities (Guither 1986), particularly shallow-rooted understory species that are important components of important nesting or brood-rearing habitat for GRSG. Though possible, past experience with underground mining on the Manti-La Sal National Forest indicates that impacts on vegetation from subsidence in the planning area are very rare. Furthermore, disrupted disturbance regimes, degraded or depressed native species, and dominance by introduced, noxious, and/or nonnative plants have moved many of these systems towards, or beyond, critical thresholds from which restoration is difficult or excessively time-consuming and expensive (Meinke et al. 2009).

Overburden and waste rock from surface mining could cause water contamination from leaching of waste rock and overburden and nutrients from blasting chemicals and fertilizer (Moore and Mills 1977). However, current state and federal regulations required controlling runoff from disturbed sites. Water regime alteration could lead to decreased surface water and eventual habitat degradation if wildlife or livestock concentrate at remaining sources. On the contrary, it is also possible to increase available surface water by releasing formation water during mining. GRSG do not require water other than what they obtain from plant resources (Schroeder et al. 1999); therefore, local water quality deterioration or dewatering is not expected to have substantial impact. However, if the dewatering results in degradation of riparian areas, this could decrease herbaceous understory and associated insects, resulting in a loss of brood habitat.

Industrial activity associated with energy and mineral development could result in noise and human activity that disrupts GRSG habitat and its life cycle. All studies that assessed impacts of energy development on GRSG found negative effects; no studies reported a positive influence of development on populations or habitats (Naugle et al. 2011).

Blasting, a practice used to remove overburden or the target mineral, produces noise and ground shock. The full effect of ground shock on wildlife is unknown. Repeated use of explosives during lekking activity could result in lek or nest abandonment (Moore and Mills 1977). Noise from mining activity could mask vocalizations, resulting in reduced female attendance and yearling recruitment as seen in sharp-tailed grouse (*Pedioecetes phasianellus*; Amstrup and Phillips 1977). In this study, the authors found that the mining noise in the study area was continuous across days and seasons.

The mechanism of how noise affects GRSG is 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 be a factor in habitat selection and a decrease in lek attendance by GRSG (Holloran 2005; Blickley et al. 2012a). Holloran's (2005) research in energy development areas observed that leks downwind from drilling rigs declined more than leks upwind, supporting evidence that increased noise intensity may negatively influence male lek attendance. More recently, in central Wyoming, Blickley and others (2012a) used recorded energy development-related sounds (drill rigs and haul trucks) to evaluate the response of

GRSG. The noise treatments were continuous (drilling) and intermittent (road) noise calibrated to mimic noise levels similar to levels measured at 0.25 mile from a noise source (70 decibels [unweighted] or 56 decibels [weighted]). Males on leks decreased immediately, and response was sustained. There was a larger response (73 percent decline) with the intermittent road noise treatments compared to the constant drilling noise treatments (29 percent decline). In addition, to evaluate stress levels of males that remained on the leks, Blickley and others (2012b) measured immunoreactive corticosterone metabolite levels in fecal samples from males on noise-treated and untreated leks and found that noise-treated leks had 16.7 percent higher immunoreactive corticosterone metabolite levels than untreated leks. Specific impacts of elevated immunoreactive corticosterone metabolite levels on GRSG are unknown, though corticosterone levels are associated with increased physiological stress (Wasser et al. 2000; Wingfield 2005; Bonier et al. 2009). Industrial noise may also mask lekking sounds used in GRSG mating displays (Blickley and Patricelli 2012). This may interfere with female attendance, and increase the likelihood that younger males will not be drawn to the lek and that eventually leks will become inactive (Amstrup and Phillips 1977; Braun 1986). There is also the concern that the quieter communications between hens and chicks are more prone to masking than male vocalization, thereby potentially increasing predation risk to hens and chicks in noisy areas (Blickley and Patricelli 2012). Based on calculating how far noise will diminish to 30 decibels, Patricelli and others (2013) recommend roads or traffic be avoided within 0.8 to 1 mile from the edge of seasonally sensitive areas. The impacts of noise to GRSG still requires more research to determine what role noise may play in affecting habitat use, vital rates, and overall persistence.

A few scientific studies examine the effects of coal mining on GRSG. In a study in North Park, Colorado, overall GRSG population numbers were not reduced, but there was a reduction in the number of males attending leks within 0.8 mile of 3 coal mines, and existing leks failed to recruit yearling males (Braun 1986; Remington and Braun 1991). New leks formed farther from mining disturbance (Remington and Braun 1991). Additionally, some leks that were abandoned adjacent to mine areas were reestablished when mining activities ceased, suggesting disturbance rather than habitat loss was the limiting factor (Remington and Braun 1991). Hen survival did not decline in a population of GRSG near large surface coal mines in northeast Wyoming, and nest success appeared not to be affected by adjacent mining activity (Brown and Clayton 2004). However, the authors concluded that continued mining would result in fragmentation and eventually impact GRSG persistence if adequate reclamation was not employed (Brown and Clayton 2004).

There are negative short-term impacts on GRSG numbers and habitats from surface mining and activities associated with mining (Braun 1998). GRSG have reestablished on mined areas once mining has ceased, but there is no evidence that population levels will reach their previous levels. Population reestablishment could take 20 to 30 years based on observations of disturbance in oil and gas fields (Braun 1998).

Many of the lands that include GRSG habitat are presently poor-quality habitat due to past disturbance. Strip mining and some underground mining would allow for some or the entire surface to be reclaimed. In the long term, reclaimed lands could create new habitat for GRSG and other species to occupy. In addition, mining on federal lands, where stipulations can control how the lands will be reclaimed in order to benefit GRSG, could be more advantageous than

closures on federal lands, which could encourage operations to move to private lands where controls cannot be applied.

#### *Nonenergy Leasables*

Under Alternative A, there are 3,870,080 acres open for leasing and 138,500 acres closed to nonenergy leasing. Stipulations associated with development are not consistent across the decision area (see **Appendix I**, Detailed No Action Alternative). Recent RMPs may apply stipulations identified for fluid minerals to new nonenergy leases. Site-specific analysis would be completed for each project; however, there is no standard protection for GRSG across the sub-regional plans. Therefore, impacts as described above, including habitat loss, degradation, and direct and indirect disturbance to GRSG, would most likely continue to occur. These impacts would likely decrease population growth and decrease the likelihood of population persistence. Deposits of gilsonite and phosphate are in the Uinta-Wasatch-Cache and Ashley National Forests portions and the southcentral portion of the Wyoming-Uinta Population Area, and north into the southern portions of the Rich Population Area. Impacts would likely be concentrated in the Wyoming-Uinta Population Area, where potential is the highest for both minerals and associated development.

#### *Solid Minerals - Coal*

Under Alternative A, 22,900 acres of federal mineral estate with coal occurrence in the decision area (1 percent of the federal mineral estate decision area) would remain unacceptable for coal leasing consideration. Although no RMP decision has specified that these areas are unacceptable, they are required to be managed as such by the BLM Manual 6330, Management of Wilderness Study Areas, and the presidential proclamation establishing the Grand Staircase Escalante National Monument (Proclamation No. 6920).

All other acres in the decision area (3,982,800 acres, or 99 percent of the decision area) are acceptable for further leasing consideration. However, 271,300 acres (7 percent) of federal mineral estate beneath National Forest System lands in the decision area are unsuitable for surface mining with the exception of surface operations incident to underground mines. For BLM-administered lands that are acceptable to leasing, upon receipt of a coal lease application in GRSG habitat, the BLM will review criterion 15 set forth in 43 CFR 3461.5 to determine if the specific area being proposed for lease is suitable for all or certain stipulated methods of coal mining. Within the decision area, there are no standardized stipulations for coal mining specifically intended to protect GRSG. LUP stipulations that apply to all surface-disturbing activities would be applied to new coal leases. While efforts to minimize impacts on GRSG could be considered on a project-by-project basis, implementation of such measures is not required. Examples of minimization efforts could include special conditions, conservation measures, and pre-project mitigation requirements that include habitat suitability success criteria (e.g., GRSG occupancy).

A majority of the acres within the Emery and Carbon Population Areas have high or moderate development potential for coal. All mining in these population areas is accomplished using underground mining methods.

Underground coal development, including construction of ancillary infrastructure, could occur near leks, in nesting and early brood-rearing habitats. This could decrease overall nest success

and chick survival and decrease the likelihood for population growth and persistence. Construction of aboveground ancillary facilities associated with underground coal mines would have the greatest impact in areas where there are small GRSG populations. For example, the Emery GRSG populations are in a small area and use the same habitats for breeding, nesting, early and late brood rearing, and wintering. Therefore, any impacts that appreciably increase hen mortality or decrease nesting success, chick survival, or habitat availability would decrease the likelihood of persistence for these populations. It is important to note that current underground coal mining occurs in the Wildcat Knoll portion of the Emery Population Area. Development has occurred in this area (without appurtenant facilities in GRSG habitat), and mitigation and habitat treatments have been implemented. To date, existing GRSG populations in the Wildcat Knoll area are stable and increasing.

Exploration for coal on BLM-administered lands and nonfederal lands with federal mineral interests in the Carbon and Emery Population Areas includes a series of drill holes using helicopter access or from a truck-mounted drill. On-lease exploration must abide by the seasonal restrictions outlined in the Price RMP. Nearly all coal exploration drilling in the Manti-La Sal National Forest (Emery Population Area) is accomplished using helicopter portable rigs and must comply with standard drilling stipulations. The overall impact on GRSG habitat is usually minimal from these operations because they are temporary in nature, drilling occurs outside important seasons, and the amount of disturbance is negligible.

Portions of the Panguitch and Parker Population Areas also have high or moderate development potential. To date, no leasing of federal coal has occurred in these population areas; however, there is an existing surface-mining operation in the extreme southern extent of the Panguitch Population Area on private lands in the Alton area. The BLM is currently evaluating leasing federal coal adjacent to the existing mining operations through a NEPA process.

Future development in the Panguitch Population Area could include both surface and underground mining activities. The impacts would depend on which type of mining occurs in the area. Refer to the general discussion above for impacts from underground and surface mining to GRSG. Overall, underground mining would impact GRSG less than surface mining. Proposed development of federal minerals could result in loss of nesting, brood rearing, and winter habitat. Development of the coal mine, removal of the overburden, and surface-mining operations would result in the long-term loss of habitat and displacement of individual birds. Although mitigation and reclamation could reduce the impacts, development of the coal mine could result in loss of the local population and retraction of the southern extent of GRSG habitat.

#### *Locatables*

Under Alternative A, 498,200 acres (12 percent) of federal mineral estate in the decision area would remain withdrawn from location under the Mining Law of 1872, as amended, and an additional 560 acres (less than 1 percent) would continue to be petitioned for withdrawal. These minerals can be extracted at three levels that could cause different impacts on GRSG. Casual use as defined in 43 CFR 3809.5 and similarly for National Forest System lands in 36 CFR 22834(a)(1) is one level of disturbance that could occur in the areas that are not withdrawn from mineral entry. While there are no GRSG stipulations associated with casual use mineral

extraction, the operators remain responsible to prevent undue and unnecessary degradation and ensure full reclamation of any disturbance created while engaging in casual use activities, as required by 43 CFR 3809.5. Casual use, which does not involve use of mechanized equipment, typically results in limited to no surface disturbance. Impacts associated with casual use would be a short-term, temporary disruption of birds.

A notice is required for exploration activity greater than casual use that will cause surface disturbance of 5 acres or less on BLM-administered lands and on nonfederal lands with federal mineral interest. On National Forest System lands, an NOI is required from any person proposing to conduct operations that might cause significant disturbance of surface resources (36 CFR 228.4(a)). For activities under BLM jurisdiction, the content of the notice will determine whether the operation qualifies as a notice-level operation and will not cause undue and unnecessary degradation (43 CFR 3809.21). Activities qualifying under a notice could cause more direct habitat loss, and possibly fragment and degrade GRSG habitat. For activities under Forest Service jurisdiction, the content of the NOI will determine whether the operation is causing or will likely cause significant disturbance of surface resources, which would require a plan of operations (36 CFR 228.4(a)(4)). Disturbance and disruption associated with exploration activities are typically intermittent, short term, and limited in extent.

When mining development requires a plan of operations, by meeting the criteria under 43 CFR 3809.11 and 43 CFR 3809.21 or 36 CFR 228.4(a)(4) or because total unreclaimed disturbance will exceed 5 acres (43 CFR 3809.21), impacts on GRSG would be greater than under notice level operations or an NOI since the area being affected could increase. The impacts on GRSG would depend on the size and location of the operation (e.g., seasonally sensitive habitats). These operations may use certain equipment (e.g., mechanized earth-moving equipment, truck-mounted drilling equipment, and motorized vehicles in areas closed to OHV use) that may contribute to increased habitat fragmentation by causing habitat loss, degradation, or direct disturbances to the GRSG. Operations that use chemicals in the recovery or processing of minerals (e.g., cyanide leaching, explosives, and mercury) could cause impacts on GRSG and their habitat similar to those described in the general impacts section, above. All of these actions would lead to the functional loss of habitat in the area. Locatable mining in GRSG habitat is not identified as a primary threat within the decision area. While there are mining claims in GRSG habitat, actual locatable mining in GRSG habitat is minimal. Therefore, anticipated locatable mining impacts on GRSG population growth and GRSG population persistence are expected to be low.

#### *Mineral Materials*

Under Alternative A, 3,935,080 acres of GRSG habitat would be open to mineral materials development and 73,500 acres would be closed. While development of mineral materials would occur throughout the decision area, the scale of development is relatively small and is often close to human development or some type of existing infrastructure. Use of these areas is usually small in scale, localized, and not continuous. Commercial mineral material sites could cause a higher amount and intensity of impact on GRSG habitat due to a potential for larger areas of development and continuous operation of the sites. There are 8 sales contracts in GRSG habitat in the planning area, and the average permit size for these areas is 82 acres. It is important to note that the amount of surface disturbance in an area is not the same as the size

of the permit. If development occurs near leks or in nesting, brood-rearing, or wintering habitat, it could decrease nest success, chick survival, and adult survival. Due to the scale and recent mineral material development trends in GRSG habitat, anticipated impacts on GRSG population growth and GRSG population persistence are expected to be low.

*Fluid Minerals (Including Geothermal)*

Under Alternative A, 1,333,300 acres of GRSG habitat would be open to fluid mineral leasing with standard stipulations, 1,300,400 acres would be open with moderate constraints, 483,500 acres would be open with major constraints, and 138,500 acres would be closed to fluid mineral leasing. Impacts from oil and gas activities would likely be greatest in areas open with standard stipulations, lower in areas with moderate constraints, and negligible in areas where there are major constraints or areas closed to fluid mineral leasing.

Some NSO stipulations would be applied to leases to protect GRSG leks, but buffers vary across the planning area from 0.25 mile to all GRSG occupied habitat. In general, recently completed plans include a larger protective buffer. Even in areas identified to be managed with NSO stipulations for GRSG, there may be valid existing rights that pre-date the LUP decision that established the NSO stipulation area. These previously leased parcels may have few or no stipulations to protect GRSG. In these areas, COAs would likely be applied to proposed developments to protect BLM and Forest Service sensitive species (including GRSG), but these would not be consistently applied throughout the decision area because currently there is no agreed-upon list of COAs. In addition to surface use restrictions, most LUPs have seasonal restrictions to protect GRSG. This includes TL stipulations to protect nesting, brood-rearing, and wintering habitat. Not all plans include a stipulation for winter habitat, and the plans are not consistent across the decision area.

Research indicates that stipulations commonly applied by the BLM and Forest Service to oil and gas leases and permits do not adequately address the scope of negative influences of development on GRSG (Holloran 2005; Walker et al. 2007a). Continued exploration and development of traditional and nonconventional fossil fuel sources in the eastern portion of the GRSG range is predicted to continue to increase over the next 20 years (US Energy Information Administration 2013a). GRSG populations are negatively affected by energy development activities, even when mitigation measures are implemented (Holloran 2005; Walker et al. 2007a, Kirol et al. 2015). Present threats to GRSG are contributing to the destruction and modification of GRSG habitat.

In addition to stipulations specifically intended to protect GRSG, in some cases, CSU, TL, and NSO stipulations developed for protection of other resources could indirectly provide protection for GRSG. For example, stipulations designed to protect crucial mule deer winter habitat could provide protection for GRSG winter habitat, to the extent that these areas overlap. However, if waivers, exceptions, or modifications are granted, any incidental protection that would have been afforded by NSO, CSU, and TL stipulations intended to protect other resource values could be removed. In addition, while stipulations intended to protect other resources may provide indirect protection from disturbance during certain seasons, they would not prevent loss of habitat from activities that are allowed during other seasons.

In other cases, CSU, TL, and NSO stipulations developed for protection of other resources outside GRSG habitats could result in development shifting into GRSG habitat where there may currently be fewer restrictions, resulting in increased potential for habitat loss, degradation, and disturbance to birds.

There is a high potential for energy development to impact sagebrush-obligate species (Holloran 2005; Sawyer et al. 2006; Walker et al. 2007a) because the five geologic basins that contain most of the onshore oil and gas reserves in the Intermountain West overlap with the sagebrush ecosystem (Connelly et al. 2004). Impacts can result from direct habitat loss; fragmentation of important habitats by roads, pipelines, and power lines; noise; and direct human disturbance (Holloran 2005; Kaiser 2006; Holloran et al. 2007). GRSG population declines can often be attributed to the negative effects of energy development that is additive to the impacts from other human development and activities (Harju et al. 2010; Naugle et al. 2011). Population declines associated with energy development result from the abandonment of leks, decreased attendance at leks that persist, lower nest initiation, decreased nest success, decreased chick survival and yearling survival, and avoidance of energy infrastructure in important wintering habitat areas (Braun et al. 2002; Holloran 2005; Kaiser 2006; Aldridge and Boyce 2007; Walker et al. 2007a; Doherty et al. 2008; Harju et al. 2010; Holloran et al. 2010; Gregory and Beck 2014).

Avoidance of energy development reduces the distribution of GRSG and may result in population declines through avoidance of suitable habitat or disruption of breeding activities (Braun et al. 2002; Aldridge and Brigham 2003; Doherty et al. 2008). Visible energy wells have been found to be associated with increased risk to chick survival (Aldridge and Boyce 2007). In the Greater Green River Basin area, yearling male GRSG reared near gas field infrastructure had lower survival rates and were less likely to establish breeding territories than males with less exposure to energy development; yearling female GRSG avoided nesting within 0.6 mile of natural gas infrastructure (Holloran et al. 2010). The fidelity of GRSG to natal sites may result in birds staying in areas with development, but they do not breed (Lyon and Anderson 2003; Walker et al. 2007a; Holloran et al. 2010). The amount of direct GRSG habitat loss is determined by well densities and ancillary facilities but should also consider other ancillary infrastructure, including flow lines, other roads, compressor stations, pumping stations, and electrical facilities necessary to develop a field. The types of wells and associated facilities can vary depending upon the individual field. Facilities include pump jacks, separators, storage tanks, electrical lines, produced water ponds/pits, or water discharge pipelines (Connelly et al. 2004).

Direct habitat loss from fluid minerals development would occur because of vegetation clearing (well pads, access roads, and ancillary facilities). Loss or modification of sagebrush communities would result in loss of GRSG habitat for approximately 20 to 30 years. In some cases, sagebrush areas may not be restored to the point where they are capable of supporting GRSG during the life of the plan amendment.

Habitat fragmentation could occur because of energy development. Fragmentation is the result of habitat loss or alteration that breaks GRSG habitat into smaller patches. While there is limited information on minimum habitat patch size for GRSG, they generally rely on large, contiguous, or interconnected expanses of sagebrush to accommodate local migrations and

access seasonal habitats distributed within their inhabited range (Connelly et al. 2004). Due to this, fragmentation of sagebrush habitats has been cited as a primary cause of the decline of GRSG populations (Patterson 1952; Connelly and Braun 1997; Johnson and Braun 1999; Connelly et al. 2000; Miller and Eddleman 2000; Aldridge and Brigham 2003; Beck et al. 2003; Connelly et al. 2004; Schroeder et al. 2004; Leu and Hanser 2011). Several studies have documented negative effects of fragmentation as a result of oil and gas development and its associated infrastructure on lek persistence, lek attendance, winter habitat use, recruitment, chick survival, yearling annual survival rate, and female nest site choice (Holloran 2005; Aldridge and Boyce 2007; Walker et al. 2007a; Doherty et al. 2008). Human alterations, uses, and impacts, coupled with natural variability (e.g., drought), have changed the extent, condition, and distribution of sagebrush-steppe and the ecosystem services these biomes provide (Meinke et al. 2009); current GRSG range is estimated to be 65 percent of historic (prior to Euroamerican contact) distribution (Stiver et al. 2006). Disrupted disturbance regimes, degraded or depressed native species, and dominance by introduced noxious plants have moved many of these systems towards, or beyond, critical thresholds from which restoration is difficult or excessively time-consuming and expensive (Meinke et al. 2009). Analyses conducted by Wisdom et al. (2011) demonstrate that fragmentation due to disturbance results in reduced population numbers and population isolation. There are no management decisions under Alternative A specifically designed to protect GRSG habitat from fragmentation.

Population trends in the Powder River Basin indicated that from 2001 to 2005, lek count indices inside gas fields declined by 82 percent, whereas indices outside development declined by 12 percent. By 2004 and 2005, 38 percent of leks inside gas fields remained active, whereas 84 percent of leks outside of development remained active (Walker et al. 2007a). Studies that assessed impacts of energy development on GRSG found negative effects, whereas no studies reported a positive influence of development on populations or habitats (Naugle et al. 2011). Studies consistently reported that breeding populations of GRSG were negatively impacted at conventional well pad densities of 4 and 8 well pads per square mile, with declines in lek attendance by male GRSG ranging from 13 to 79 percent (Harju et al. 2010; Naugle et al. 2011). Lek attendance declines have consistently been reported when well pad densities exceed 1 pad per square mile within approximately 2 miles of a lek (Tack 2009 as cited by Naugle et al. 2011). Well pad densities exceeding approximately 0.4 pad per section within 11 miles of leks negatively influenced lek trends range-wide (Johnson et al. 2011), and larger leks (greater than 25 males) did not occur in areas where well pad densities exceeded 2.5 pads per section within 7.6 miles of a lek (Tack 2009). A recent study reported that the probability of lek persistence (e.g., leks remaining active) approached 0 percent when well pad densities exceeded approximately 6.5 pads per section (Hess 2012 as cited by Manier et al. 2013). Gregory and Beck (2014) recently evaluated various effects of development out to various distances from leks, and their findings suggest that 1 well pad within 1.2 miles leads to immediate lek attendance declines. In addition, they suggest a time-lag effect when industrial development occurs within 6.2 miles of a lek. Stipulations often restricted surface occupancy within 0.25 mile of a lek during the time of most studies, and leks that had one or more pads within this radius had 35 to 92 percent fewer attending males than did leks with no wells within this distance (Harju et al. 2010; Naugle et al. 2011). In general, the research suggests that GRSG are negatively affected when well pad densities within approximately 2 miles of a lek exceed 1 well pad per section and when leks become surrounded by infrastructure. Energy development as far as 4 miles of a lek may

negatively influence lek attendance (Naugle et al. 2011). At this time, well pad densities in many developed areas in the Uintah Population Area exceed 6.5 pads per section, suggesting that there is most likely a substantial impact on any leks in the area. Since well pad densities in some areas surpass the rate of disturbance at which research suggests there is an impact on GRSG, it is reasonable to assume that GRSG within developed areas are being negatively impacted to some degree. In addition, there are varying buffers maintained through NSO stipulations in these areas. More focused studies are needed in Utah and within those population areas to further understand all of those impacts and to what degree the individual populations are being affected.

Impacts on leks from energy development were most severe near the lek, remained discernible out to distances greater than 3.7 miles, and have resulted in the extirpation of leks within gas fields (Holloran 2005; Walker et al. 2007a). Curvilinear relationships in Holloran (2005) showed that lek counts decreased with distance to the nearest active drilling rig, producing well, or main haul road, and that development influenced the counts of displaying males to a distance of between 2.9 and 3.85 miles (Figure 5). All well-supported models in Walker et al. (2007a) indicated a strong negative effect of energy development, estimated as proportion of development within either 0.25 mile or 2 miles, on lek persistence. Models with development at 4 miles had considerably less support indicating that negative impacts were still apparent out to 3.85 miles. Based on Walker and others (2007a), a 0.25-mile buffer around leks is insufficient to conserve breeding GRSG populations. Furthermore, full-field development of 98 percent of the landscape within 2 miles of leks in a typical landscape in the Powder River Basin reduced the average probability of lek persistence from 87 percent to 5 percent (Walker et al. 2007a). Management under Alternative A only limits activities outside 0.25-mile to 3.1-mile lek buffers with NSO stipulations within the GRSG habitat. Habitat outside of the buffers is still open to development outside of seasonal time periods. According to the Wyoming research, where prevalent energy development overlaps with GRSG population areas, impacts could be substantial. Further studies within Utah are needed to confirm if already fragmented populations respond similarly to Wyoming populations. In the meantime, the best available science on oil and gas development impacts on GRSG is from Wyoming.

Impacts from roads may include direct habitat loss, direct mortality, barriers to migration corridors (depending on size of road and season of use) or seasonal habitats, facilitation of predators and spread of invasive vegetation species, and other indirect influences such as noise (Forman and Alexander 1998, Blickley et al. 2012a). For a detailed description of impacts on GRSG from these impacts, except noise (discussed above), refer to the infrastructure section.

General impacts from roads document that GRSG avoided nesting and summering near major roads (e.g., paved secondary highways) in southcentral Wyoming (LeBeau 2012), and traffic disturbance (1 to 12 vehicles per day) within 1.9 miles of leks during the breeding season reduced nest-initiation rates and increased distances moved from leks during nest site selection of female GRSG in southwestern Wyoming (Lyon and Anderson 2003). Roads may be the primary impact of oil and gas development on GRSG due to their persistence and continued use even after drilling and production have ceased (Lyon and Anderson 2003). Daily vehicular traffic along road networks for oil wells can impact GRSG breeding activities based on lek abandonment patterns (Braun et al. 2002). A recent summary of studies investigating GRSG response to natural gas development reported impacts on leks from energy development were

most severe when infrastructure occurred near leks and that impacts remained discernible out to distances of 3.8 to 4 miles (Naugle et al. 2011). In summary, research suggests that roads within 4.7 miles of leks negatively influence male lek attendance (Connelly et al. 2004). This suggests that the current NSO stipulation areas (except the Uinta-Wasatch-Cache National Forest) would not be adequate to maintain persistent GRSG populations.

Declines in GRSG population growth (21 percent) between pre- and post-development was primarily attributed to decreased nest success and adult female annual survival; treatment effect (proximity to gas field infrastructure) was especially noticeable on annual survival of nesting adult females (Holloran 2005; Taylor et al. 2013). Annual survival of individuals reared near gas field infrastructure (yearling females and males) was significantly lower than control individuals that were not reared near infrastructure (Holloran et al. 2010). Yearling female GRSG avoided nesting within 0.6 mile of the infrastructure of natural gas fields (Holloran et al. 2010), and visible wells within a 247-acre area negatively influenced female selection of nesting habitats (Kirol 2012). Female early brood-rearing (early June to early July) locations were negatively correlated with the number of visible wells within a 247-acre area, and late brood-rearing females (early July through late August) avoided habitats when a surface disturbance (e.g., well pads and improved roads) threshold of approximately 5 percent of a 1,200-acre area was surpassed (Kirol 2012). In general, females selecting habitats near infrastructure have demonstrated lower annual survival (resulting in population-level declines in response to development), and females influenced by development activity within 1.8 miles of the lek are less likely to initiate a nest (Manier et al. 2013). Studies in southwest Wyoming showed that early in the development process, nest sites were farther from disturbed leks than from undisturbed leks, that nest-initiation rate for females from disturbed leks was 24 percent lower than for GRSG breeding on undisturbed leks, and that 26 percent fewer females from disturbed leks initiated nests in consecutive years (Lyon and Anderson 2003). Similarly, in northeast Wyoming, Kirol and others (2015) evaluated the effectiveness of implementing various mitigation practices in natural gas development areas based on GRSG nest success. Mitigation activities included piping water rather than having on-site reservoirs, reducing vehicle traffic volume, minimizing sagebrush removal, reducing well pad construction, and buffering industrial noise. As a result, analyses suggested that mitigation activities did increase the nest success compared to nest success in unmitigated areas but was not as high as nest success in undeveloped areas. The analysis suggests that the presence of water reservoirs has the largest impact on nesting success in this area. While there is a TL stipulation specifically for GRSG that applies to disturbance during the nesting season, management under Alternative A does not protect nesting habitat year-round from any disturbance. The stipulation protecting the lek does incidentally provide some protection but not to the extent to prevent negative impacts, including direct habitat loss and degradation. Since disturbance has been and would continue to be allowed within 1.8 miles in almost all current plans, decreased likelihood of nesting may decrease the likelihood of population persistence as localized development increases to levels described above in various GRSG nesting and brood-rearing habitats.

In Wyoming, GRSG were 1.3 times more likely to use winter habitat if development was not present (Doherty et al. 2008). Under Alternative A, current plans vary from no protection for GRSG winter habitat to TL stipulations during GRSG winter use. TL stipulations prevent activities from disturbing birds when they would be in winter habitat but would not prevent

development from occurring in winter habitat and resulting in winter habitat loss. Like nesting habitat, the NSO stipulations for leks provide some incidental protection where this habitat overlaps the buffer around the lek. The impacts on GRSG from loss, fragmentation, degradation, and disturbance to winter habitat would most likely be substantial under this alternative.

There is also potential for limited oil sands and tar shale development in Utah. There is one existing oil shale preference right lease in GHMA (White River Oil Shale Oil Shale Research, Development, and Demonstration site and Preference Lease Right Area), and one pending tar sands preference right lease area (Asphalt Ridge Preference Lease Right Area) in GHMA and PHMA. These are the only two areas in GRSG habitat where oil shale and tar sands development would be permitted.

The impacts associated with geothermal leasing and development is essentially the same as those stated above with the exception that they usually require additional facilities (thermal plant). This is usually a centralized facility that harnesses the power produced from several geothermal wells within one area. The Bald Hills Population Area is the only population area where geothermal activity is anticipated. Within the Bald Hills Population Area occupied habitat, there is an existing undeveloped 980-acre geothermal lease with an RFD scenario of five geothermal energy production or produced fluid injection wells. With an estimated surface disturbance of 7 acres per well, including respective access roads and pipelines, 35 acres of long-term surface disturbance would result.

*Fluid Mineral Development Reasonably Foreseeable Development in Population Areas*

Fluid mineral development would likely be concentrated where there are existing leases that are held by production. These areas have high potential for oil and gas. The majority of these areas are in the Uinta Population Area and portions of the Carbon Population Area.

A cluster of federal oil and gas leases covers the northwest extent of the occupied habitat within the Emery Population Area. There are three federal oil and gas exploratory units; listed from west to east, they are Skyline II, Middle Mountain, and the productive East Mountain Unit. Based on the existing well spacing, the topography, and access, the RFD scenario for the Emery Population Area is 884 acres of disturbance from 45 new wells on 45 new pads during the next 15 years. Some roads and pipelines are already present and would not require additional surface disturbance, thereby limiting further fragmentation and habitat loss. Impacts on the Emery Population Area from the predicted development could result in the loss of functional habitat for GRSG. Even though most of the development is expected to be outside of occupied habitat, there are several existing leases within the northern portion of occupied habitat available to be developed. Development of these leases could add to the fragmentation between the Emery and Carbon Population Areas. Due to the limited knowledge of these small areas of GRSG habitat, the full extent of the potential impact on these populations if development were to occur is not fully understood.

The western portion of the occupied habitat in the Strawberry Population Area covers National Forest System lands, whereas the eastern portion is mostly fee and state lands. The RFD scenario for the occupied habitat within the Strawberry Population Area is calculated as 60 well pads (120 wells), only 4 of which would be located on federal land. Since this is an area with a large amount of birds and a small amount of habitat, if 60 well pads and infrastructure were to

be realized in this area, it would have a substantial impact on the population of GRSG. According to the RFD, construction of 60 well pads could result in 1,247 acres of disturbance with the possibility of 132 miles of pipelines and 132 miles of roads. The Strawberry Population Area has the largest area managed with NSO stipulations (all GRSG habitats), which would protect GRSG on leases issued on National Forest System lands. However, because the majority of development is projected to occur on nonfederal lands, development would most likely result in direct habitat loss, habitat degradation, and fragmentation of the Strawberry Population Area.

A total of 1,417 wells are predicted to be drilled from 709 pads within the occupied habitat of the Carbon Population Area, with a total disturbance estimated to be 6,384 acres. Development of 1,417 wells from 709 pads within occupied habitat in the Carbon Population Area would most likely impact some portions of the population to a greater degree than others. Most of the development is expected to occur in the Gasco, West Tavaputs, Gordon Creek, Drunkards Wash, and Brundage Canyon development areas. Developing 709 pads additional wells and ancillary facilities would likely cause direct habitat loss, functional habitat loss, and fragmentation and may impact the local GRSG population. The development in some of these areas may hinder the function of seasonal habitat for some of the local populations, causing localized population declines. The northern population that uses these areas for most of their life history needs would most likely decline. The population that is centered in the central region of the Carbon Population Area (Emma Park) would be impacted to a lesser degree because development is not currently focused in this area, this habitat would be left more intact, and the local birds are mostly nonmigratory. However, under this alternative, additional leasing and development could still occur in this area, leaving it vulnerable to the impacts of future development.

The Uintah Population Area consists of three distinct areas: a southern area in southern Uintah County and northern Grand County comprising mostly BLM-administered and tribal lands, a smaller eastern portion of the population area on the Utah-Colorado border in central Uintah County with BLM-administered and state lands, and a large east-west area extending from central Duchesne County to the northeastern corner of Utah. The latter area includes tribal, fee, state, BLM-administered, and National Forest System lands.

The RFD scenario estimates that there will be 5,947 acres of disturbance from 788 well pads, with a total of 1,575 wells, 276 miles of road, and 433 miles of pipeline in occupied habitat. Drilling is expected to continue in the southern and western areas, but little drilling will occur in the northeastern corner during the next 15 years.

The 788 wells pads would mainly occur within the Uinta Basin portion of this population area, where oil and gas development is already occurring. Increased development would result in direct habitat loss and fragmentation that could cause the local loss of populations. The larger GRSG populations in the northeastern portion of the Uintah Population Area are less likely to be affected by development and the impacts that oil and gas because there is low oil and gas development potential. However, there is a small area on the Wyoming-Utah border (Clay Basin) that is heavily impacted, and it is anticipated that it will continue to be impacted at the same rate. The eastern portion of the population along the Colorado border has many existing leasing and development activities encroaching from the west. This population will continue to be impacted by development as described above.

An RFD scenario, completed for the Rich Population Area in 2012, projected 712 acres of disturbance from 35 new wells on 35 well pads (13 on federal lands) in the next 15 years, which would cause a direct loss of habitat, most likely lead to the propagation of new roads and other infrastructure, and increase fragmentation. There have not been any successful exploratory actions to date on federal lands, so there is no way to predict where the oil and gas activity would occur and, therefore, where the impacts would take place. However, based on the concentration of leks in the Rich Population Area, development would likely result in direct loss and fragmentation of nesting, brood-rearing, and winter habitats, as described above.

There is little reasonably foreseeable development proposed in the remaining population areas (typically one well during the next 15 years). Any development that does occur will likely be exploratory in nature. Impacts from isolated exploration could include a temporary loss of habitat, short-term disruption from increased human activity, and secondary impacts (e.g., introduction of weeds).

For additional information on the RFD scenario for each population area, refer to **Appendix R**, Oil and Gas Reasonably Foreseeable Development Scenario for Greater Sage-Grouse Occupied Habitat in Utah Sub-Region.

### ***Infrastructure***

The infrastructure section of this analysis includes a broad array of activities, including range improvements and fences, mineral development, ROWs and permits for pipelines, communication and meteorological towers, fiber optic lines, power lines, roads, renewable energy facilities, and urban and agricultural development. Though impacts from infrastructure are common throughout Utah GRSG populations, they are particularly pronounced in areas where there is mineral development and areas near large and growing human populations. Under Alternative A, most GRSG habitat would be open to new ROWs, and new infrastructure development (e.g., roads, pipelines, transmission lines, and communication facilities) would be allowed in GRSG habitat. Approximately 27,600 acres of GRSG occupied habitat would continue to be managed as ROW exclusion areas and 67,200 acres would be managed as ROW avoidance areas. While existing ROW avoidance areas are intended to protect other resource values, not GRSG habitat, these areas may provide incidental protection from ROW development. In addition to new roads authorized under ROWs, cross-county OHV travel could occur on 797,000 acres of BLM-administered land that are currently open to cross-country use.

Currently, coal leasing has been identified as unacceptable on 22,900 acres in Utah GRSG management areas. This leaves approximately 432,109 acres of moderate and high coal development available for leasing in GRSG management areas (6 percent is potential surface extraction). For mineral materials in GRSG management areas, only 73,500 acres are closed to mineral material development and there has been low demand for this resource in Utah and in GRSG management areas (64 community pits, 59 free use permits, and 8 sales contracts). Infrastructure development potential associated with fluid minerals and nonenergy leasable minerals development is also high where these resources are found because only 138,500 acres of GRSG habitat are currently closed to leasing.

Some protection of GRSG habitats would be provided by existing protective buffers around leks. Depending on the LUP, some or all infrastructure development may be prohibited within 0.25 mile of a lek in all GRSG habitats. Loss of GRSG habitat would occur across the range of GRSG in Utah. As a result, GRSG populations would be less likely to persist. The greatest loss is expected to occur in the Uintah and Carbon Population Areas where there is high potential for minerals development, the Summit and Morgan County areas of the Rich Population Area due to urban development, and the Sheeprocks Population Area due to ROW authorizations and OHV use.

Construction of linear ROWs is most likely to occur in designated corridors. As discussed in the Lands and Realty section of **Chapter 3**, there are approximately 177,700 acres of designated corridors in mapped occupied GRSG habitat. Impacts on GRSG from construction of transmission lines and other types of linear ROWs are discussed in detail in the ensuing sections.

GRSG are a landscape-scale species and require large expanses of intact sagebrush-dominated areas (Connelly et al. 2004; Schroeder et al. 2004). Increasing human-related fragmentation has broken large expanses of sagebrush areas into smaller and less connected pieces and is attributed as the primary factor in GRSG declines (Aldridge et al. 2008; Johnson et al. 2011, Leu and Hanser 2011, Wisdom et al. 2011). Habitat fragmentation can occur at multiple scales, from nest sites up to the scale of multiple lek complexes. Fragmentation may result from direct habitat loss (e.g., a paved highway), habitat degradation (e.g., increased occurrence of nonnative invasive understory vegetation; Bergquist et al. 2006), or habitat alterations, making the habitat less suitable or unusable (i.e., functional habitat loss; USFWS 2010). Degraded habitat or habitat loss can increase predation rates above natural levels directly (e.g., less suitable cover) and indirectly (e.g., increased energy expenditure from increased movements by hens and broods to find the resources they need to meet life history requirements). A population's resiliency may decline if various types of fragmentation persist over time or occur concurrently. GRSG have a relatively low reproductive output and are a relatively long-lived species (compared to other upland gamebird species) and did not evolve with the combined suite of natural and anthropogenic impacts that may influence a population. At a population level, the effects of fragmentation may decrease or degrade habitat to the extent that movements between populations decrease and potentially result in reduced genetic fitness of populations.

Infrastructure can result in a variety of direct and indirect impacts, including habitat loss, habitat degradation at multiple scales (e.g., invasive species at the microsite habitat scale and increased habitat fragmentation at the seasonal habitat scale and population level), increased likelihood of predation because of increased predator abundance or decreased suitable habitat and cover, increased likelihood of disturbance because of increased human presence, and functional habitat loss as a result of habitat avoidance. GRSG population declines have resulted from avoidance of infrastructure and reduced productivity and/or reduced survival near infrastructure (Holloran 2005). Infrastructure impacts may be associated with avoidance from increased predation risk, noise associated with construction, operation or maintenance, disturbance from traffic volumes, or increased habitat fragmentation. More research is necessary to clarify the mechanisms of these anthropogenic features and how site-specific conditions may affect the extent and magnitude of impacts on GRSG (UWIN 2012; Messmer et al. 2013).

*Power Lines*

Power lines can result in direct habitat loss, habitat degradation, and GRSG mortality (Braun 1998; Connelly et al. 2004, Beck et al. 2006). The degree of other potential impacts, such as GRSG habitat avoidance near lines or increased predation from the additional perching/nesting opportunities, are difficult to determine due to limited research and multiple confounding factors (e.g., roads, oil and gas development) (Messmer et al. 2013, Walters et al. 2014, Manier et al. 2014). The primary potential reasons for avoidance are thought to relate to increased risk of predation near power lines, especially where perching opportunities are limited (Steenhof et al. 1993; Atamian et al; 2007; LeBeau 2012). Other potential effects of power lines such as electromagnetic fields to GRSG physiology have not been evaluated (Messmer et al. 2013) but have been shown to adversely affect reproduction and development in other bird species (Fernie and Reynolds 2005).

Keeping in mind the difficulties of determining causation, range-wide analyses of the influences of environmental and anthropogenic features on the landscape suggest that GRSG lek trends generally decreased as the number of towers within 3.1 miles and 11.2 miles of leks increased (Johnson et al. 2011). In addition, a Wyoming gas development GRSG study found that probability of lek persistence declined as proximity to transmission lines decreased, and lek persistence declined as power line density increased within a 4-mile buffer of a lek (Walker et al. 2007a).

While predation from eagles perching on newly constructed transmission lines (Ellis 1985) and GRSG mortality from collision with distribution lines (Beck et al. 2006) have been documented, the only research, to date, that has evaluated the effects from the installation of a new transmission line on GRSG has been on the Falcon to Gondor 345 kV line in Nevada. It should be noted that this project only collected GRSG location data for one year prior to the installation of the transmission line. This project demonstrated the complexity of variables that influence GRSG at any one time. For example, the Falcon-Gondor 345 kV line research first concluded that nest locations were not affected by the installation of the line, but once the study took habitat quality into consideration, nest location and female survival did show the line had a substantial effect (Gibson et al. unpublished).

A range-wide evaluation of the effects of increased avian predator abundance, specifically ravens, and resulting predation rates on GRSG has not been conducted. However, the fact that ravens increase in abundance and distribution expansion is well-documented (Boarman et al. 1993; Sauer et al. 2011). Though GRSG are a prey species, there is mounting concern that raven abundance, because of human-related changes on the landscape (e.g., food and substrate), may be increasing nest predation above naturally observed levels in some areas. In support of this, Nevada has found that when raven abundance goes up, likelihood of nest success goes down (Coates and Delehanty 2010). Ravens are a known primary GRSG nest predator in some areas in Nevada and are assumed to be responsible for nest predation events in other states (Coates et al. 2008, Lockyer et al. 2013; Connelly et al. 2011). Furthermore, ravens concentrate foraging behaviors within 1.4 miles of transmission lines, and raven foraging was observed 6.8 miles out from transmission lines (Coates et al. 2014a). Howe and others' (2014) research suggest that the greatest potential for impact on GRSG nests occurs within 0.35 mile of structures, and Dinkins and others (2014) found that risk of death for female GRSG was higher near perches. In

addition, power poles and cross-arms provide nesting opportunities for potential avian predators, such as golden eagles and ravens. In contrast, a Wyoming study found that female GRSG did not avoid habitats close to transmission lines, though the researcher attributed the results to site fidelity and time lags, making population impacts difficult to detect immediately following disturbance (LeBeau 2012).

Degradation of habitat occurs from ground disturbance that decreases habitat availability, may increase predation, and may spread invasive plant species. Infrastructure associated with energy development in the Powder River Basin resulted in increased invasive species presence relative to undeveloped areas (Bergquist et al. 2007). Invasive species introduction and proliferation degrades habitat for GRSG, decreasing habitat function and carrying capacity, resulting in lower bird densities. In general, Wyoming big sagebrush sites in Utah are more susceptible to nonnative vegetation invasion because the elevation is lower, precipitation is less, and there is less understory cover. Some Wyoming big sagebrush sites are reported as providing winter habitat and may only meet winter needs now because the amount of understory vegetation no longer supports GRSG nesting and brood-rearing habitat. Extensive habitat degradation can lead to habitat loss. For example, if cheatgrass increases to the extent that its presence increases fire risk and subsequent fire return intervals, habitat functionality for GRSG can be permanently lost.

GRSG change their behavior in response to noise and increased human presence associated with construction, operation, and maintenance. Similarly, GRSG may change their behavior in response to tall structures (or electromagnetic radiation from communication towers; Balmori 2005, 2006, 2009). As a result, GRSG may be displaced to lower quality habitat that can disrupt breeding and nesting (Lyons and Anderson 2003; Holloran 2005).

Burying power lines in GRSG habitat would avoid GRSG predator perching or nesting opportunities, GRSG avoidance of aboveground power lines, and GRSG collisions with power lines, but there would be ground disturbance in the short term from construction and the potential for aboveground ancillary infrastructure (e.g., vaults). Ground disturbance occurring during construction, repairs, and maintenance may result in large, permanent displacement of excavated soil and subsequent issues with re-establishing native vegetation and preventing the overgrowth of invasive species.

#### *Communication Towers*

Impacts from communication towers can be similar to those from power lines, including direct habitat loss, habitat degradation, GRSG habitat use avoidance, and mortality (Braun 1998; Connelly et al. 2004). GRSG avoidance of habitat due to tall communication tower structures may be due to electromagnetic between electromagnetic radiation within 500 meters of communication towers and a number of species' decreased reproductive success (Balmori 2005, 2006, 2009). In addition, recent modeling suggests GRSG are specifically avoiding habitat in close proximity to communication towers (Knick et al. 2013), resulting in functional habitat loss. Wisdom et al. (2011) reported the mean distance to cellular towers in occupied GRSG range (13 miles) was almost twice that of extirpated range (7 miles).

#### *Roads*

Impacts from roads are similar to those from power lines and communication towers and may include direct habitat loss, habitat degradation, GRSG habitat avoidance, and mortality from

collision with vehicles or increased predation rates (Braun 1998; Connelly et al. 2004). Roads result in direct habitat loss, 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 (Bergquist et al. 2007), increase noise disturbance that can result in GRSG habitat use avoidance (i.e., functional habitat loss) (Blickley et al. 2012a), and increase mammalian and avian predator abundance (Forman and Alexander 1998). 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. In Montana and southern Canada, as the miles of roads within 2 miles of a lek increased, the likelihood of lek persistence decreased (Tack 2009).

#### *Fences*

Fences may also cause habitat disturbance and degradation, but the impacts may not rise to the same level of power lines and roads. Fences do result in direct mortality from collisions, and impacts may be substantial in localized areas (see additional discussion on fence collisions under the Grazing section). In addition, fence posts may provide predator perch sites, and linear fence corridors may facilitate predator movements into contiguous GRSG habitats for mammalian species that tend to follow linear features. Fences may allow for the invasion or spread of invasive weeds along the fencing corridor. Furthermore, fences may result in habitat fragmentation and functional habitat loss, as GRSG may avoid habitat around the fences to escape predation (Braun 1998). Fencing impacts likely vary depending on the population and landscape topography (Stevens 2011).

#### *Renewable Energy*

Wind-generating facilities have increased in size and number and currently surpass the pace of other renewable development in the GRSG range (USFWS 2010). Similar to nonrenewable energy development, impacts on GRSG from wind development facilities include roads, power lines, noise, and increased human presence (Connelly et al. 2004). These impacts are associated with both construction and operation of wind energy facilities, which increase habitat fragmentation through habitat loss and degradation and directly disturb GRSG. While there are impacts that are unique to wind development (e.g., noise produced by the rotor blades, GRSG mortality from flying into rotors, and GRSG avoidance of structures) most of the impacts are from the roads and power lines necessary for construction and maintenance (see Infrastructure section; Connelly et al. 2004). Only one study in southcentral Wyoming has evaluated the specific immediate impacts of wind development on GRSG and found that while birds were not avoiding nesting or using brood-rearing habitat near wind turbines, nesting success and brood survival decreased in close proximity to wind turbines (LeBeau 2012). Based on GRSG population response time lags documented in coalbed natural gas development (Walker et al. 2007a), impacts may take 2 to 4 years before population responses are observed (Manier et al. 2013). LeBeau (2012) found that adult female survival did not appear to be affected by wind turbines.

There is no utility-scale wind energy development within occupied GRSG habitat in Utah. However, high wind potential exists on 35,500 acres of occupied GRSG habitat, mainly within the Rich, Carbon, and Hamlin Valley Population Areas. Assuming wind energy demand increases at the current rate, these are the areas where wind development would most likely occur. Under Alternative A, most GRSG habitat would be open to new wind ROWs, and wind energy applications would be processed on a case-by-case basis. Depending upon the size and location of permitted wind development in GRSG habitat, there could be impacts ranging from discountable in less important habitats to decreasing the population growth rate if placed in important habitats. COAs could be applied to reduce impacts on GRSG, but they would not be consistently applied across the decision area. Therefore, wind development in GRSG habitat would be expected to result in habitat loss, degradation, fragmentation, and direct disturbance to the birds. In the Rich Population Area, high wind potential overlaps approximately 2 percent of population in nesting and brood-rearing habitat. In the Hamlin Valley Population Area, high wind potential overlaps approximately 15 percent of the population's habitat, including high-elevation brood-rearing habitat. While the value of this area to GRSG is not well understood, it would decrease brood-rearing habitat in an area where habitat is limited. In a portion of the Carbon Population Area (Anthro), high wind potential overlaps half of the primary habitat area and would impact all seasonal habitat types (breeding, nesting, brood-rearing, and wintering). If wind development were to occur, it would be in an area that supports a small population where habitat is already fragmented and limited. Based on LeBeau's research (2012), nests and broods near wind facilities would have a lower rate of success and such declines in these vital rates, especially impacts on nest success, would decrease the population growth rate in these populations and may lead to loss of the population over time (Taylor et al. 2012).

#### **Fire**

Fire is the primary threat to GRSG populations in 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 where increasing exotic annual grasses, primarily cheatgrass, are resulting in sagebrush loss and degradation (USFWS 2010). Cheatgrass can more easily invade and create its own feedback loop in areas that are dry, with the understory vegetation cover that is not substantial, or where surface-disturbing activities (e.g., road construction) take place. 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 prevent sagebrush seedlings from establishing, though the presence of cheatgrass is attributed to larger and more frequent fires in the Great Basin (Balch et al. 2013). 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, facilitate establishment and spread of cheatgrass and other invasive weeds (see discussion on infrastructure and invasive species; Gelbard and Belnap 2003). While fires do occur within higher-elevation mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) GRSG habitats, typically they are 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 downslope into sagebrush habitats (Baker 2011; Balch et al. 2013). 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 Utah, most of the population areas are susceptible to some level of cheatgrass invasion and subsequent fire. This is especially the case in the Wyoming big sagebrush sites at lower elevations in the western part of the state (Box Elder, Ibapah, Sheeprocks, Hamlin Valley, and Bald Hills Population Areas). Low-elevation areas are less resistant and resilient to cheatgrass invasion, have a higher likelihood of burning, and are more difficult to rehabilitate after a fire due to their warmer and drier soils (Chambers et al. 2014). 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). If a large area of GRSG habitat burns and repeatedly burns in subsequent years, it could lead to the extirpation of a local GRSG population (Pedersen et al. 2003). 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 GRSG populations, they become increasingly susceptible to stochastic events and local extirpation (Knick and Hanser 2011; Wisdom et al. 2011).

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 predicted 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 are fuels treatments, pre-suppression planning, fire prevention efforts, and effective fire suppression geared toward protecting GRSG habitat. Current fire suppression efforts lead to the suppression of 93 to 98 percent of all fires. Under the infrastructure, minerals, and recreation sections, facilitating the spread of cheatgrass and the likelihood of ignition through BLM-administered and Forest Service-authorized programs is further discussed.

In general, BLM and Forest Service planning decisions have had limited effect to decrease fire occurrence in GRSG habitats. Under Alternative A, the BLM would continue to follow guidance provided in BLM IM 2011-138, Sage-Grouse Conservation Related to Wildland Fire and Fuels Management. This IM provides BMPs, habitat maps, and guidelines applicable to fire and fuels management functions and prioritizes GRSG and their habitats for fire suppression. The majority of the fire management decisions are related to fire suppression, fuels management (e.g., prescribed fire, shrub or woodland control, or fuelbreaks), and reclamation after fire. In general, fuels management, stabilization, and rehabilitation efforts are not specifically focused on GRSG, but GRSG may benefit from reduced fire size in sagebrush habitats, post-fire site stabilization, or rehabilitation of diverse native vegetation communities. However, recent research found that past post-fire rehabilitation efforts have yielded little benefits for GRSG (Arkle et al. 2014), though past projects were not specifically focused on rehabilitating GRSG habitat. Future fuels projects would consider where and how to best protect GRSG habitat from fire while conserving GRSG habitat quality. Some LUPs promote the use of native seed for stabilization and rehabilitation, but this guidance is not consistently applied across the decision area.

Under this alternative, fires would likely continue to increase in size and frequency in GRSG habitats, and those habitats would continue to be degraded or lost. Small and heavily disturbed population areas with cheatgrass-invaded habitats, such as Ibapah, Hamlin Valley, and Sheeprocks would be particularly susceptible to these impacts.

Results from the Great Basin VDDT modeling effort (see **Appendix V**) for Alternative A are presented in **Table 4.2**. **Table 4.2** presents the modeled percentage of sagebrush within mapped occupied habitat in each population area that provides between 10 and 30 percent sagebrush cover. That reflects the degree of sagebrush coverage in the mid- to late-seral stage, which is typically the areas identified as providing for GRSG habitat needs (Connelly et al. 2000). Based on current levels of management and vegetation treatment, the modeled trends reflect that areas such as the Emery, Hamlin Valley, Ibapah, Strawberry, and Box Elder Population Areas will have stable to increasing trends in the amount of acres that provide GRSG habitat. Parker Mountain, Panguitch, Bald Hills, and Carbon Population Areas are anticipated to decrease in the short term but hold relatively steady in the long term. The model indicates that current levels of management are not sufficient to alter the decreasing trend of sagebrush in the Sheeprocks Population Area and the population areas associated with the Wyoming Basin (Rich, Uintah, Lucerne, Wyoming-Uinta, and Wyoming-Blacks Fork). The model shows this is due to the collective pressures from conifer encroachment, fire, and nonnative annual grasses. Under Alternative A, the percent of these areas that provide GRSG habitat would be on a negative trend.

Under current management, fire would continue to be a concern in the majority of the population areas. However, according to the model, the number of acres burned annually is projected to slightly decrease in the next 50 years in all population areas except the Sheeprocks, where there is a steady trend. Reductions in the amount of fire would result in minor reductions in the amount of annual GRSG habitat loss.

**Table 4.2**  
**Sagebrush Condition and Trend Analysis: Comparing Alternatives by Percent of Sagebrush Area in Mid or Late Seral Classes for Population Areas at 10 Years and 50 Years – Alternative A**

Population Area	Percent of Sagebrush Area in Mid- and Late-Seral Class		
	Current Conditions	10 Years	50 Years
Uintah	80	76	67
Carbon	66	57	58
Emery	77	83	85
Parker Mountain	70	67	68
Panguitch	70	67	68
Bald Hills	70	67	68
Hamlin Valley	36	45	54
Ibapah	36	45	54
Sheeprocks	53	46	38
Box Elder	55	61	70
Rich	80	76	67
Strawberry	76	76	78
Lucerne	80	76	67
Wyoming-Uinta	80	76	67
Wyoming-Blacks Fork	80	76	67
<b>All</b>	<b>57</b>	<b>60</b>	<b>65</b>

### ***Invasive Plant Species***

#### *Weeds*

In this analysis, invasive plant species are considered both nonnative and native plants that result in GRSG habitat degradation and loss. Species (such as diffuse knapweed (*Centaurea diffusa*), spotted knapweed (*Centaurea stoebe*), Russian knapweed (*Rhaponticum repens*), dyers wood (*Isatis tinctoria*), leafy spurge (*Euphorbia esula*), hoary cress (*Cardaria draba*), and several thistles) can invade rangelands and any area in GRSG habitat where soils are disturbed. In riparian areas used by GRSG, species such as Johnson grass (*Sorghum halepense*), purple loosestrife (*Lythrum salicaria*), perennial pepperweed (*Lepidium latifolium*), poison hemlock (*Conium maculatum*), and saltcedar (*Tamarix chinensis*) can invade riparian areas, altering the plant composition and reducing the forb component. Medusahead (*Taeniatherum caput-medusae*) is an annual grass that is a growing concern in northern Utah because of its extremely competitive nature. Of particular concern to GRSG habitats is invasive plant species, most notably downy brome, otherwise known as cheatgrass. Invasive plant species can proliferate with surface disturbance (Rice and Mack 1991; Gelbard and Belnap 2003; Zouhar et al. 2008) or without disturbance (Young and Allen 1997; Roundy et al. 2007), and multiple factors (e.g., wildfire, energy development, infrastructure, mining, and over-grazing) may result in invasive plant species colonizing, replacing, and outcompeting desirable native species. In general, surface-disturbing activities could cause erosion, loss of topsoil, and soil compaction, which could affect the ability of native vegetation to regenerate and could facilitate the invasion of invasive plant species. The extent and magnitude of effects that invasive plant species have on GRSG habitat depends upon a variety of factors, including ecological site potential, pre-disturbance sagebrush condition and

composition, and the presence of propagules or sprouting of native species (West and Yorks 2002; Beck et al. 2009; Epanchin-Niell et al. 2009; Condon et al. 2011).

Invasive plant species alter plant community structure and composition, productivity, nutrient cycling, and hydrology and may cause declines in native plant populations, including sagebrush, through competitive exclusion and niche displacement, among other mechanisms. Invasive plant species reduce and, in cases where monocultures occur, eliminate vegetation that GRSG use for food and cover. Invasive plant species do not provide suitable GRSG habitat, since chick survival depends on a diversity of native forbs and associated insects. As a result, areas that become completely converted to invasive plant species can be considered to be habitat lost to GRSG. GRSG also depend on sagebrush, which is eaten year-round and used exclusively throughout the winter for food and cover. Along with replacing or removing vegetation essential to GRSG, invasive plant species can fragment existing GRSG habitat or reduce habitat quality. Invasive plant species can also create long-term changes in ecosystem processes, such as fire-cycles (see discussion under Fire, above) and other disturbance regimes that persist even after an invasive plant is removed (USFWS 2010).

Under current management, each field office or forest would use their Weed Management Plan, Normal Year Fire Rehabilitation Plan, Standard Operation Procedures, and COAs to address noxious weed issues and help ameliorate the threat of invasive plant species to GRSG. Emergency stabilization and rehabilitation after wildland fire can help prevent the introduction of invasive plant species, and wildland fire suppression can provide long-term protection to intact native vegetation, thereby preventing the spread and conversion to invasive plant species. Current BLM and Forest Service policies do not require that GRSG are prioritized above other resources. Given the extent of cheatgrass, and the fact that it is not a noxious weed, invasive plant programs are unlikely to directly treat or suppress this species.

Invasive plant species would continue to be introduced and spread as a result of ongoing vehicle traffic in and out of GRSG habitat, recreational activities, wildlife, improper livestock grazing, fire, and surface-disturbing activities (e.g., construction of ROWs and roads, mineral development, and fuelbreaks). Areas most susceptible to cheatgrass invasion are low-elevation areas with low understory vegetation cover and surface-disturbing activities. Sheeprocks and Ibapah already have cheatgrass-dominated areas and are at high risk for cheatgrass expansion. One of the Sheeprocks primary wintering areas is a Wyoming big sagebrush stand with a cheatgrass understory and is particularly susceptible to fire. A fire would result in winter habitat loss and could limit winter survival and subsequently impact the entire population. Other potentially susceptible population areas are the Box Elder, Hamlin Valley, and Bald Hills, where there are currently low levels of cheatgrass, but the frequent occurrence of fires may facilitate the spread of cheatgrass. The spread of cheatgrass in these areas would degrade habitat and may eventually lead to habitat loss from fire.

According to the VDDT model, during the next 50 years it is projected that the percent of annual grass would increase or remain stable in all population areas except Box Elder and Strawberry. Decreases in annual grasses are expected in these two areas. As shown in **Table 4.3** during the next 50 years it is estimated that annual grasses would constitute less than 10

**Table 4.3**  
**Alternative A VDDT Model Outputs – Average Juniper and Annual Grasses Over 50 Years**

Population Area(s)	Percent Juniper	Percent Annual Grasses
Box Elder	7	9
Hamlin Valley, Ibapah	25	7
Rich, Uintah, Wyoming-Uinta, Wyoming-Blacks Fork	13	4
Carbon	29	2
Emery	3	0
Parker, Panguitch, Bald Hills	18	1
Strawberry	12	0
Sheeprocks	35	17

percent of total vegetation in mapped occupied habitat in all population areas except the Sheeprocks, where annual grasses are estimated to make up approximately 17 percent of the total vegetation. The percent of annual grasses is estimated to be higher in population areas in the Great Basin region (Box Elder, Hamlin Valley, Ibapah, Sheeprocks) than those in the Rocky Mountain region.

#### *Conifer Encroachment*

Woodland expansion, especially juniper (*Juniperus spp.*) encroachment, is a wide-spread invasive species threat to GRSG habitat. Native junipers have expanded into sagebrush ecosystems over the last century (Miller et al. 2011). GRSG are negatively impacted by the expansion of juniper regardless of the understory condition (Freese 2009) because they avoid habitats where conifer encroachment is occurring (Casazza et al. 2011). Studies have shown that GRSG lek attendance is impacted at very low levels of conifer encroachment (Baruch-Mordo et al. 2013). As juniper increases in abundance and size, the shrub and herbaceous understory components for GRSG diminishes. In Utah, juniper is encroaching into GRSG habitat throughout BLM-administered and National Forest System lands but is particularly problematic in the Sheep Rocks, Box Elder, Bald Hills, Hamlin Valley, and Panguitch Population Areas. Woodland expansion is also occurring to a lesser degree in the Halfway Hollow, Three Corners (Uintah Population Area), West Tavaputs (Carbon Population Area), and the western portion of the Parker Mountain Population Area. Fire suppression is a primary cause of juniper encroachment because fire intervals are longer than the natural cyclical variation, allowing junipers time to establish as seedlings and grow to mature trees and dominate a site (Miller et al. 2011). Juniper encroachment is a synergistic result of fire suppression, introduction of grazing, increases in carbon dioxide concentrations, climate change, and natural recovery from past disturbance (Miller and Rose 1999; Miller and Tausch 2002; Baker 2011).

In Utah, juniper inhabits elevations ranging from 4,000 to 7,500 feet. More precipitation and site productivity are found in these higher elevations and in the absence of fire, juniper has encroached moving downslope to neighboring communities (Miller and Rose 1995; Miller et al. 2000; Miller and Heyerdahl 2008; Sankey and Germino 2008; Shinneman et al. 2008; Bradley 2010). In the encroachment areas, active restoration such as mechanical treatments may be needed to maintain GRSG habitats by reducing juniper cover (Bradley 2010; Rowland et al. 2010).

The current approach in Utah is to manage juniper encroachment by removing trees in Phase 1, where trees are present but shrubs and herbaceous species (e.g., perennial grasses and forbs) are the dominant vegetation that influence ecological processes; and Phase 2 sites where trees are co-dominant with shrubs and herbaceous species and all three vegetation layers influence ecological processes. Targeted removal of juniper is based on what seasonal habitat area is being encroached upon and the specific limiting factors for a GRSG population.

Restoration potential is the greatest where there is the least disturbance for vegetation and soils recovery (Shinneman et al. 2008). The rate of recovery processes may be supported and enhanced through treatment methods and timing of application (Bates et al. 2011; Rau et al. 2011). Based on past trends and the current distribution of juniper relative to sagebrush habitat, it is anticipated that juniper will continue expanding at varying rates across the landscape and result in further loss of sagebrush habitat within the GRSG range.

According to the VDDT model, during the next 50 years the percent of juniper within GRSG habitat is expected to increase in the Box Elder, Rich, Uintah, Wyoming-Uinta, and Wyoming-Blacks Fork Population Areas. The percent of juniper is expected to decrease in all other population areas. As shown in **Table 4.3**, regardless of trends, juniper encroachment is expected to continue to affect the majority of the population areas in the Utah Sub-regional planning area.

Under Alternative A, current LUPs provide varying degrees of habitat objectives identified for maintenance, improvement, and restoration of sagebrush communities, which provide for improvements to wildlife habitat or to increase available forage for wildlife, livestock, and wild horses. A few LUPs (e.g., Vernal RMP and Uintah LRMP) provide more detailed habitat objectives (e.g., desired seral stage, percent canopy cover, or height) or include management actions to implement the most recent UDWR Strategic Management Plan for Sage-Grouse (UDWR 2002) and the BLM National Sage-Grouse Habitat Conservation Strategy. Under Alternative A, management would focus restoration of GRSG habitat impacted by conifer encroachment based on habitat objectives set forth in these plans, which would allow for the incorporation of BMPs to avoid, minimize, or mitigate conifer encroachment. Under Alternative A, the BLM would continue to prioritize the use of mechanical treatments for removing encroaching conifers, which would result in improvements to habitats that may have been less desirable due to the presence of conifers. Restoration of habitats affected by conifer encroachment can allow for rapid recolonization of leks by GRSG (Baruch-Mordo et al. 2013). The Forest Service would continue to pursue current vegetation management objectives, including conifer removal. Focus under Alternative A would continue to be on removal of early-stage juniper stands that may transform unsuitable habitat into effective habitat for GRSG. Highly flammable juniper stands would continue to be removed (stands where trees are the dominant vegetation and the primary plant influencing ecological processes) (Phase 3; Miller et al. 2008) in low-elevation sagebrush habitats, which would lead to improvements to GRSG habitat. Restoring sagebrush communities where conifer encroachment has resulted in habitat degradation or loss within specific population areas could result in improvements to the sagebrush community. Increasing quality or quantity of habitat available to GRSG increases a population's resiliency to adapt to changing environmental conditions and provide for expansion into areas that may be more suitable for meeting seasonal habitat requirements.

### ***Grazing (Including Wild Horses and Burros)***

Grazing by livestock and wild horses is one of the most widespread land uses across GRSG habitat (Connelly et al. 2004). Through historic and current livestock grazing practices, most sagebrush habitats in Utah have been grazed at some point over the last century (Knick 2011). Domestic livestock grazing was first introduced into the planning area in the mid- and late-1800s, coinciding with settlement of the area. Following their introduction, the number of domestic livestock increased steeply over the ensuing decades (Manier et al. 2013; Knick 2011). This increase in livestock numbers, combined with the drought in the 1920s and 1930s, severely altered the condition of western landscapes (Manier et al. 2013; Connelly et al. 2004). “Native perennial grasses and forbs that were not adapted to heavy grazing pressure were depleted from the vegetative community and replaced, in much of the Great Basin and surrounding intermountain regions by grazing tolerant grass species, exotic annual grasses, or both” (Manier et al. 2013). In the Great Basin, West (1988) noted it is possible that the more arid sagebrush rangelands are more sensitive to drought and may have been more severely affected by overgrazing than wetter shrub-steppe to the north.

Since passage of the Taylor Grazing Act of 1934 (1940 to 2009), grazing permits in the planning area have been reduced by approximately 63 percent (Banner 2009). Most of the decreases came in the 1940s, 1950s, and 1960s, with reductions enacted to bring livestock stocking rates in line with carrying capacity of allotments (Banner 2009). Because of the lasting impacts of the historic grazing of the late 1800s and early 1900s, the reduced numbers of livestock in the modern era often do not simply represent reduced effects from grazing (Knick et al. 2011), but a slower rate of accumulation of effects (Manier et al. 2013). Research has shown that livestock grazing in GRSG habitat may either improve or decrease habitat quality, depending on the type of habitat, spatial and temporal scale, and how the grazing is administered (Beck and Mitchell 2000).

It is imperative to note that because of numerous variables that influence the landscape (e.g., vegetation present, soil, elevation, aspect, and precipitation) combined with historic and current levels (e.g., numbers and use) and methods of livestock grazing (e.g., kind of livestock, rest-rotation, and seasonal use), impacts on GRSG habitat from livestock grazing vary tremendously in space and time (Manier et al. 2013). Because these variables, history of use, and site-specific livestock grazing practices vary widely in Utah within GRSG habitats, the nature and level of impacts discussed in this analysis are discussed in broad terms in regards to grazing pressures.

### ***Impacts from Domestic Livestock Forage Use (Herbivory)***

There is little scientific data directly linking grazing practices to GRSG population levels (Knick et al. 2011). However, use over time can influence ecological pathways and can shape which plant and animal species persist (Knick et al. 2011). There is literature that has identified relationships between aspects of grazing and effects on various components of GRSG habitat (see in below text). These relationships vary based on site-specific conditions and grazing practices.

Impacts from livestock herbivory (consumption of vegetation) are diffuse (exerted over broad spatial or temporal scales) and are different in nature than discrete disturbances (BLM IM 2012-044, BLM National Greater Sage-Grouse Land Use Planning Strategy). In some areas, the

environmental conditions combined with livestock use strategies and levels could result in decrease or loss in GRSG habitat functionality, in other areas there could be no loss of functionality, and in other areas specific grazing practices could result in improvement of GRSG habitats. Due to the complexity of these systems and the site-specific nature of how these factors may interact, it is not possible to make simple assumptions. For example, in the Box Elder, Rich, Parker Mountain, and Diamond Mountain portion of the Uintah population areas, livestock grazing is the primary use of public lands in GRSG habitat. These areas also provide habitat for more than 70 percent of breeding birds in Utah and are the only areas in Utah with populations large enough to sustain regular harvest (UDWR 2009). While there may be portions of these and other population areas that have site-specific impacts that limit GRSG habitat functionality, some may assume that the presence of livestock grazing in these population areas has not resulted in unsustainable GRSG populations. Making these conclusions assumes that these areas have similar past grazing and current grazing management (season of use, stocking level, duration), vegetation communities, history of impacts on the area (e.g., fire), and temperature and precipitation, when in fact they are very different. The primary commonality of these populations is the amount of relatively contiguous habitat, which is a function of how the sagebrush areas naturally occur on the landscape and where substantial human-related impacts currently exist. It is well documented that the resiliency of a population is closely related to larger areas of habitat.

In relation to the effects of livestock herbivory on GRSG habitat, there are two important influences: the influence of grazing on annual vegetation conditions, and the accumulation of effects on vegetation from livestock selectively consuming specific species, resulting in altered vegetation dominance over time. Prolonged selective grazing pressure on vegetation communities can affect the condition of individual plants, abundance of species, interspecific competition, and ultimately, community composition (Manier and Hobbs 2006). Jones (2000) review of literature found detrimental effects of cattle grazing on xeric ecosystems in 11 of 16 variables measured, including litter cover and soil quality. While specific effects and conditions from grazing are localized in most cases, the continuous and collective presence of these effects across the West may affect the regional condition of GRSG habitats (Manier et al. 2013).

The timing of when grazing occurs relative to plant growth stages (e.g., growth initiation, rapid growth, seed development, seed ripe, and dormancy) can influence the effects of grazing on the vegetation on which wildlife depend (Briske and Hendrickson 1998; Briske et al. 2003; Veblen et al. 2011). Repeated grazing during periods of fastest growth of the dominant grasses and forbs in intermountain sagebrush steppe over multiple consecutive years tends to favor sagebrush growth (Pyke 2011) through reduced competitive ability of grasses (Manier et al. 2013). GRSG preferred areas of reduced spring grazing and low forage use for nesting sites near Lander, Wyoming (Kuiper 2004). However, spring grazing in winter habitat may improve GRSG winter habitat because grass reductions can increase sagebrush densities (Wright 1970; Owens and Norton 1990; Angell 1997; Beck and Mitchell 2000). The relationship between spring grazing and long-term sagebrush densities suggests an opportunity for adaptation of grazing systems to graze GRSG winter habitats in spring when brood-rearing habitats would be avoided, and vice versa (Manier et al. 2013), thereby improving both. However, this would only be a viable option where allotments in wintering habitat do not overlap with allotments with nesting and brood-rearing habitats. Because GRSG initiate nesting early in the year, prior to new herbaceous

growth, grazing levels from the previous year and the residual grass remaining provides initial cover for nesting GRSG (Hausleitner et al. 2005; Holloran et al. 2005). Grazing during the dormant season (late summer through winter) influences spring grass stubble height (Pyke 2011). However, due to the variability in population and site-specific conditions, it is possible to manage for a healthy sagebrush community but fail to achieve GRSG habitat objectives if sufficient residual vegetation (standing crop) is not provided (Manier et al. 2013).

Direct conflicts between livestock and GRSG may occur during spring and early summer when both livestock and GRSG are using forbs and grasses. Because nesting GRSG consistently select areas with more sagebrush canopy cover and taller grasses compared with available habitats (Hagen et al. 2007), the presence of such characteristics increases the probability of a successful hatch (Manier et al. 2013). If nesting and early brood-rearing habitats are grazed in a manner that consistently results in a lack of sufficient residual grass cover the following spring, predation of GRSG nests could increase and the rate of GRSG nest success could decrease (USFWS 2010).

Decreases in the forb component of the sagebrush environment will also affect GRSG population areas. The availability of forbs may be an essential component of a pre-laying hen's diet (Barnett and Crawford 1994; Connelly et al. 2000; Gregg et al. 2008). In Nevada, greater forb diversity and higher plant species richness were small-scale habitat factors associated with brood success (Casazza et al. 2011). Forb diversity and concentration dramatically increase invertebrate densities, which are crucial for chick survival and growth (Blenden et al. 1986; Brush and Stiles 1986; Johnson and Boyce 1990). Insect diversity and density was positively correlated with herbaceous density and diversity (Hull 1996; Jamison et al. 2002). Different research has found that stocking intensity and season of use are both related to increases in herbage production (Van Poolen and Lacey 1979; Mueggler 1950; Laycock 1978; Owens and Norton 1990). In general, livestock grazing systems that reduce the presence of forbs or alter higher-value forbs within the sagebrush community would likely reduce the value of nesting and early and later brood-rearing habitat for GRSG and may cause them to use less optimal habitat, potentially affecting nesting GRSG (Barnett and Crawford 1994) and chick survival (Huwer et al. 2008).

Under certain conditions, livestock grazing may reduce sagebrush cover and alter plant community composition (Messmer and Peterson 2009; Vavra 2005). Sagebrush is not typically considered a key forage species for grazing animals, except on winter sheep allotments because terpene concentration levels limit use by most grazing animals. Terpene levels decrease in late summer, fall, and winter, making sagebrush more palatable (Kelsey et al. 1982). This is especially true for sheep fall and winter use, when sheep readily browse sagebrush and may reduce the vertical structure, density, and vigor of sagebrush, thus affecting the quantity and quality of GRSG habitat (Wright 1970; Owens and Norton 1990; Angell 1997; Beck and Mitchell 2000). Isolated occurrences of such use levels may occur within GRSG habitats in Utah, which would reduce the ability of the sagebrush to provide sufficient hiding cover, thermal protection, and forage for GRSG, particularly in winter habitat where sagebrush comprises the majority of GRSG diet.

Spring grazing during wet conditions may increase potential for soil compaction, which can reduce water infiltration rates, decrease water availability for vegetation, increase surface runoff, and increase erosion. In addition, alteration of plant community composition caused by livestock grazing on preferred species can also affect water infiltration rates, increase runoff in areas where vegetation cover has been reduced, and increase soil erosion. While all of these effects are possible, the presence and magnitude of each depends on the local environmental conditions and grazing levels and strategies.

The effects from grazing also vary by kind of livestock, numbers of livestock (intensity), and grazing management systems (e.g., rest-rotation and deferred rotation). Grazing intensity (e.g., stocking rate, duration, and frequency) has consistently been identified as having impacts on ecosystem and rangeland health (Vallentine 1990; Briske et al. 2008; Veblen et al. 2011), including the vegetative structure required by GRSG. The different kinds of livestock (e.g., cattle or sheep) that are managed within GRSG habitats are important considerations due to dietary preferences of each and the differing manner in which each are managed. Livestock utilization patterns are dependent on what types of forage are available, which may vary seasonally (e.g., abundant in the spring growing season) or because of depleted rangeland conditions (e.g., fire, drought, and heavy utilization). Different kinds of livestock will focus on preferred species initially, then move to less preferred species as the availability of the first reduces. This results in uneven pressure on plants that livestock prefer (e.g., herbaceous understory), which in turn provides a competitive disadvantage for water, space, and nutrients when compared with other species in the area (e.g., noxious weeds or shrubs). Over time, this effect favors one species over another. Which species is preferred by livestock and therefore is impacted over time depends on the species available on the ecological site and grazing strategies (e.g., kinds of livestock, the season of use, and duration of use).

Riparian and wet-meadow habitats are seasonally important to GRSG, especially for brood rearing, since they provide areas high in forbs and invertebrates necessary for early chick development. Livestock, especially cattle, prefer to concentrate near water sources; the location of water affects livestock distribution patterns. This pattern can result in disproportional use of riparian habitats and wet meadows, which can result in loss of riparian vegetation and cover, as well as compaction of soils and lowering of water tables, which alters water quality, invertebrate populations, and plant species composition. This can result in degradation of crucial habitats for GRSG. Some research demonstrated that livestock exclusion from riparian habitats can result in increased sedge cover, forb cover, foliage height diversity, and water table depth along with expansion of riparian vegetation laterally from stream channels (Dobkin et al. 1998). Other research has shown that livestock grazing of riparian and wet meadow habitats can increase forb diversity in certain cases, depending on timing and intensity (Evans 1986). Additionally, other research has shown that GRSG prefer grazed over ungrazed wet meadows where protective cover conditions were otherwise equal under rest-rotation grazing at moderate stocking levels (Neel 1980).

Riparian areas make up only a small fraction of the total planning area but receive a disproportionate amount of use by livestock as well as being a key seasonal habitat for GRSG. Under the Utah Standards for Healthy Rangelands (Standard #2–Riparian – Wetland), the BLM is required to ensure that riparian and wetland areas are in proper functioning condition (PFC).

When standards are not being met, the BLM must take action to assure significant progress towards achievement is being made. Similarly, the Forest Service is required to manage grazing allotments to standards laid out in the LUP or grazing decisional document. Under Alternative A, managing riparian and wetland habitat to meet Utah's riparian standard, meeting PFC, and implementing Utah's livestock grazing guideline would maintain or improve brood-rearing habitat for GRSG.

In some situations, livestock grazing can be a management tool to aid in the management or maintenance of certain vegetation communities within GRSG habitat. When properly applied, livestock grazing may change plant community composition, increase productivity of selected species, increase forage quality, and alter structure to increase habitat diversity (Vavra 2005). "Well-prescribed livestock management may positively influence GRSG habitat suitability especially during nesting (spring), early brood rearing (early summer), and winter, but extended rest may be required for areas that are currently degraded" (Manier et al. 2013). Many studies demonstrate that weeds can be controlled through grazing at a specific time, intensity, and duration to reduce abundance of these species. Under controlled situations, where livestock is used as a targeted vegetation treatment tool, livestock can reduce fine fuel loads (e.g., cheatgrass) (Diamond et al. 2009). Recent research suggests that bunchgrass community structure and the presence of biological soil crusts increases resistance to cheatgrass invasions and that grazing management that decreases those components decreases the vegetation communities' resistance to invasion (Reisner et al. 2013). Cheatgrass completes its reproductive cycle, using limited soil moisture and nutrients, well before most native perennial grasses and is usually dry by mid-summer, which coincides with increased fire danger (Pellant 1996). Intense "flash" grazing during the winter or early-late spring, while it is still green, may control cheatgrass. Cheatgrass is highly variable in regards to production and grazing readiness from year-to-year (Schmelzer 2009), which makes it difficult to target livestock grazing at the most opportune time and to the proper extent to be an effective management tool. Sheep and goats (if permitted) can be used to control noxious weeds such as leafy spurge, spotted knapweed, and yellow star thistle. Weed management usually needs to occur during the spring to be most effective, though spring timing for the application of livestock specifically as a tool to control undesirable vegetation could conflict with GRSG nesting season.

Effectiveness of livestock as a management tool for the control of undesirable vegetation is highly dependent on the scale, livestock behavior, and ability to avoid grazing native vegetation. Within current permits, small-scale grazing management systems can be used to control invasive and noxious weeds but require consideration of several factors to ensure strategic planning is in place to target weeds. These factors include the kind of livestock, class (e.g., yearling, does, and ewes) of livestock most effective at controlling a particular species, growth stage of the plant at which livestock would be most effective, palatability of the plant, and plant response to grazing. Impacts on GRSG from the various targeted grazing practices could reduce habitat suitability shortly after the targeted grazing, but this would occur in areas where the presence of invasive weed species would have already affected the condition of GRSG habitat. After the targeted area recovers from grazing, if grazing to reduce invasive species were implemented effectively and controlled from using adjacent unaffected areas, GRSG habitat could be improved. While livestock grazing as a management tool for controlling undesirable plants within GRSG habitat may be effective in limiting the expansion of these species and may protect intact sagebrush

habitat for GRSG, livestock can also disperse weed seeds, which could cause spread of invasive plants into areas previously free from infestation. Implementation of weed control practices through livestock management may limit the permittees ability to use the allotment for general livestock production. The use of targeted livestock grazing as a management tool has been effective in resulting in changes in small area, when conducted within specific terms of a permit. However, management of large-scale weed invasions and manipulating livestock management to address those situations would require additional NEPA before implementation.

The impacts of livestock grazing within sagebrush habitats can be compounded during periods of drought. The BLM and Forest Service have authority to modify grazing management practices when necessary to lessen livestock impacts on drought-stressed public land resources. Drought conditions often require annual adjustments in livestock numbers to provide for the sustainability of the vegetative community. The impacts associated with the onset of drought can be alleviated through drought agreements and decisions to modify use and to monitor or temporarily close areas until conditions are suitable for grazing. Severe drought conditions within GRSG habitat could result in adverse effects on the sagebrush communities, and in some cases may result in a long-term loss of the herbaceous vegetation due to reduced capabilities to plants to recover from the increase stresses of drought. Herbaceous vegetation, especially in areas that did not evolve with repeated large ungulate grazing, may be more susceptible to mortality during or after droughts if grazing (domestic and wild) has already reduced the overall vegetation vigor.

Although the potential for population level effects are uncertain, GRSG may also be directly impacted by livestock in the event that livestock destroy GRSG eggs or cause nest desertion (Beck and Mitchell 2000). Trampling by livestock under short-duration or season-long grazing may also kill sagebrush, particularly seedlings growing in the spaces between shrubs (Beck and Mitchell 2000). This occurs most where livestock congregate (e.g., near watering areas or supplement blocks).

While active AUMs would be available for livestock grazing, the actual number of AUMs authorized on a permit may be adjusted through permit renewals, permit modification, allotment management plan development, or other appropriate implementation activity. While 329,521 AUMs would be available on BLM-administered lands and 265,373 AUMs would be available on National Forest System lands, the average actual billed use over the past 10 years was approximately 70 percent and 98 percent of permitted use, respectively. Therefore, although Alternative A could result in 100 percent of the permitted use being used, such use would only be permitted if climatic and environmental conditions resulted in forage production capable of supporting this level of use while complying with the terms and conditions of the permits.

Annual adjustments to active AUMs would continue to occur through annual grazing and would be based on site-specific evaluations to respond to variations in vegetation (e.g., rangeland health standards, allotment conditions, and permittee operational considerations drought). Making these annual adjustments to meet rangeland health standards and LUP objectives could maintain or improve GRSG habitat since actual use would correspond to vegetative conditions. However, because Alternative A does not require consideration of GRSG habitat guidelines and because

most existing plans do not include specific GRSG habitat objectives that must be met, annual adjustments would maintain or improve GRSG habitat only insofar as such habitat is benefitted by rangelands that meet general rangeland health standards and guidelines for livestock grazing in Utah, as well as considerations given to BLM special status species (see **Table 3.59** on the acres of allotments and the Rangeland Health Standards). Without specific management actions in regards to GRSG, current trends in overall GRSG habitat condition would continue and livestock actual use numbers would be anticipated to be maintained. Additionally, completion of rangeland health standards evaluations in GRSG habitat would receive the same prioritization as all other areas. As a result, rangeland health standards evaluations would be conducted on a case-by-case basis, usually associated with permit renewals. This would mean that some areas of GRSG habitat would go several years without a formal evaluation of whether the area is meeting rangeland health standards, which could result in habitat in some areas being affected in a negative trend before the issue is identified and steps are implemented to correct the trend. Because the Uintah planning unit LUP includes specific height and use requirements for GRSG habitat, livestock grazing in the areas addressed by that plan would be conducted in a manner that achieves or maintains the needed GRSG habitat attributes.

#### *Impacts from Wild Horse Forage Use (Herbivory)*

While the effects of wild horse grazing on vegetation are similar in nature to those described above, horses remove more of the plant than cattle or sheep, which limits and/or delays vegetative recovery (Menard et al. 2002), and horses can range further between water sources than cattle, making them more difficult to manage (USFWS 2013). Additionally, because horses separate themselves from cattle and use higher elevations and steeper slopes, areas of sagebrush with wild horses may have fewer occurrences of ungrazed areas (Connelly et al. 2004). Research has shown that sites grazed by wild horses have a greater abundance of invasive plant species, reduced native plant diversity, and reduced grass density (Beever and Aldridge 2011) compared with areas not grazed by wild horses. This is because wild horses are dietary generalists; while they will preferentially select for grasses, in the absence of grass species, wild horses will turn to shrub and forb communities for a major portion of their diets for sustained nutritional needs. Unlike cattle, wild horses are continuous grazers, capable of being highly selective, and clip grass very close to the base of a plant. The manner in which wild horses use forage could lead to reduced herbaceous vegetation (perennial grasses and forbs) for nest concealment. Reduced nesting cover could lead to increased predation on nests and young. The ability to selectively choose forage species that are preferred could also lead to reduced diversity of desirable perennial grasses in areas that are heavily used by wild horses and a dominance of less palatable and less desirable vegetation species (Beever and Aldridge 2011).

Research on vegetation community responses to grazing pressures by horses demonstrated that areas without horses showed higher shrub cover, greater total plant cover, greater species richness, greater native grass cover, and greater frequency of native grasses (Beever et al. 2008). In areas where wild horses and GRSG use overlap in winter concentration areas, wild horses may reduce shrub cover and the quality of winter habitat for GRSG.

Water is an important resource for wild horses, which use water troughs and natural springs. Wild horses are often one of the causal factors for riparian habitats that are not achieving proper functioning condition. Impacts on riparian habitat degradation are similar to those

discussed in the Grazing section. As previously mentioned, wild horses are year-round grazers on public lands within the HMAs, unlike livestock where grazing management systems can be developed to alleviate seasonal grazing pressures such as hot-season grazing in riparian habitat. One of the only means to alleviate wild horse impacts on riparian areas is to construct an exclosure fence and develop the spring with an offsite trough or ensure there is still some access to the water. The loss or degradation of riparian habitats could cause GRSG to use less optimal habitats for late brood-rearing activities, and in the absence of other areas, could reduce the population levels. In the Hamlin Valley, Carbon, and Sheeprocks Population Areas, the impacts from wild horses may interact with other local threats and decrease a GRSG population's vigor and resiliency.

Under Alternative A, wild horse populations would continue to be managed for AMLs and in balance with other resource uses (e.g., rangeland health, livestock, and wildlife). Wild horse gathers would be prioritized based on escalating or potential emergencies, public safety, nuisance animals, court orders, population growth suppression, and resource impacts associated with monitoring data, which is generally based on wild horse population inventories, wild horse condition, availability of sufficient water and forage resources, rangeland health, use levels of upland habitats, and riparian resource conditions.

#### *Impacts from Wild Ungulate Forage Use (Herbivory)*

Native herbivores, such as pronghorn antelope (*Antilocapra americana*), elk (*Cervus elaphus*), and mule deer (*Odocoileus hemionus*) co-occur with GRSG (Miller et al. 1994), but there are no known studies that evaluate the impacts of native herbivores on GRSG. Concentrated native ungulate herbivory may impact vegetation in GRSG habitat on a localized level. For instance, elk may forage heavily in low-elevation sagebrush during heavy snow years (Wambolt and Sherwood 1999), and such browsing could have localized impacts on the vegetation by decreasing sagebrush cover. Impacts on GRSG could be detrimental or beneficial depending on when GRSG use the habitat and whether that habitat type is of limited availability for the local GRSG population. Loss of sagebrush in limited GRSG wintering habitat could adversely affect GRSG, especially when combined with other threats impacting a local GRSG population. Conversely, if the area impacted by winter foraging from elk is also brood-rearing habitat, the decreased sagebrush cover may improve brood-rearing habitat by decreasing the competitive advantage for sagebrush and increasing the availability of resources for grasses and forbs.

#### *Impacts from Livestock Grazing Program Actions*

A variety of actions are taken to support the use of BLM-administered and National Forest System lands for livestock grazing, which may include the construction of fences, roads, and stock ponds/watering troughs. Range improvement projects such as fences, water developments, and pipelines are intended to provide for implementation of grazing management systems that ensure proper livestock grazing. Additionally, vegetation treatments, though often not implemented just for the livestock-grazing program, can affect GRSG habitat. The effect of these actions on GRSG are different than those of herbivory, in that these actions are discrete in time and place and can directly affect GRSG and their habitat.

The development of water sources has the potential to improve the distribution of livestock on the landscape, allowing grazing in areas that were previously ungrazed or lightly grazed within an

allotment. In many situations in Utah, water developments for livestock are designed to provide water sources away from riparian areas and other livestock concentration areas, improving the condition of the natural riparian areas and the associated brood-rearing habitat. In addition to range improvement projects to facilitate livestock management, herding and placement of mineral/salt blocks can be employed to improve livestock distribution. These practices can increase use of little used areas in an allotment due to distance from water. This reduces the use of some areas in the allotment, but it also has the effect of spreading the impacts of herbivory over a larger area (Connelly et al. 2004), thus expanding affects upland areas important for GRSG during nesting, early brood rearing, and winter seasons.

Open water associated with ponds, natural or constructed, has been suggested as a limiting factor for summering GRSG. While water availability may influence the species' summer distribution (Patterson 1952; Autenrieth 1981), movements to summer range are probably in response to lack of succulent forbs in an area rather than a lack of free water (Connelly and Doughty 1989). GRSG do not need open water sources but will opportunistically use water when available. Existing research suggests that GRSG do not regularly use water developments even during relatively dry years, but obtain required moisture from consuming succulent vegetation in the vicinity (Connelly 1982; Connelly and Doughty 1989; Connelly et al. 2004). Water sources may also facilitate the spread of West Nile virus within GRSG habitats as these water developments may support populations of the mosquito (*Culex tarsalis*) associated with West Nile virus longer than natural, ephemeral water sources (Walker and Naugle 2011). Water projects that create mesic zones around water developments to promote the growth of succulent vegetation may inadvertently contribute to the proliferation of West Nile virus as *Culex tarsalis* regularly breed in water-filled hoof prints in these areas (Walker and Naugle 2011). In addition, Kirol and others (2015) found that presence of water developments (associated with energy development) was that primary factor attributed to decreased nest success.

Fences are widely used within grazing allotments to facilitate livestock grazing management systems. Fences within GRSG habitat can result in GRSG collision, causing injury or mortality, though it is unknown if those mortalities are compensatory or additive (Call and Maser 1985; Connelly et al. 2004; Christiansen 2009; Stevens et al. 2012). Much of the available research has been limited to GRSG breeding habitats; however, fence collisions are likely a risk factor in other GRSG habitats. Fence collisions have been documented by localized studies or observations in Wyoming, Idaho, and Utah. In the Rich Population Area in Utah, 36 GRSG carcasses were found along a 2-mile stretch of fence within 3 months of the fence being constructed (Call and Maser 1985). In Wyoming, Christiansen (2009) placed fence markers on a portion of fence after 143 GRSG collisions were documented over a 2-year timeframe and found that the markers decreased collisions by 70 percent over unmarked fences. Christiansen identified that fence design, landscape topography, and spatial relationship to seasonal habitats are the primary factors that affect mortality risk to GRSG. More recently, Stevens (2011) conducted research in Idaho GRSG breeding habitat to specifically test the efficacy of fence markers by identifying numerous high-collision fence areas and marking these fences. Results were similar to Christiansen; marking high-risk fences decreased collision rates, but by 83 percent (Stevens et al. 2012). In general, collisions were more common along fences with steel t-posts and a greater than 12-foot span between posts than with wooden post fences with a less than 12-foot span between them (Stevens 2011). Ultimately, terrain ruggedness and distance

from the leks were the primary factors associated with high fence collision risk (Stevens et al. 2013). As a result, Stevens and others (2013) developed a Fence Collision Risk Tool to aid managers throughout the West in identifying potential high-risk areas for fence collisions (Stevens et al. 2013). This mapping will assist in marking fences where there is a high risk for collision, because not all fences within 1.2 miles of all leks are a high-collision risk and need to be marked.

Fences can also increase opportunities for raptor perching and predation on GRSG. Impacts would be expected to increase in areas where perching is occurring in proximity to seasonal habitats where GRSG are concentrating. Concentrations of predators may also result in habitat fragmentation due to avoidance strategies by GRSG to avoid areas of high predator use (Dinkins et al. 2012).

In contrast to the deleterious effects of fencing, fences can also improve GRSG habitat conditions by protecting riparian areas and brood-rearing habitats from overgrazing. The assessment of the impact or benefit of fences must be made considering local ecological conditions and the movement of GRSG within local areas (Stevens et al. 2012).

GRSG have been known to use openings in the sagebrush created by human activities (e.g., sheep camps, water hauls, and corrals) as leks during breeding season. Continued human use of these areas outside of breeding season would maintain the areas' openness and value to GRSG as a lek. However, if human use of these areas shifts to coincide with breeding season, breeding activities could be disrupted by the presence of humans, livestock, sheep dogs, and associated equipment (e.g., camp trailers, water trucks, and troughs) at the site. The potential of impact would depend on the type of activity and its timing and duration (e.g., winter season versus breeding season, 1 month versus 4 months). If the human presence extends from the breeding through the nesting season, the impacts could result in GRSG displacement from the area and shifting into less desirable locations.

Other disruptions that may occur because of rangeland management include disturbance from water hauling, range improvement project maintenance, and livestock trailing/herding or transporting. Given the frequency of these types of projects, the likelihood of a long-term effect on population areas is low.

Livestock and associated human facilities may also increase the presence of predators such as ravens, coyotes, eagles, and other raptors. Dead livestock and trash can attract predators, which may then prey upon or disrupt GRSG using these sites (e.g., leks, nesting areas) or cause displacement into less desirable habitats.

Direct augmentation of habitat condition by rangeland treatments used to manipulate vegetation may have a greater effect on long-term GRSG habitat availability and condition than the impacts of grazing described above (Freilich et al. 2003; Knick et al. 2011). After the introduction of livestock grazing in the West, the reduction of native grasses and forbs would have created a competitive advantage for sagebrush, increasing density over time. Driven by the desire to increase forage production on rangelands, large areas of sagebrush were treated to reduce shrub cover and introduce additional forage species adapted to regular grazing. These historic treatments directly reduced available GRSG habitats and fragmented intact blocks of sagebrush,

reducing the quality and quantity of habitat value for GRSG. Current management generally provides for the maintenance of existing areas that were treated and implementation of new treatments to meet LUP objectives, as needed. Currently, the nature of BLM vegetation treatments are designed in consideration of multiple-resource benefits and provide quality habitat for wildlife, wild horses, and livestock and are not oriented towards single-use projects as was done in the 1950s to 1970s for livestock forage. The BLM currently implements treatments for general habitat augmentation, such as reducing pinyon-juniper, treating areas of dense sagebrush to increase understory grasses and forbs, treating areas affected by invasive species or wildfire, or reducing vegetation through building fuelbreaks. Additionally, diverse seed mixes include a variety of native and nonnative grasses, forbs, and shrubs with an emphasis on natives. Throughout Utah, seed mixes are identified that consider GRSG habitat values, particularly sagebrush, and a diverse component of grasses and forbs. Similarly, the Forest Service implements a diverse array of vegetation management approaches to benefit multiple resources, including wildlife habitat. Under Alternative A, most seedings would be maintained by removing competing vegetation in order to prevent the seeding from accomplishing the initial objective of the seeding. Since GRSG habitat objectives are not generally addressed in current LUPs, it is anticipated that such maintenance would not be a direct improvement of GRSG habitat.

Research suggests that GRSG need a minimum range of 50 to 70 percent of the landscape acreage in sagebrush cover for long-term GRSG persistence (Aldridge et al. 2008; Doherty et al. 2010; Wisdom et al. 2011). Sagebrush currently comprises approximately 56 percent of the occupied GRSG habitat in the planning area. Additionally, GRSG often show a preference for heterogeneous stands of sagebrush (Crawford et al. 2004). Dense stands of sagebrush have the potential to reduce the presence of understory forbs and grasses and in the past, these habitats have been treated to increase grass cover (Utah Greater Sage-Grouse Working Group 2013). However, dense stands of sagebrush can be very important for GRSG during the winter, and recent research evaluating the impacts of mechanical, chemical, or fire treatments in occupied GRSG habitats suggest that it is not advisable to treat these areas, especially in Wyoming sagebrush areas (Connelly et al. 2000; Beck and Mitchell 1997; Heath et al. 1997; Beck et al. 2012).

Under Alternative A, most plans do not specify habitat treatments for GRSG but do usually include allowances for continued habitat treatments using a variety of treatment methods. In addition to the treatment methods identified in the existing plans, general impacts associated with vegetative treatments on BLM-administered lands tier to the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement (2007)*, which analyzes and recommends treatment methods to be used on BLM-administered lands. Methods include mechanical and manual treatments, biological treatments, prescribed burning, chemical applications, and use of livestock. In addition, to authorize vegetative treatments and other range improvement projects, site-specific NEPA analysis and decisions are developed and issued in accordance with BLM and Forest Service regulations and policies. Given the continued allowance of multiple treatment types, combined with the general lack of GRSG objectives in the existing plans, GRSG habitat under Alternative A would continue to receive vegetation treatments. Where those treatments reduce pinyon-juniper encroaching into sagebrush, GRSG habitat quantity and quality could be increased.

Where the treatments reduce areas of dense sagebrush, the impacts on GRSG would depend on the limiting habitat in the area. In some instances, GRSG winter habitat could be reduced, exposing the local GRSG population to lack of winter habitat under certain climactic conditions. In other instances, GRSG brood-rearing habitat would be increased, with closed-canopy sagebrush being opened up to allow for an increase in the grass and forb understory. The effect of the various vegetation treatments would depend on variables such as the type of the treatment, the ecological site potential, and the limiting factor for GRSG in the area.

#### *Impacts from Wild Horse Program Actions*

The main impacts on GRSG from the wild horse program would be associated with period gathers of wild horses. Activities associated with wild horse gathers include using low-flying helicopters, operating support vehicles, and constructing a series of fenced holding pens. All these activities generally occur in a relatively small area and can result in direct disturbance to GRSG habitat in proximity to the gather operations. Gather operations that use helicopters are limited to between July 1 and February 28 due to the moratorium on wild horse gathers during the foaling season (March 1 to June 30), which would alleviate any concerns with disturbance to GRSG during the majority of the breeding season. Impacts associated with any change in this timing would be addressed in environmental assessments associated with the specific gather. While gather operations could result in damage or loss of nests and young chicks if wild horses being gathered travel through areas that are being used for nesting and early brood rearing, most hens have hatched their broods by the end of June, and most broods would be old enough to escape such disruption. Disturbances associated with wild horse gathers would be localized around the trap sites, which are typically but not always located in previously disturbed areas.

#### **Recreation**

Recreational use of BLM-administered and National Forest System lands can be categorized as dispersed or casual (e.g., camping, bicycling, wildlife viewing, shed gathering, equestrian, fishing, and hunting), concentrated (e.g., OHV use and developed campsites), and permitted (i.e., BLM SRP or Forest Service recreational SUP). The BLM also manages SRMAs where recreation is a primary resource management consideration.

Recreation activities (e.g., OHV use [all-terrain vehicle, motorcycle, and 4 x 4 vehicles], camping, bicycling, and hunting) on federally administered lands that use the extensive network of routes (e.g., double-track and single-track) have an impact on sagebrush and GRSG (also see Infrastructure - Roads). Potential impacts include noise (Blickley et al. 2012a, b), distribution of invasive plants (With 2004; Christen and Matlack 2009; Bradley 2010; Huebner 2010), generation of fugitive dust (Gillies et al. 2005; Lee et al. 2007; Ouren et al. 2007; Padgett et al. 2008), and effects on predator and prey behavior (Gavin and Komers 2006; Poulin and Villard 2011; Whittington et al. 2011). The impacts of recreation within GRSG habitats in Utah are not likely to cause a direct irretrievable loss of sagebrush habitats in the majority of the population areas. However, habitat loss could occur associated with cross-country OHV travel, which is only allowed on some BLM-administered lands.

Recreational activities can degrade GRSG habitat through direct impacts on vegetation and soils, introduction or spread of invasive species and noxious weeds, and habitat fragmentation. This occurs in areas of concentrated use such as developed or dispersed campsites, trailheads,

staging areas, and routes and trails. As use levels increase, the magnitude of these impacts also increases.

The spread of invasive species and noxious weeds is likely to be greater with dispersed recreation compared with permitted activities. This is primarily because the BLM and Forest Service place stipulations on permitted uses to help control the spread of invasive species and noxious weeds on public lands.

Direct disturbance to GRSG resulting from recreational use is most likely to be influenced by type of activity, frequency and magnitude, timing of the activity, and location. OHV use is expected to result in the greatest level of impact due to noise levels generated as compared with hiking or equestrian use. OHV users are most active in the southeastern and central parts of Utah; BLM-administered land is the primary destination, and approximately half prefer to ride off of established roads or trails (Fisher et al. 2002). In addition, increased human use of areas could attract GRSG predators (e.g., ravens) through residual trash and food waste.

Motorized activities are expected to have a larger footprint on the landscape than nonmotorized uses. Cross-country OHV travel, which is permitted in designated areas on BLM-administered lands but not on National Forest System lands, would result in increased potential for soil compaction, loss of perennial grasses and forbs, and reduced canopy cover of sagebrush (Payne et al. 1983). Losses in sagebrush canopy would likely be the result of repeated, high frequency, cross-country OHV use over long periods. 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.

Under Alternative A, 797,000 acres of GRSG habitat on BLM-administered lands is open to cross-country travel, the majority of which falls within the Hamlin Valley, Bald Hills, Rich, Sheeprocks, and Box Elder Population Areas. All of these population areas are in the western or northern part of the planning area. Many of these habitat areas are also susceptible to impacts from invasive species and fire. Cross-country OHV travel within the BLM-administered portions of these areas could result in the establishment of new motorized vehicle routes and cause fragmentation and loss of GRSG habitat. OHV travel can also result in the spread of invasive species and increase the frequency of fires, thereby causing habitat loss and degradation. The magnitude of these impacts would depend on amount and type of use; however, since sagebrush structure is typically not conducive to cross-country OHV travel, the proliferation of new routes in these areas is expected to be limited. Population areas with BLM-administered lands that are 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.

Almost all other GRSG habitat on BLM-administered lands in the planning area would be limited to existing or designated routes. All National Forest System lands would be limited to designated routes. Limited designations reduce or eliminate the creation and proliferation of new routes in GRSG habitat. However, use of designated routes may still cause habitat loss and fragmentation as described above; the magnitude of impacts would depend on the frequency and type of use as well as the density of routes. Noise associated with OHVs in open or limited

areas could result in disruption of birds as described above (Blickley et al. 2012a, 2012b). In areas where there is concentrated use, persistent disruption could eventually result in species displacement and an effective loss of habitat.

BLM SRMAs that overlap GRSB habitat and are specifically designated for OHV recreation include the Sheeprocks/Tintic Mountains and Five Mile Pass SRMAs within the Sheeprocks Population Area. Recreational OHV use is higher in these areas because they are located in the wildland-urban interface and have established route systems. OHV use in these areas is generally limited to designated or existing routes. Based on the amount of use, impacts on GRSB are greater in these locations than in other occupied habitat areas.

Anticipated increased use of BLM and Forest Service existing and designated routes within the planning area under Alternative A due to increasing human populations would have impacts as described above, including habitat avoidance and loss of functional habitat, proliferation of invasive species and associated increased fire risk, and increased predation.

Under the Alternative A, the BLM and Forest Service would continue to issue SRPs and recreational SUPs in GRSB habitat, including permits for motorized events. Issuance of permits for motorized recreation events, including races, would have similar impacts as those described above. These impacts would be short in duration, high in intensity, and limited in extent. Currently the only races that are permitted within GRSB habitat are in the southern portion of the Sheeprocks Population Area in winter habitat. Since race events typically occur during the spring season, the potential for displacement is low, but habitat degradation from trail use could occur.

In addition to impacts from OHV use, there would be impacts from other recreation activities occurring in GRSB habitat. For example, the Uintah, Wyoming-Blacks Fork, and Strawberry Population Areas contain a concentration of recreational sites. Recreational activities include fishing (year-round), camping, hiking, OHV use, winter snowmobile use, and hunting. Increased human activity associated with use of these sites and adjacent areas could result in habitat degradation and species disruption. Impacts from dispersed recreation (e.g., shed collection, hiking, and hunting) would have similar impacts on those that would occur near developed recreation sites; however, these impacts would be lesser in extent due to the dispersed nature of the activities.

#### ***Habitat Conversion for Agriculture and Urbanization***

USFWS identified habitat conversion for agriculture and urbanization as threats contributing to destruction, modification, or curtailment of GRSB habitat or range. While agricultural conversion or urbanization are not activities permitted on BLM-administered or National Forest System lands, the lands and realty program and travel and recreation management programs could contribute to or be influenced by increasing urbanization levels through increased development, increased energy demands, and increased direct and indirect anthropogenic impacts on GRSB. In Utah, lands generally suitable for agricultural conversion have already been converted. Similarly, conversion of sagebrush habitat to agriculture is not expected on National Forest System lands in Utah. This section will analyze the impacts from land tenure decisions under the lands and realty program. See the Infrastructure section for ROW issuance, the Recreation section for activities authorized under the Travel and Recreation Management

programs, and the Minerals section for more detailed GRSG impacts analyses specific to those programs.

Under Alternative A, 24,400 acres of BLM-administered land within GRSG habitat are available for disposal. No National Forest System lands within GRSG habitat are available for disposal. While disposal of GRSG habitats could contribute to habitat loss, degradation, and disruption to GRSG, lands with sensitive species (including GRSG) would not be disposed of unless there was a net benefit for GRSG.

#### ***ACEC Designation***

Special management areas such as ACECs and research natural areas can be used as a management tool to provide protection to GRSG and habitats through restrictions on uses and surface-disturbing activities. However, the ACEC designation itself does not inherently prohibit or restrict other uses in the area. Rather, the management of ACECs is focused on the resource or natural hazard of concern, which varies considerably from area to area. In some cases, surface-disturbing activities may be allowed. In contrast, research natural areas are permanently protected and maintained in natural conditions for the purposes of conserving biological diversity, conducting nonmanipulative research and monitoring, and fostering education. In these areas, GRSG habitats would be more likely to be protected over the long term.

Although no existing ACECs or research natural areas include GRSG as a relevant and important value, some existing ACECs and research natural areas overlap GRSG habitat and may provide incidental protection to GRSG and their habitats by restricting land disturbances (e.g., ROWs) within their boundaries. Existing ACECs overlap with small portions of occupied habitat in the Box Elder, Rich, Carbon, and Uintah Population Areas, and research natural areas overlap with occupied habitat within the Rich Population Area (see the Special Designations section of **Chapter 3** for a list of overlapping ACECs and research natural areas).

#### **4.3.3 Alternative B**

##### ***GRSG Habitat and Disturbance Thresholds***

Under Alternative B, 84 percent of the mapped occupied habitat in the Utah planning area would be managed as PHMA. This includes 97 percent of the mapped occupied habitat in the USFWS-identified PACs. Under this alternative, leks associated with 95 percent of the GRSG in the planning area would be managed as PHMA. The areas of GRSG habitat managed as GHMA include areas with poor habitat quality largely due to the presence of existing disturbances or ecological conditions that are not best-suited to maintain GRSG in the long term.

Under Alternative B, disturbances would be limited to an aggregated 3 percent disturbance cap at two spatial levels: 1) within the PHMA (regardless of land ownership); and 2) within each section or one square mile (unless exceeding 3 percent in a section would be a net benefit for GRSG). Disturbance would be calculated in all PHMA in a population area, regardless of land ownership. Disturbances would include discrete anthropogenic disturbances (excluding fire). No new leasing or ROWs would be allowed in PHMA. Therefore, the disturbance cap would primarily apply to valid existing rights. While individuals would be given reasonable access to their valid existing rights, no related disturbances would be allowed within 4 miles of a lek to the extent possible. Application of RDFs and the requirement to complete a Master Development

Plan would additionally minimize surface disturbance on valid and existing rights by proactively planning all the development rather than developing with a piecemeal approach.

In the Uintah and Carbon Population Areas, existing disturbance in PHMA is 1.7 and 1.1 percent, respectively. Thus, less disturbance would be permissible in these population areas under the 3 percent disturbance cap. Other population areas have approximately 1 percent or less existing disturbance. Assuming that the existing disturbances within PHMA do not already equal or exceed 3 percent disturbance, the exclusion of fire in the disturbance calculation would allow for continued disturbances even if fire has decreased available GRS habitat. Impacts could be particularly pronounced in areas that have the highest occurrence of fire (e.g., Box Elder, Sheeprocks, Ibapah, Hamlin Valley, and Bald Hills). As shown in **Table 3.53**, wildfire has resulted in a loss of 5 percent of sagebrush in mapped occupied habitat statewide. Fire has impacted 8 percent of the sagebrush in the Bald Hills, 4 percent of the GRS habitat in the Box Elder, and 2 percent of the Ibapah Population Area. Depending on how much occupied sagebrush habitat was lost in the fire, the quality of those habitats, how the birds used the lost habitat, and how much of that specific seasonal habitat type remains, the resiliency of the GRS population areas could be diminished. Larger impacts may occur in the smaller population areas where a larger percent of the area burned (e.g., Bald Hills).

### **Minerals**

#### *Nonenergy Leasables*

Under Alternative B, the BLM and Forest Service would close all PHMA to nonenergy leasable mineral leasing. Under this alternative, new leases to expand existing mines would also not be allowed. This would prevent future impacts from nonenergy leasable mineral development in these areas. For existing leases, RDFs listed in Appendix I, Best Management Practices for Locatable Minerals and Required Design Features for Other Solid Minerals, of the Draft LUPA/EIS would be applied. The primary development potential for nonenergy leasable resources is gilsonite and phosphate, which occur in the Uintah Basin (**Map 3.21-5**). The RDFs are intended to lessen the impact of the development of gilsonite and phosphate within occupied GRS habitat. They specifically aim to address impacts such as fragmentation, habitat loss disturbance, and habitat degradation associated with roads, operations, and reclamation. Since the RDFs would not be required in GHMA, existing leases on BLM-administered lands in the gilsonite development area may have a larger impact on East Bench area leks. The majority of the area has gas development with wells that range from 2 to 50 wells per square mile. Therefore, GRS habitat loss, habitat degradation, and disturbance could add to the existing disturbances in the area and affect a small number of birds (10-year average male count is 1 male on BLM-administered lands lek and 4 males on both leks). These impacts would further impact a population that has been declining and already has been substantially impacted by gas development on the landscape.

#### *Solid Minerals - Coal*

All surface mining of coal in PHMA would be found unsuitable under Alternative B, including 129,300 and 9,300 acres of high coal development potential areas in the Carbon and Emery (combined), and Panguitch Population Areas, respectively. This action would have more impact on the GRS population within the Panguitch Population Area, where surface mining of coal is

likely to occur. All current coal mining in the Carbon and Emery Population Areas is accomplished using underground mining methods.

For underground mining, no new leases would be granted unless all related surface disturbances, including appurtenant facilities, could be placed outside of PHMA. Therefore, surface disturbance-related impacts associated with new leases described under Alternative A would not occur. The only impacts from underground mining would be those impacts associated with subsidence. The potential impacts from subsidence would be the same as those described under Alternative A.

Where there are existing mining leases, new appurtenant facilities could still be placed near leks, impact nesting, and early brood-rearing habitats in PHMA. Efforts to minimize impacts in GRSG habitat would be made by encouraging new disturbances to be placed outside of PHMA. However, if it is not possible, then new disturbance would be collocated with other existing disturbed areas to the extent possible, which would limit fragmentation and habitat loss. If there are no existing disturbed areas, then the facilities would be built to the minimum standard necessary for operations. Lessening the amount of disturbance associated with appurtenant facilities would reduce both the direct loss of habitat and the functional loss of habitat.

There is limited coal development potential in areas that would be managed as GHMA; however, this alternative would not provide added protection to those areas.

#### *Locatables*

In PHMA, all of the locatable minerals (3,650,900 acres) would be proposed for mineral withdrawal. Validity examinations would be conducted to determine which existing mining claims constitute valid existing rights. Those claims lacking discovery would be declared null and void and contested. Those claims determined to be valid (a discovery of valuable minerals) would not be contested and would continue to enjoy all of the rights vested by the Mining Law of 1872, as amended.

Impacts on GRSG would be decreased with plans of operations that require effective GRSG mitigation, in perpetuity, prior to any proposed surface-disturbing activities. Seasonal restrictions would be considered if they would be effective to protect the GRSG. In addition to the above management, under this alternative the BLM and Forest Service would apply all of the BMPs identified in Appendix I of the Draft LUPA/EIS to the extent allowable by law.

All of the actions above would lessen the impact on GRSG in PHMA compared with Alternative A. A mineral withdrawal would provide the maximum protection from future locatable mineral entry, and the measures required in the plan of operations would afford protection to GRSG habitats already authorized in the area recommended for withdrawal. Direct loss of habitat and disruption during certain seasons would be reduced for GRSG within PHMA under this alternative. Functional loss of habitat would also be decreased with the implementation of the BMPs in Appendix I of the Draft LUPA/EIS. While current locatable mining in GRSG habitat in the planning area is minimal, this alternative would decrease the likelihood of impacts on GRSG on federal lands.

*Mineral Materials*

Under Alternative B, all PHMA (3,340,000 acres) would be closed to mineral material sales. Mineral material pits that are no longer in use would be restored to meet GRSG conservation objectives. The closure of all mineral material sales in PHMA would also eliminate any additional habitat loss, habitat degradation, and disturbance from activities associated with mineral material extraction.

*Fluid Minerals (Including Geothermal)*

Under Alternative B, all PHMA would be closed to new mineral leasing. Upon expiration or termination of existing leases, nominations/expressions of interest for parcels within PHMA would not be accepted. Closing PHMA to new fluid mineral leasing would have the greatest impact in unleased areas where there is high oil and gas potential, such as the Rich Population Area.

Operations would only be allowed via helicopter-portable drilling operations and in accordance with any seasonal timing restrictions and/or other restrictions to protect GRSG. Closure of PHMA to new leasing could cause developers to look to private, tribal, and state lands within PHMA and develop those areas more heavily if the nonfederal lands are of sufficient size to support economically profitable development. This is most likely to occur in areas where there are mixed landownership patterns, such as in the Rich Population Area and the central Uinta Basin. Impacts could result in direct habitat loss, habitat degradation, and disturbance to birds and may, depending on development proximity to federal mineral estate, cause functional habitat loss on federal lands. This alternative may still result in habitat loss, degradation, and disturbance to birds, but the impacts would be concentrated on nonfederal mineral estate. In areas where there are predominately federal lands, closure to new fluid minerals leasing could discourage new development of nonfederal lands because it may no longer be economically viable to develop nonfederal lands in PHMA. In such areas, closure of federal lands could provide protection for GRSG on nonfederal lands.

In areas of PHMA that have already been leased, the conservation measures listed in **Chapter 2** would be applied through completion of an environmental record of review (43 CFR 3162.5), including appropriate documentation of compliance with NEPA when the BLM or Forest Service approve an APD or Sundry Notice (43 CFR 3101.1-2). Where feasible, application of RDFs, including precluding disturbance within 4 miles of a lek, would reduce most impacts on the lek and the surrounding nesting habitat. A 4-mile buffer maintained by NSO stipulations on existing leases would protect up to 74 percent of the nesting birds (Holloran and Anderson 2005; Holloran et al. 2007). Such buffer requirements may reduce the economic feasibility of leasing in GRSG habitat and result in existing leases not being developed.

To minimize the possibility that disturbance thresholds are exceeded and GRSG populations respond negatively, permitted disturbance would be limited to one disturbance per section and could not exceed 3 percent. In the Uintah and Carbon Population Areas, existing disturbance is 1.7 and 1.1 percent, respectively. This would allow for additional development, similar to the other population areas, but Uintah and Carbon are the population areas most likely to have energy-related development.

As mentioned in Alternative A, research has shown that GRSG are negatively affected when well pad densities within approximately 2 miles of a lek exceed one well pad per section (Tack 2009) or one well pad within 1.2 miles of a lek (Gregory and Beck 2014). Equitable distribution of disturbance across the landscape would prevent development at densities that would impact lek attendance. On the other hand, limiting the disturbance in GRSG habitat to one disturbance within a section, without flexibility, could distribute disturbance across the landscape and increase general fragmentation of PHMA. Other minimization measures would include completing master development plans, requiring unitization, and requiring design features in Appendix J, Required Design Features for Fluid Minerals, of the Draft LUPA/EIS to reduce fragmentation and direct habitat loss of all seasonal habitats. Unitization under this alternative would avoid duplication of infrastructure in GRSG habitat. Master development plans require the project proponent to plan the development as a unit rather than in pieces in order to encourage development designs that minimize impacts on GRSG. Impacts on GRSG within PHMA would also be decreased with the application of seasonal restrictions. Application of RDFs and other GRSG protection measures as COAs would have the greatest impact in leased areas where development is currently occurring, such as the West Tavaputs and Anthro areas.

Under Alternative B, the conservation measures listed in **Chapter 2** in Alternative B and RDFs in Appendix J of the Draft LUPA/EIS would be applied to nonfederal lands with federal mineral interests. This would reduce the impact of fluid mineral development on GRSG located on some private, state, and tribal lands, but may affect the feasibility of drilling on these lands under existing leases.

The RFD scenario for Alternative B decreased to almost half the development anticipated in Alternative A. There are 363 fewer wells and 7,373 acres less total disturbance (approximately 45 percent) projected in GRSG habitat for Alternative B than in Alternative A. The main difference in Alternative B is that wells would likely be strategically located in PHMA to minimize impacts on GRSG. In addition, some existing leases may not be developed due to the restrictions imposed under Alternative B.

The majority of the reasonably foreseeable development would occur in GHMA in the southern portions of the Uintah Population Area, Deadman's Bench, and East Bench, where disturbance is currently 2.5 percent with portions that currently exceed 10 wells per section. This could result in further habitat loss, degradation, and direct disturbance to the small population of birds that occupy this area. Impacts on GRSG in GHMA would be the same as described under Alternative A.

The impacts associated with geothermal leasing and development is essentially the same as those stated above because the acreage is already leased. The Bald Hills Population Area is the only population area where geothermal activity is anticipated. Geothermal activity would be managed constantly with the management described under PHMA.

### **Infrastructure**

New infrastructure development would be substantially limited compared with Alternative A. All GHMA (529,600 acres) would become ROW avoidance areas; all PHMA (2,784,200 acres) would be excluded from new ROW authorizations. New linear ROWs would be allowed only in designated ROW corridors. The inability to site ROWs in PHMA could lead to longer ROW

routes in order to bypass closed areas. Longer routes would increase surface disturbance and other impacts of ROW siting on GRSG habitats, and may result in increased impacts on GRSG populations using habitat on adjacent private lands.

Under Alternative B, all ROW corridors that are not encumbered by an existing ROW would be undesignated. Once undesignated, these areas would become exclusion areas. Construction of new infrastructure (e.g., roads, pipelines, and power lines) could occur in designated corridors located in PHMA as long as the new ROW is collocated next to an existing ROW and the entire footprint of the new ROW (including construction and staging) can be completed within the existing disturbance associated with the authorized ROWs. Given the restrictive nature of this management decision, construction of new infrastructure adjacent to existing infrastructure in PHMA would be improbable. Any new ROWs constructed would likely be limited to smaller ROWs such as telephone or fiber optic lines. Construction would be subject to TLs. Construction of new ROWs adjacent to existing ROWs could result in slightly higher densities of line. Impacts would be more pronounced in existing corridors that are close to leks. Higher densities of line within 4 miles of a lek negatively influence the probability of lek persistence (Walker et al. 2007a). However, given that new developments would likely be small, would be restricted to areas where direct habitat loss and degradation has already occurred, and would not occur during important seasons, impacts on GRSG would be minor.

Additional protection from infrastructure would be provided by closing PHMA to leasing of nonenergy minerals, leasing of fluid minerals, and mineral material disposal. For coal, PHMA would be closed to new surface mining, and underground mining would only be allowed if aboveground appurtenant facilities are located outside of PHMA. Finally, PHMA would be withdrawn from mineral entry.

On top of prohibiting or restricting new minerals development in PHMA, the BLM and Forest Service, to the extent allowable by law, would protect GRSG from development where there are valid and existing rights (i.e., existing mining claims and leases) through application of either BMPs or RDFs (depending on the mineral program). For example, in areas currently leased in PHMA, there would be a 3 percent disturbance cap on anthropogenic disturbances, and disturbance would be limited to approximately one disturbance per section.

In addition to making PHMA ROW exclusion area, new road development and associated new noise disturbances would not occur in PHMA because OHV use would be limited to existing roads and trails until additional travel management planning is completed. For additional restrictions on mineral development and OHV use, see Mineral Development and Recreation.

Because of restrictions across multiple resource programs, only a minimal loss of habitat within PHMA would occur. Disturbance would primarily be limited to development of existing leases. Some loss of habitat is expected to occur in the Uintah, Carbon, and Emery Population Areas where there is the greatest potential for minerals development.

Loss of habitat within GHMA would be more substantial because there would be fewer restrictions on land uses. However, as previously mentioned, BLM and Forest Service areas identified as GHMA support small GRSG populations, and loss of habitat within GHMA would be expected to occur primarily in the Uintah Population Area where fluid minerals development

is the greatest. Some habitat loss in GHMA may also occur in the Summit and Morgan county areas of the Rich Population Area due to urban development, though these areas are primarily private lands.

#### *Renewable Energy*

Under Alternative B, PHMA would be a ROW exclusion area for wind energy development. Prohibiting wind energy development would eliminate the likelihood for habitat loss, degradation, fragmentation, and direct disturbance to birds in these areas.

#### **Fire**

Under Alternative B, impacts from fire would be similar to those described under Alternative A but the BLM and Forest Service would designate 2,781,700 acres of GRSG habitat as PHMA. Within PHMA, fuels treatments would be focused on protecting GRSG habitats. 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 wintering habitat. Prescribed fire in low-precipitation areas (less than 12 inches) would also be prohibited. Invasive vegetation would be monitored and controlled (see Invasive Plant Species section). Where appropriate, the use of livestock to strategically remove fine fuels would be considered. Post-fire rehabilitation would be conducted using primarily native seeds, unless availability is low or conditions decrease likelihood for success, and grazing management may require temporary or long-term changes to ensure seeded or native plant persistence. These activities may decrease the likelihood for fire in GRSG habitats and would restore GRSG habitat in fire-affected areas. **Table 4.4** shows the estimated percent change in average annual acres burned over the next 50 years when compared with Alternative A.

**Table 4.4**  
**Alternative B VDDT Model Outputs- Average Changes in Fire, Juniper, and Annual Grasses Over 50 Years**

<b>Population Area(s)</b>	<b>Percent Change in Average Annual Acres Burned</b>	<b>Percent Juniper</b>	<b>Percent Change in Juniper</b>	<b>Percent Annual Grasses</b>	<b>Percent Change in Annual Grasses</b>
Box Elder	-8	11	57	9	0
Hamlin Valley, Ibapah	-29	26	4	5	-29
Rich, Uintah, Wyoming-Uinta, Wyoming-Blacks Fork	-10	13	0	3	-25
Carbon	-5	27	-7	1	-50
Emery	0	3	0	0	0
Parker Mountain, Panguitch, Bald Hills	-15	19	6	0	-100
Strawberry	-13	12	0	0	0
Sheeprocks	-35	31	-12	15	-12

According to the VDDT modeling, when compared with Alternative A, implementation of fuels and fire management decisions would reduce the number of acres burned annually in all population areas except Emery, where numbers are expected remain the same. Changes in fire

management would have the greatest impact in the Great Basin population areas that are most susceptible to wildfire.

**Table 4.5** shows changes in the percent of the modeled sagebrush area in the mid- to late-seral stage. Changes in trends are primarily a result of estimated changes in fire, annual invasive grasses, and juniper encroachment. The effects of management changes under Alternative B are most pronounced in the Sheeprocks Population Area, where at 10 years the modeled decrease in mid- to late-seral sagebrush is only 3 percent under Alternative B compared with 7 percent under Alternative A. This is more pronounced at 50 years, where Alternative B sees a 5 percent decrease in mid- to late-seral sagebrush compared with a 15 percent decrease under Alternative A. The long-term decreases in other population areas are similar, though to a lesser degree.

**Table 4.5**  
**Sagebrush Condition and Trend Analysis: Comparing Alternatives by Percent of Sagebrush Area in Mid- or Late-Seral Classes for Population Areas at 10 Years and 50 Years – Alternatives A and B**

Population Area	Percent of Sagebrush in Mid- and Late-Seral Class				
	Current Conditions	10 Years		50 Years	
		Alternative A	Alternative B	Alternative A	Alternative B
Uintah	80	76	77	67	69
Carbon	66	57	61	58	59
Emery	77	83	83	85	85
Parker Mountain	70	67	69	68	70
Panguitch	70	67	69	68	70
Bald Hills	70	67	69	68	70
Hamlin Valley	36	45	46	54	59
Ibapah	36	45	46	54	59
Sheeprocks	53	46	50	38	48
Box Elder	55	61	60	70	68
Rich	80	76	77	67	69
Strawberry	76	76	77	78	79
Lucerne	80	76	77	67	69
Wyoming-Uinta	80	76	77	67	69
Wyoming-Blacks Fork	80	76	77	67	69
<b>All</b>	<b>57</b>	<b>60</b>	<b>60</b>	<b>65</b>	<b>66</b>

At 50 years, the percent of sagebrush that would be mid- to late-seral stage would decrease in the Uintah, Carbon, Sheeprocks, Rich, Lucerne, Wyoming-Uinta, and Wyoming-Blacks Fork Population Areas. The percent sagebrush that would be in the mid- to late-seral stage would remain the same in the Panguitch, Bald Hills, and Parker Mountain Areas. The percent sagebrush that would be in the mid- to late-seral stage would increase in the Hamlin Valley, Ibapah, Box Elder, Strawberry, and Emery Population Areas. According to the model, at 50 years, all population areas except Carbon, Hamlin Valley, Ibapah, and the Sheeprocks would meet the GRSG habitat objective for Alternative B, which is to manage or restore PHMA so that at least 70 percent of the land cover provides adequate sagebrush habitat to meet GRSG needs.

As discussed in the introduction to this GRSG analysis (methodology), information derived from the VDDT model provides valuable information on estimated trends; however, the model also has a number of limitations. While quantitative objectives for treatments were not included under Alternative B, an increase in treatment could be consistent with the goal, objectives, and management actions considered under Alternative B.

Under Alternative B, not all occupied GRSG habitat would be managed as PHMA. Some occupied GRSG habitat in the Carbon, Uintah, Sheeprocks, Box Elder, Wyoming-Uinta, and Wyoming-Blacks Fork Population Areas would be managed as GHMA. GHMA (approximately 16 percent of the mapped occupied habitat in the planning area) are areas that have been determined to have less conservation value than PHMA. Removal of GHMA from the model area would likely result in decreases in percent of juniper and annual grasses and increases in the amount of sagebrush in the mid- to late-seral stage in PHMA. Therefore, population areas that are not currently meeting objectives may be able to meet objectives in the future.

### ***Invasive Plant Species***

#### *Weeds*

Under Alternative B, the BLM and Forest Service would greatly limit surface-disturbing activities in PHMA and would apply a 3 percent disturbance cap on anthropogenic disturbance. Prohibiting and restricting development would limit the introduction and spread of invasive weeds. In addition, management would be implemented to restore areas infested with invasive plant species. The BLM and Forest Service would require the use of native seeds and would design post-rehabilitation management to ensure the long-term persistence of the rehabilitation efforts. Invasive plant species would be monitored and controlled after fuels treatments and at existing range improvements. In addition, fuels management BMPs would incorporate invasive annual prevention measures. Together, these actions would minimize the likelihood for invasive annual invasion and may reduce the extent of invasive plant species in some areas. The actual change in the probability of invasive annual establishment would depend on the resources available to devote to the effort. Given the extent of existing invasive annual infestations and the lack of effective large-scale control methods, cheatgrass would largely remain a threat to GRSG and continue to spread and degrade habitats.

According to the VDDT model (**Table 4.4**), under Alternative B the percent of annual grasses would remain approximately the same in the Box Elder Population Area during the next 50 years. Based on elevation, invasive annual grasses are not dominant in the Emery and Strawberry Population Areas. Decreases in annual grasses would occur in all other population areas. Again, as shown in **Table 4.5**, when compared with Alternative A, more vegetation would be in the mid- to late-seral stage under Alternative B based on changes in weeds management, when combined with other management decisions.

#### *Conifer Encroachment*

Under Alternative B, impacts would be similar to those disclosed in Alternative A; however, habitat restoration would be prioritized in seasonal habitats found to be limiting GRSG population growth. Restoration of sagebrush habitats impacted by conifer encroachment would include habitat guidelines as outlined in Connelly et al. 2000 and Hagen et al. 2007. Managing

sagebrush communities to the habitat parameters outlined in Connelly et al. 2000 and Hagen et al. 2007 may not be appropriate for broad application across the range of GRSG; however, Alternative B allows for site-specific adjustments to habitat guidelines based on documented regional variations of habitat characteristics.

According to the VDDT model (**Table 4.4**), during the next 50 years vegetation treatments, including removal of encroaching conifer, would not be sufficient to prevent some loss of GRSG habitat due to juniper encroachment in the majority of the population areas. However, the amount of juniper would decrease in the Carbon and Sheeprocks Population Areas, which are two of the areas with the highest percent of juniper.

### **Grazing (Including Wild Horses and Burros)**

#### *Impacts from Domestic Livestock Forage Use (Herbivory)*

The potential impacts on GRSG habitat from livestock herbivory identified under Alternative A would continue to be potential impacts under Alternative B, with the exception that the likelihood of the impacts would decrease. Under Alternative B, the BLM and Forest Service would manage PHMA to incorporate GRSG-specific habitat objectives and management considerations, including maintaining vegetation diversity and limiting structural range improvements and standing water in GRSG habitat (see **Table 2.4**), into permit renewals, allotment management plans, or annual operating instructions. In addition to including specific objectives for GRSG habitat, land health assessments would be prioritized under Alternative B, increasing the potential to identify site-specific areas where the impacts described under Alternative A could be occurring. By prioritizing land health assessments, such areas, if they exist, would be identified and adjustments to grazing practices could be implemented to eliminate the impact. Efforts to improve GRSG habitat would focus on allotments that have the best opportunity for conservation, enhancement, or restoration of GRSG habitat, working in cooperation with other stakeholders in an integrated ranch planning approach. This proactive approach would manage GRSG habitat on a landscape level with nonfederal and federal areas being managed to improve overall GRSG habitat and identify areas with potential problems quickly. While site-specific impacts may still occur, given the prioritization of assessment and landscape approach, the duration of the impact would likely be short, thereby managing GRSG habitat to meet GRSG objectives.

Biologically, as long as sagebrush communities have not moved beyond an ecological threshold for the site to withstand (based on ESD), whether affected by juniper, annual nonnative grasses (e.g., cheatgrass), or other stressors, good ecological condition can be restored and/or maintained while being grazed (Launchbaugh undated). Even under such conditions, grazing practices need to be carefully managed to ensure that the threshold is not exceeded (e.g., number of animals, duration in the area, season of use, and rotation schedule). However, if sagebrush communities move past an ecological threshold, simply removing livestock grazing would not return the area to its previous state (Cagney et al. 2010; Launchbaugh undated). This is important, because under Alternative B, PHMA would be assessed based on GRSG habitat indicators such as structure, condition, cover, and composition, based on recommendations from Connelly et al. (2000) and Hagen et al. (2007) or locally derived habitat objectives. There are currently no local or statewide specific habitat objectives that address these metrics.

Therefore, PHMA would be managed based on guidelines set forth in habitat studies conducted in GRSG habitat outside of Utah, which may or may not provide for local vegetation community variations and site capabilities within Utah. While ESDs and ecological site potential would be used as a baseline to determine if rangeland health standards are being met, adjusting grazing to meet habitat guidelines based on studies from Oregon, Montana, Wyoming, Colorado, and Idaho may not be ecologically possible in Utah. In those areas where meeting such standards would not be possible, grazing would likely have to be reduced or removed. Reduced grazing may or may not help the area meet the Connelly and Hagen guidelines, given potential variations in the ESD. Alternative B does direct the BLM and Forest Service to develop specific objectives to conserve, enhance, or restore PHMA based on ESDs. While Connelly and Hagen guidelines may not be possible in all areas, moving vegetation toward ESD and ecological site potential would likely improve habitat components for GRSG, such as by increasing local grasses.

While active AUMs available for livestock grazing under Alternative B would be the same as under Alternative A, adding requirements for GRSG habitat objectives and implementing management to meet seasonal GRSG habitat requirements, specifically guided by ESDs and Connelly and Hagen guidelines, would require the application of a variety of grazing management measures identified under Alternative B. During assessment of habitat condition and Rangeland Health Standards, annual adjustments would likely have to be made to meet the new requirements, reducing the average annual AUMs used by livestock. While Alternative B could result in 100 percent of the permitted use being used, such use would only be permitted if climatic and environmental conditions resulted in forage production capable of supporting this level of use while meeting GRSG objectives. Since that may not be ecologically possible in some areas, it is anticipated that the average annual AUM usage would decline compared with Alternative A. In the short term, this would likely increase the amount and height of grasses on the landscape, improving brood-rearing habitat.

During periods of drought, impacts under Alternative B would be similar to those described under Alternative A because management is consistent with policies currently available to the BLM and the Forest Service that allow for adjustments to grazing practices to maintain rangeland health. However, because Alternative B includes specific objectives for GRSG and prioritization for assessments in PHMA, the likelihood that problems related to the drought would be identified and measures taken to correct problems would be greater under Alternative B. Additionally, under Alternative B, it would be expected that the impacts associated with drought within PHMA may provide assurances that actions are being taken in regards to livestock management to minimize the effects of drought and may provide for greater chance of recovery of vegetation communities impacted. Therefore, PHMA values would likely continue to meet food and cover needs during and following drought, and the likelihood for habitat loss or degradation caused by livestock grazing during drought would be reduced.

Continuing to manage riparian areas and wet meadows for proper functioning condition would protect GRSG brood-rearing habitat, similar to Alternative A. However, Alternative B would reduce hot season grazing within PHMA in riparian and meadow complexes through fencing and herding of livestock, season of use changes, or livestock distribution. While these same actions are provided for under Alternative A, they are not required. Therefore greater and more rapid

improvement would be expected for the maintenance and improvement of riparian and meadow complexes within PHMA.

Riparian areas and wet meadows would be managed for a reference state condition based on the ESD rather than PFC (or any Forest Service equivalent). This could reduce grazing further beyond just meeting PFC, resulting in additional growth within these areas. Some research indicates that GRSG preferred grazed over ungrazed wet meadows where protective cover conditions were otherwise equal (Neel 1980). This is likely due to overstories being maintained at a level that does not crowd out understory forbs. No similar literature exists for GRSG use of grazed or ungrazed riparian areas.

Collectively, the requirements to protect GRSG habitat in Alternative B would maintain or improve GRSG habitat compared with Alternative A. With the restrictions of Alternative B and the changes in riparian management, combined with the considerations of GRSG habitat, it is expected that over the life of the plan, the quality of GRSG seasonal habitats would improve given the focus on meeting GRSG habitat objectives. In the long term, reducing livestock grazing could result in some areas decreasing in productivity, resulting in the same impacts on the grass heights as described under Alternative A. Changes in productivity may not occur if increases in grazing by wild ungulates and other small mammals offset decreases in use by livestock.

*Impacts from Wild Horse Forage Use (Herbivory)*

Continuing to manage wild horse levels within established AMLs would result in similar impacts on GRSG habitat from wild horse herbivory as those described under Alternative A. However, evaluation of land health assessments in wild horse HMAs could identify vegetation conditions that could prompt gathers, reducing wild horse numbers and the associated impacts on GRSG habitats.

*Impacts from Wild Ungulate Forage Use (Herbivory)*

The impacts from wild ungulates would be the same as under Alternative A.

*Impacts from Livestock Grazing Program Actions*

Under Alternative B, new spring or seep development for livestock or wild horse water in PHMA would only be authorized if it would benefit GRSG. In addition, modifications to springs, seeps, and pipelines would be considered where it is determined necessary to provide continuity of the pre-development riparian area within PHMA when such modifications are neutral or beneficial to GRSG. Water developments or modification of existing water developments would incorporate BMPs to mitigate potential impacts from West Nile Virus. Therefore, riparian habitats would be maintained and would not result in long-term habitat degradation or loss within PHMA.

Alternative B would require that fences located in high-risk areas be removed, modified, or marked. This would reduce the potential for GRSG injury or death from incidental strikes compared with Alternative A, though the potential would remain in areas of moderate and low potential for strike. This would reduce the loss of individual birds, and reduce this threat to the population. Other structural range improvements would be designed and located to conserve, enhance, or restore GRSG habitat through an improved livestock grazing management system relative to GRSG objectives. Range improvement projects that are designed and located in

consideration of impacts on GRSG would reduce the likelihood of long-term habitat degradation, habitat loss, or disruption to GRSG movements or habitat quality.

Under Alternative B, introduced perennial grass seedings (e.g., crested wheatgrass, smooth brome) would be evaluated within and adjacent to PHMA and considered in regards to their compatibility with GRSG habitat. In addition, monitoring and treating invasive species associated with range improvements would reduce the potential for invasive or introduced species to further reduce the quality of adjacent GRSG habitats.

One of the larger differences between Alternative A and Alternative B is that range vegetation treatments must conserve, enhance, or restore GRSG habitat. The impact on GRSG is contained in the decision itself, in that only treatments that improve the quality or quantity of GRSG habitat would be permitted. This would eliminate potential vegetation treatments that could reduce winter habitats or convert sagebrush into perennial grasslands or other treatments that would have been implemented for livestock grazing or other wildlife species. This decision would increase the likelihood that the 50 to 70 percent sagebrush cover requirements that GRSG need would be maintained.

#### *Impacts from Wild Horse Program Actions*

Alternative B would prioritize wild horse gathers within PHMA, unless removals are necessary to address other issues such as public safety, nuisance animals, court orders, and population growth suppression. Impacts from wild horse grazing would be similar to Alternative A; however, prioritizing wild horse gathers within PHMA would increase the likelihood that wild horse AMLs are being maintained, which would not result in long-term habitat degradation, loss, or disruption to GRSG. Herd management plans and evaluations for wild horse AMLs would take into consideration GRSG habitat objectives, which would provide indicators for measuring structure, condition, and composition of vegetation for maintenance of GRSG habitat, thereby establishing a framework for assessing GRSG habitat within HMAs. Range improvement projects for wild horses would have similar impacts as addressed in livestock under Alternative B.

#### **Recreation**

Under Alternative B, areas in PHMA that are currently open to cross-country OHV travel on BLM-administered lands would be changed to a limited category. All National Forest System lands would remain limited to designated routes. Changes in OHV area designation may reduce proliferation of new routes. However, given that sagebrush-dominated landscapes are not conducive to cross-country travel, changes in management would not necessarily result in changes in use on the landscape.

In most circumstances, impacts from OHV use would be the same as those described under Alternative A. However, the BLM would be required to complete activity-level plans designating routes in PHMA within 5 years. Route evaluations that take into consideration impacts on GRSG could result in use limitations, realignments, or closures, thereby reducing the likelihood of impacts on GRSG such as habitat loss, habitat degradation, and disturbance to the birds.

Under Alternative B, recreational permits would only be issued in PHMA where the permitted activity would have neutral or beneficial effects. Therefore, issuance of recreational permits would not result in long-term degradation, disruption, or loss of GRSG habitat in PHMA.

Impacts from other types of recreation, including recreation at developed recreation sites and dispersed recreation, would be the same as those described under Alternative A.

#### ***Habitat Conversion for Agriculture and Urbanization***

Under Alternative B, management would designate 2,781,700 acres as PHMA, and those areas would be retained unless an exchange was deemed a benefit for GRSB.

#### ***ACEC Designation***

No special management areas would be designated to provide protection for GRSB under Alternative B. Any incidental protections under Alternative A would continue to occur.

### **4.3.4 Alternative C**

#### ***GRSB Habitat and Disturbance Thresholds***

Under Alternative C, all mapped occupied habitat would be managed as PHMA. This includes 100 percent of the mapped occupied habitat included in the USFWS-identified PACs. Similarly, Alternative C would include 100 percent of the birds in PHMA. In concert with the management and associated impacts described below, the allocation decisions under Alternative C would limit land uses and provide for no disturbances associated with new leases or permits, but restrictions on fire and vegetation management would also preclude some proactive actions that could improve and maintain GRSB habitat.

Under Alternative C, cumulative disturbances would be limited to 3 percent of GRSB habitat and would include all of the types of disturbances noted under Alternative B, as well as vegetation treatments that result in the loss of sagebrush, severely burned areas, and heavily grazed areas. Land uses that could introduce new direct disturbance would largely be precluded (e.g., minerals and ROWs). Management for livestock grazing associated with Alternatives C1 and C2 would preclude the potential for grazing to result in heavy use by either complete closure or through a substantial reduction in livestock grazing. As a result, the only potential for new disturbances in GRSB habitat would be from development of valid existing mineral rights, maintaining and realigning existing ROWs, vegetation treatments, and wildfire. As shown in **Table 3.53**, wildfire has resulted in a loss of 8 percent of sagebrush in the Bald Hills, 1 percent in the Sheeprocks, 4 percent of the GRSB habitat in the Box Elder, and 2 percent of the Ibapah Population Area. Because wildfire is included in the disturbance cap, and assuming that areas burned within the past 10 years have not been restored to a point where they have regained GRSB habitat value, no new surface disturbance associated with discretionary uses would be allowed in any of these population areas on federal lands because they currently exceed the amount of allowable disturbance due to wildfire. Once burn areas are suitable GRSB habitat again, those acreages are subtracted from the disturbance acreage, and if the disturbance percentage drops below 3 percent at that time, some discretionary activities would then be possible in that GRSB population area. In the Bald Hills and Box Elder Population Areas, disturbance already exceeds 3 percent of land area when fire history is taken into account. Bald Hills has over 12 percent disturbance. These areas would face greatly reduced potential for development under this alternative. Other population areas have less than 3 percent existing disturbance when fire is taken into account; however, the inclusion of fire in the disturbance

threshold places the total allowable disturbance very near the 3 percent disturbance cap in several population areas, including Uintah, Carbon, and Hamlin Valley.

Measures to protect GRSG can be considered in association with development on valid existing rights and maintenance associated with existing ROWs, which could adjust the timing and nature in which the valid existing rights and ROWs are developed and maintained. However, the BLM and Forest Service cannot preclude reasonable access to valid existing rights or maintenance of ROWs according to the permit terms. As a result, while the disturbance cap could result in consolidating some disturbances, it is anticipated that some areas would continue to see disturbance, regardless of existing disturbance levels (e.g., south and southeast sides of the Uintah Population Area). This could result in areas where disturbance exceeds levels that are needed to maintain GRSG populations, and as such, some areas could continue to see population declines even with the disturbance cap.

Only allowing treatment methods that retain sagebrush cover could maintain GRSG habitat in some areas (e.g., winter habitat), but in others, the reduction in treatments could result in habitat decreasing in quality (e.g., closed-canopy sagebrush, invasion by nonnative species) or quantity (e.g., dominance of nonnative species, areas encroached by pinyon-juniper). In these areas, natural processes would be used to manage vegetation, which could result in loss of GRSG habitat over time.

### **Minerals**

#### *Nonenergy Leasables*

Impacts under Alternative C would be the same as those described for Alternative B but would close a larger area to development. All occupied GRSG habitat (4,008,580 acres) would be closed to new nonenergy mineral leases. This would further reduce impacts on GRSG habitat caused by nonenergy leasable development, specifically on East Bench and in wintering habitat on Deadman's Bench, where there is gilsonite development occurring.

Although these areas would be managed as PHMA rather than GHMA under Alternative C, and new leasing would not be allowed, development could still occur from existing leases. Where possible, RDFs would be required when developing existing leases.

As mentioned in other sections, East Bench has gas development that ranges from 2 to 50 wells per square mile, and the GRSG population has declined from 34 males in 2005 to 1 male in the last 3 years. The wintering area in the Deadman's Bench area could be affected, but the only occupied lek has a 10-year average male lek count of 3 males, and an average of 1 male from 2010 to 2013. Given the amount of existing leases and development in the area, it is unlikely that the additional protections included under Alternative C would be sufficient to stop continued population decline.

#### *Solid Materials - Coal*

Management for solid mineral leasing and development under Alternative C would be similar to that described for Alternative B. While decisions would apply to all occupied habitat (4,008,580 acres), the impacts on GRSG habitat would be essentially the same as described for Alternative B.

#### *Locatables*

Management for locatable minerals under Alternative C would be similar to that described for Alternative B. Decisions would apply to all occupied habitat (4,008,580 acres) instead of 3,650,900 acres proposed under Alternative B; however, the impacts on GRSG habitat would be qualitatively the same as described for Alternative B.

#### *Mineral Materials*

Management for mineral materials under Alternative C would be similar to that described for Alternative B. While decisions would apply to all occupied habitat (4,008,580 acres), the impacts on GRSG habitat would be essentially the same as described for Alternative B.

#### *Fluid Minerals (Including Geothermal)*

Impacts on GRSG from fluid minerals would be similar to those described under Alternative B with a few exceptions. First, under Alternative C, all GRSG occupied habitat would be managed as PHMA, which means additional GRSG habitat would be closed to new fluid mineral leasing (16 percent). Second, no exploration would be allowed within occupied GRSG habitat. When compared with Alternative B, this could protect leks associated with an additional 1.3 percent of the GRSG in the planning area.

Under Alternative C, approximately 2,330 wells would be drilled from 616 well pads in GRSG habitat. This is 870 fewer wells and 1,028 fewer pads than would be drilled under Alternative A. Total disturbance associated with new oil and gas development would be approximately 7,386 acres, which is 8,899 acres (55 percent) less than Alternative A. All new development on federal lands or lands with federal mineral interest would be from existing leases. Under Alternative C, fire would be counted as disturbance. This could mean that in some areas there would be fewer acres available for mineral development; for example, Uintah would only be able to add 0.2 percent additional disturbance. In the Bald Hills and Box Elder Population Areas, no more surface disturbance would be allowed with their 12.8 and 5.9 percent disturbance, respectively. In addition, Hamlin Valley would be very close to exceeding allowable disturbance with 2.9 percent. However, as discussed above, the BLM and Forest Service cannot preclude reasonable access to valid existing rights. As a result, it is anticipated that some areas would continue to see disturbance, regardless of existing disturbance levels (e.g., south and southeast sides of the Uintah Population Area).

The impacts associated with geothermal leasing and development is essentially the same as those stated in Alternative B.

#### ***Infrastructure***

Similar to Alternative B, new infrastructure development would be substantially limited compared with Alternative A. All occupied GRSG habitat would be closed to new ROW authorizations, including renewable energy development. In addition, all ROW corridors would be undesignated. The inability to site ROWs in GRSG habitat could lead to longer ROW routes in order to bypass closed areas. Longer routes would increase surface disturbance and other impacts of ROW siting and may result in increased impacts on GRSG habitat on adjacent private lands. Additional protection would be provided through restrictions on mineral development and OHV use (see Mineral Development and Recreation). GRSG habitat (both federal lands and nonfederal land with mineral interests) would be closed to leasing of nonenergy minerals.

Habitat would also be protected from any new surface coal mining and from underground coal mining leases, because no supporting surface infrastructure would be allowed in GRSG habitat. In addition, GRSG habitat would be withdrawn from locatable mineral entry, and all GRSG habitat would be closed to mineral material sales. A 3 percent disturbance cap that would apply to all disturbances (including fire) and disturbance would be limited to one disturbance per section.

Under Alternative C, 523,500 acres of BLM-administered lands that are currently open to cross-country travel or limited to existing or designated routes would be closed to OHV use. Identification of closed areas would reduce direct loss, degradation, and fragmentation of GRSG habitat. Identification of closed areas could result in closure of some existing or designated routes, including routes that may currently impact GRSG. The impact of individual route closures would depend on a number of variables, including the size of the route, type of use, and frequency of use. Most areas that would be identified as closed areas currently do not have roads. The primary benefit of designating areas as closed to OHV use would be that intact habitat would remain protected from OHV-related impacts such as noise and bird strikes. The effects on GRSG would depend on the type of habitat (season). Impacts on GRSG would be greatest in nesting and brooding habitat because OHV use typically occurs during the spring, summer, and fall seasons.

In addition to designating OHV closed areas, no new roads would be allowed within 4 miles of a lek under Alternative C. This would further limit the amount of disturbance to GRSG nesting and brood-rearing habitat, as well as limit the amount of direct disruption (noise and bird strikes) associated with development and use of future roads in these areas. These measures would maintain GRSG habitats and minimize new impacts on GRSG populations from infrastructure development such as roads to an even greater extent than Alternative B.

Because of restrictions on ROW development, road building, and application of the 3 percent disturbance cap across multiple resource programs, only minimal loss of GRSG habitat would occur from development of infrastructure. Habitat loss would be limited to those areas where existing leases and authorizations are present. For example, some habitat loss would be expected to occur in the Uintah and Carbon Population Areas because these areas have the greatest potential for minerals development.

#### *Renewable Energy*

Under Alternative C, although exclusion restrictions to wind energy development would apply to a larger area, development would likely only occur in areas included as priority under Alternative B. Therefore, the impacts on GRSG would be the same.

#### **Fire**

Under Alternative C, there would be less surface disturbance allowed than under any other alternative because all occupied GRSG habitat would be subject to a 3 percent disturbance cap, which would include existing disturbance and fire under this alternative. In addition, most land uses would be prohibited (e.g., closed to new minerals development). Under this alternative, the BLM has identified OHV closed areas. Reductions in the amount of human activity from both permitted and recreation/casual uses in GRSG habitat could result in fewer human-caused fire starts.

Removal of grazing as proposed under Alternative C-1 and reductions in grazing as proposed under Alternative C-2 could have varied results. In already degraded sites, there could be an increase in undesirable fine-fuel grasses (Strand and Launchbaugh 2013). Under those circumstances, livestock grazing could be keeping fine fuels from grasses from building up. In areas dominated by cheatgrass, Diamond and others (2009) found that targeted or prescribed livestock grazing can be used as a tool to decrease these areas from carrying fire. However, this type of targeted grazing is generally not the way permitted livestock grazing on public lands is managed and would require more resources to implement (e.g., more people to move the livestock at greater intervals). Some research has identified that the removal of livestock grazing may exacerbate the influence of cheatgrass (Young and Allen 1997) due to increases in fine fuel and increased potential for sagebrush stand-replacing wildfire (Peters and Bunting 1994; West 1999). The influence on fire spread, severity, and intensity would depend on factors such as weather, fuel characteristics, and landscape features, though evidence suggests that the potential role of grazing on fire behavior is limited under extreme burning conditions (i.e., low fuel moisture and relative humidity, high temperature, and wind speed) (Strand and Launchbaugh 2013), though the number of lower-intensity fires could increase given the abundance of fine fuels remaining from removing livestock grazing. In addition to making BLM-administered and National Forest System lands unavailable for permitted livestock grazing, short-term or temporary targeted livestock grazing would not be considered as a fine-fuel management tool. The impacts of prohibiting temporary grazing as a fine-fuel management tool would be the same as those described above; namely, this could allow for buildup of fine fuels from grasses that could be consumed by livestock.

In addition to changes in grazing management under Alternative C, an emphasis would be placed on passive restoration as opposed to active restoration. As such, there would be fewer vegetation treatments, including juniper reduction projects. Less emphasis would be placed on the construction of fuelbreaks or green strips than under other alternatives such as Alternatives D and E.

**Table 4.6** shows the estimated changes in the average annual acres burned under Alternative C when compared with Alternative A. Despite the fact the BLM and Forest Service would prioritize fires suppression in GRSG habitat, reductions in the acres of treatment and cuts in the number of fuelbreaks constructed could result in increases in the number of acres burned annually during the next 50 years. It should be noted that the VDDT modeling completed for this project does not take into consideration changes in development; rather the model is primarily based on changes in vegetation treatment, fire management, and potential for overgrazing. As such, some of the estimated increases in fire could potentially be offset by decreases in human-caused fires.

**Table 4.7** shows changes in the percent of the modeled sagebrush in the mid- to late-seral stage. This shows that the modeled trends for GRSG habitat would be similar to those described for Alternative A at 10 years, though several population areas have slightly lower percentages of sagebrush in the mid- to late seral stage compared with Alternative A. At the 50-year mark, the model indicates that the lack of proactive vegetation treatments in areas affected by fire, invasive annual grasses, and juniper encroachment would result in decreases in mid- to

**Table 4.6**  
**Alternative C VDDT Model Outputs- Average Changes in Fire, Juniper, and Annual Grasses Over 50 Years**

Population Area(s)	Percent Change in Average Annual Acres Burned	Percent Juniper	Percent Change in Juniper	Percent Annual Grasses	Percent Change in Annual Grasses
Box Elder	7	11	57	15	67
Hamlin Valley, Ibapah	16	25	0	8	14
Rich, Uintah, Wyoming-Uinta, Wyoming-Blacks Fork	6	16	23	6	50
Carbon	2	30	3	3	50
Emery	0	18	500	0	0
Parker Mountain, Panguitch, Bald Hills	6	22	22	1	0
Strawberry	0	19	58	0	0
Sheeprocks	18	34	-3	19	12

**Table 4.7**  
**Sagebrush Condition and Trend Analysis: Comparing Alternatives by Percent of Sagebrush Area in Mid- or Late-Seral Classes for Population Areas at 10 Years and 50 Years – Alternatives A and C**

Population Area	Percent of Sagebrush in Mid- and Late-Seral Class				
	Current Conditions	10 Years		50 Years	
		Alternative A	Alternative C*	Alternative A	Alternative C*
Uintah	80	76	75	67	59
Carbon	66	57	59	58	53
Emery	77	83	72	85	69
Parker Mountain	70	67	66	68	62
Panguitch	70	67	66	68	62
Bald Hills	70	67	66	68	62
Hamlin Valley	36	45	45	54	50
Ibapah	36	45	45	54	50
Sheeprocks	53	46	46	38	36
Box Elder	55	61	58	70	58
Rich	80	76	75	67	59
Strawberry	76	76	73	78	67
Lucerne	80	76	75	67	59
Wyoming-Uinta	80	76	75	67	59
Wyoming-Blacks Fork	80	76	75	67	59
<b>All</b>	<b>57</b>	<b>60</b>	<b>58</b>	<b>65</b>	<b>56</b>

\*This table addresses both Alternative C1 and Alternative C2. Because the only difference is the level of livestock grazing, either no grazing or a substantially reduced grazing alternative would effectively eliminate the associated risk for potential incidental overgrazing.

late-seral stage sagebrush in all population areas. The decreases compared with Alternative A vary from 2 percent in the Sheeprocks Population Area to 12 percent and 16 percent in the Box Elder and Emery Population Areas, respectively.

It is important to note that the modeled risk of overgrazing was the same under both Alternative C1 and Alternative C2. This reflects the impact that a substantial reduction in livestock grazing would have in eliminating the risk of incidental overgrazing.

According to the model, at 50 years no population areas would have 70 percent sagebrush cover; however, all population areas except the Sheeprocks would have at least 50 percent sagebrush land cover. The minimum amount of sagebrush that has been determined to be necessary to meet GRSG needs is 50 to 70 percent land cover (Aldridge et al. 2008; Doherty et al. 2010; Wisdom et al. 2010).

As mentioned under Alternative B, information derived from the VDDT model provides valuable information on estimated trends; however, the model also has a number of limitations. Quantitative objectives for treatments were not included under Alternative C; because passive restoration is emphasized under Alternative C, it was assumed that the amount of treatments conducted in GRSG habitat would be less than during the past 10 years. Expanding the amount of treatment beyond modeled level could increase the estimated percent of habitat in mid- to late-seral condition at 50 years. Given the restrictions on the types and locations of vegetation treatments, increases in treatment above current levels would be unlikely.

### ***Invasive Plant Species***

#### *Weeds*

Under Alternative C, the BLM and Forest Service would apply a 3 percent disturbance cap to all disturbances, including fire. In addition, many land uses would be prohibited in mapped occupied GRSG habitat. The combination of closures and the disturbance cap would reduce the likelihood for introduction and spread of invasive plant species from human activity (e.g., motorized vehicle use, including OHVs) compared with Alternative B. Despite reductions in human activity, as shown in **Table 4.7** and discussed in the preceding section, implementation of Alternative C is estimated to increase the average annual acres burned in all population areas except Strawberry and Emery during the next 50 years. Increases in fires would result in the expansion of annual grasses. As discussed under Alternative A, annual grasses could replace and outcompete desirable native species. Impacts would be the greatest in the Sheeprocks, Hamlin Valley, Ibapah, and Box Elder Population Areas based on the susceptibility of these areas to wildfire.

#### *Conifer Encroachment*

Alternative C would place additional restrictions on vegetation/range treatments compared with Alternatives A or B. Under Alternative C, only treatment methods that retain sagebrush cover would not be counted as disturbance against the 3 percent disturbance cap. In addition, treatments would be required to retain sagebrush height and cover. When compared with other alternatives, Alternative C places greater emphasis on passive restoration. These requirements would limit the type and acreage of treatments possible. In some areas, this could maintain GRSG habitat, but in others, the lack of treatments could result in habitat decreasing in quality (e.g., closed-canopy sagebrush, and invasion by nonnative species) or quantity (e.g., lack

of fuelbreaks to slow large fires, invasion by nonnative species, and areas encroached with pinyon-juniper). According to the VDDT model, using natural processes to manage vegetation could result in loss of GRSG habitat over time. As shown in **Table 4.7**, over the next 50 years the percent of juniper on the landscape in occupied GRSG habitat would be expected to increase or remain stable, compared with Alternative A, in all population areas except the Sheeprocks, where a minor decrease in juniper is expected. A reduction in juniper in the Sheeprocks is likely due to increases in fire and associated increases in annual grasses.

### **Grazing (Including Wild Horses and Burros)**

#### *Alternative C1*

##### *Impacts from Domestic Livestock Forage Use (Herbivory)*

Under Alternative C1, GRSG occupied habitat would be made unavailable for livestock grazing for the life of the plan. The effects of livestock exclusion would depend on site conditions, including climate, soils, fire history, and disturbance and grazing history (Strand and Launchbaugh 2013). While studies have examined the effects of reductions or changes to livestock grazing, limited literature is available regarding effects of the complete removal of livestock grazing from the range at a landscape level. Grazing is associated with direct and indirect impacts on GRSG, as described in Alternative A above, including livestock disturbance or trampling of nesting birds (Rasmussen and Griner 1938; Patterson 1952; Call and Maser 1985; Coates 2007), competition for resources, and loss of important herbaceous cover from livestock herbivory. These impacts specifically associated with livestock would be eliminated under Alternative C1. Cessation of grazing could remove the impacts noted in Alternative A and could allow for recovery of native and nonnative understory perennials and an increase in sagebrush (if the area is grazed during the winter with sheep) and herbaceous vegetation cover (Strand and Launchbaugh 2013), thereby improving habitat components important to nest success, including cover and forage (by increasing the insect population) (Anderson and Holte 1981).

It is important to note that the majority of the studies that evaluate the impacts of removing livestock grazing were conducted by evaluating small exclosures over various periods of time (Robertson 1971; Vale 1974; Rice and Westoby 1978; West et al. 1984; Yorks et al. 1992; Angell 1997; Bork et al. 1998; Courtois et al. 2004; Manier and Hobbs 2006; Yeo 2005; Davies et al. 2010), instead of evaluating the impacts of removing livestock at a landscape scale. The results from these studies were varied, which is expected considering that the site history, precipitation, soils, elevation, plant species within the sagebrush community, and duration of livestock exclusion varied.

Studies have varied results, depending on the site history (e.g., fire), previous livestock grazing (including timing, duration, and stocking levels), type and abundance of species (native or nonnative), and the other (wild) herbivores using the vegetation. Long-term evaluations to determine the effects of livestock removal are limited. Existing research suggests there are a variety of results from removing livestock, including no change in the vegetation (West et al. 1984; Yeo 2005), an increase in herbaceous understory and species diversity (Anderson and Inouye 2001), an increase in desirable grasses (York et al. 1992; Manier and Hobbs 2006) or in

already degraded sites, and an increase in undesirable fine-fuel grasses (Strand and Launchbaugh 2013).

The one landscape-scale study that explored the changes to vegetation following the long-term removal of livestock indicated a steady increase in the richness of shrubs, perennial grasses and forbs, and vegetative heterogeneity through 45 years post-removal of livestock in southwestern Idaho (Anderson and Inouye 2001). Other small enclosure research, which compared grazed and ungrazed (not grazed for 25 to 40 years) big sagebrush communities in Utah and Idaho, found that sagebrush canopy increased in percent cover from 13 to 54 percent (Beck and Mitchell 2000). However, this research did not find any increases in total herbaceous standing crop after livestock were removed for 13 years (Beck and Mitchell 2000). Studies tracking changes in vegetation over 15 years after livestock were removed from sagebrush systems reported that a minimum of 10 to 15 years were required for seed production, seedling establishment, and growth to occur beyond the initial proportions of the different growth forms (Connelly et al. 2004; Pyke 2011). In Utah, exclusion of grazing in the Pine Valley documented a 10-fold increase in perennial grasses and found that shrub cover increased where grazing still occurred (York et al. 1992).

In some situations, habitats throughout Utah may not respond any more favorably to eliminating livestock grazing than a continuation of light to moderate grazing intensities (Holechek et al. 2006). Some research suggests removing livestock grazing could result in a lack of increase in understory herbaceous productivity in areas with currently depleted sagebrush areas (Beck and Mitchell 2000). The influence of livestock grazing on sagebrush cover may have resulted in increases in sagebrush as use of perennial grasses and forbs increased; however, once sagebrush cover reaches an upper threshold, livestock exclusion may have little effect on reversing the immediate trend (Johnson and Payne 1968; Rice and Westoby 1978; Sanders and Voth 1983; Wambolt and Payne 1986). In such areas, passive restoration may not be sufficient to improve GRSG habitat, and active restoration may be necessary (Davies et al. 2011). In areas where sagebrush communities have moved past an ecological threshold, simply removing livestock grazing would not return the area to its previous state (Cagney et al. 2010). In such situations, vegetation communities within GRSG occupied habitat would continue to be influenced by land uses, wild horse and wild ungulate grazing, fire and disturbance regimes, and climatic conditions (which have likely altered vegetation communities across the allotments), reducing herbaceous perennial grasses and forbs and increasing woody species.

Changes to vegetation communities resulting from the removal of livestock grazing may favor a particular component of GRSG seasonal habitat. For example, livestock grazing has been removed within the Brown's Park area of the Uintah Population Area, which was providing favorable winter habitat for GRSG when livestock were present. In the years following removal of livestock, the ecosystem has resulted in a shift of shrub/perennial grassland to a perennial grassland-dominated vegetation community. In instances such as these, removing properly managed livestock from vegetation communities may result in increased ground cover and could reduce vegetation diversity. This could result in the area's vegetation shifting from providing winter habitat to becoming more suitable for brood-rearing habitat.

Removal of grazing could allow for buildup of fine fuels from grasses, especially in degraded shrublands, that could otherwise be consumed by livestock, potentially causing an increase in the likelihood of a fire that could result in stand replacement and loss of GRSG habitat over large areas. Some research has identified that the removal of livestock grazing may exacerbate the influence of cheatgrass (Young and Allen 1997) due to increases in fine fuel and increased potential for sagebrush stand-replacing wildfire (Peters and Bunting 1994, West 1999). The influence on fire spread, severity, and intensity would depend on factors such as weather, fuel characteristics, and landscape features. Evidence suggests that the potential role of grazing on fire behavior is limited under extreme burning conditions (i.e., low fuel moisture and relative humidity, high temperature, and wind speed) (Strand and Launchbaugh 2013), though the number of lower-intensity fires could increase given the abundance of fine fuels remaining from removing livestock grazing.

Unintended adverse effects could also occur to GRSG and their habitat from increased livestock use of private and state lands in response to a reduction in AUMs and/or season of use on federal lands. Removal of livestock grazing on federal lands could lead to overgrazing and habitat fragmentation on adjacent private lands to compensate for loss of forage on federal lands. In addition, private lands with livestock operations dependent upon public land grazing are often located in more productive valley bottoms, which are often used as brood-rearing habitat by GRSG. Producers may convert these valley bottoms or other private lands to introduce forage species (e.g., crested wheatgrass), in order to provide enough livestock feed to continue in business without access to federal lands. Others may go out of business and sell their land, potentially for development, causing permanent loss of GRSG habitat.

Riparian and wetland areas that have been altered by grazing-associated water developments would be restored, thereby improving and potentially increasing late brood-rearing habitat for GRSG. Similarly, where there are livestock water developments that are not associated with existing riparian, wetland, or springs, the removal of water developments could benefit GRSG. Kirol and others (2015) found that presence of water developments (associated with energy development) was the primary factor attributed to decreased nest success. However, in some riparian areas, complete removal of grazing can result in increased tree and shrub cover and reduced forb cover important to late brood rearing. Some research indicates that GRSG preferred grazed over ungrazed wet meadows where protective cover conditions were otherwise equal (Neel 1980). However, even given the removal of domestic livestock, impacts from wildlife and wild horse use of riparian and wetland areas would continue.

*Impacts from Wild Horse Forage Use (Herbivory)*

Impacts from wild horse herbivory would be the same as described under Alternative B.

*Impacts from Wild Ungulate Forage Use (Herbivory)*

The impacts from wild ungulates would be the same as described under Alternative A.

*Impacts from Livestock Grazing Program Actions*

Removal of grazing would also be accompanied by an associated removal of grazing-related infrastructure, including fences, livestock water troughs, pipelines, and wells. Removal of fences would reduce threats from GRSG collisions. However, in some areas with checkerboard land ownership, more fences may be needed to separate BLM-administered and National Forest

System lands unavailable for livestock grazing from private or state lands that would be available for livestock grazing. In this instance, though fence marking would be required for any new fences constructed in GRSG habitat, there may be a potential for bird mortality from fence strikes.

*Impacts from Wild Horse Program Actions*

Impacts from wild horse program actions would be the same as described under Alternative B.

*Alternative C2*

*Impacts from Domestic Livestock Forage Use (Herbivory)*

Impacts from livestock herbivory under Alternative C2 would be the same as those described under Alternative B, with three differences: 1) active AUMs available for livestock grazing would be reduced by approximately 40 percent in occupied GRSG habitat; 2) livestock grazing that occurs during the growing season would be changed so no grazing occurs until after the spring; and 3) the BLM and Forest Service would establish and maintain areas free of livestock as reference areas. While the impacts from livestock grazing that were described in Alternative B would still be possible, the likelihood of the impacts occurring in GRSG habitat is reduced.

The reductions in AUMs would not be implemented evenly across the decision area but would be addressed through an evaluation of allotment-specific information, which would result in reductions in AUMs on allotments showing high use levels, poor habitat conditions, or with trends away from desired conditions. This would focus reductions on areas needing them instead of complete closures prescribed under Alternative C1. Reduction may be made across an entire allotment or in part during the permit renewal process or other evaluation process depending on need. In either case, active AUMs would be lowered to approximately 14 percent under average billed use on BLM-administered lands and 39 percent under average billed use on National Forest System lands. According to research conducted in sagebrush steppe, applying light use standards helps ensure a healthy plant community (Cagney et al. 2010 in Manier et al. 2013). As such, reducing AUMs throughout GRSG habitat would result in increased grass and forb occurrence and height, improving nesting and brood-rearing habitats. Closing GRSG habitat to spring use would ensure that early grass growth would be available to provide screening for brood rearing. Waiting to graze forbs would allow hens and broods to take advantage of increased production and the associated increases in invertebrate populations. In general, these changes from Alternative B would improve brood success and would likely lead to increases in GRSG populations.

Alternative C2 would decrease grazing pressure on vegetation communities while still allowing grazing to continue. Allowing grazing to continue would retain the ability for certain areas to be strategically grazed, maintaining the productivity of bunch grasses and improving GRSG habitats where needed, based on ecological conditions. Closing areas to spring grazing would eliminate the potential for nests to be damaged by incidental trampling, and it would reduce soil compaction associated with livestock congregating and trailing during wet soil conditions.

The decreased numbers of livestock in GRSG habitat would also decrease the likelihood for overgrazing at the beginning of droughts. Given the lag time between the beginning of a drought and when monitoring identifies an impact for habitat conditions, the reduced levels of grazing

would limit grazing, decreasing potential impacts on habitats (e.g., decreased grass and forb cover).

Precluding spring grazing could result in grasses and forbs increasing in winter habitat. In some areas, the increase in grasses and forbs could increase competition for water and nutrients and, over time, could reduce sagebrush density. While this process would likely take decades to occur, GRSG populations where winter habitat is the limiting factor could be affected.

Alternative C2 would establish and maintain large areas free of livestock grazing; this would allow rehabilitation and reclamation efforts to use these exclosures as reference points to monitor the progress of the efforts in light of ecological norms. Although fences would be marked, this increase in fences in areas to keep livestock out of the exclosures could increase the potential for bird strikes.

#### *Impacts from Wild Horse Forage Use (Herbivory)*

Under Alternative C2, wild horse AMLs would be reduced by 25 percent. While impacts from wild horses would remain, this would reduce the effects of wild horses described under Alternative A. More residual grasses and forbs would likely remain in three population areas where GRSG habitat overlaps HMAs.

#### *Impacts from Livestock Grazing Program Actions*

While similar to Alternative B, Alternative C2 proposes different actions with resulting impacts under the livestock grazing program. To start with, the combination of focusing on GRSG objectives, reducing active AUMs, and closing spring grazing would likely reduce the need for many rangeland improvement projects since most projects are designed to improve livestock distribution or improve available AUMs. As a result, loss or fragmentation of habitat from rangeland improvements would be decreased from those described in Alternatives A and B.

No new water developments would be authorized, which would reduce both the loss of habitat from the development itself and the impacts on the vegetation and soils associated with livestock traveling to and congregating at these areas. New watering opportunities for predators would also be precluded. Any GRSG habitat improvement due to forbs or insects associated with water developments would also be precluded. Beyond water developments, any other new structural range development (e.g., cattle guards and nutrient supplements) would be avoided unless research indicates it would benefit GRSG.

Compared with Alternative B, the threat of impacts from fences would be reduced, since under Alternative C2 fences in moderate- and high-risk areas would be removed, modified, or marked. This would increase the number of fences affected and would correspondingly reduce the likelihood of bird strikes and mortality.

Alternative C2 would place additional restrictions on vegetation/range treatments compared with Alternatives A or B. Under Alternative C2, only treatment methods that retain sagebrush cover would not be counted as disturbance against the 3 percent disturbance cap. In addition, treatments would be required to retain sagebrush height and cover. While vegetation treatments with demonstrated benefit to GRSG could be considered, these requirements would limit the type and acreage of treatments possible. In some areas, this could maintain GRSG

habitat, but in others, the lack of treatments could result in habitat decreasing in quality (e.g., closed-canopy sagebrush or invasion by nonnative species) or quantity (e.g., lack of fuelbreaks to slow large fires, invasion by nonnative species, or areas encroached with pinyon-juniper). In these areas, natural processes would be used to manage vegetation, which could result in loss of GRSG habitat over time.

#### *Impacts from Wild Horse Program Actions*

By reducing wild horse AMLs by 25 percent, the need for wild horse gathers would increase since the AML would be met on a more frequent basis. In addition, of the 5 HMAs in GRSG occupied habitat, a 25 percent reduction could result in 3 HMAs dropping below viability levels. These combined issues would increase the frequency of the disturbances associated with the gathers and other management intervention, as well as the areas of habitat affected by the gather staging areas.

#### **Recreation**

Under Alternative C, GRSG habitat that is open to cross-country OHV travel on BLM-administered land would be changed to either closed to OHV travel or to a limited area designation category. In addition, some areas currently designated as limited (both to existing and designated) would be closed. Impacts from designation of OHV closed areas were discussed under the Infrastructure section, above. All National Forest System lands would remain limited to designated routes. As previously discussed, this would reduce or eliminate the proliferation of new routes. Management actions under Alternative C would be similar to those under Alternative B, with the exceptions described below.

Within PHMA, camping and other nonmotorized recreation would be prohibited during certain seasons within 4 miles of a lek. Implementation of this decision would reduce human activity in nesting and brood-rearing habitat, thereby reducing disturbance to the bird, potential for habitat degradation, and predation potential. However, there is limited literature linking nest and brood success rates to dispersed and nonmotorized recreational activities. Impacts from dispersed and nonmotorized activities are usually temporary. This would effectively result in large area closures that may be difficult to enforce and may require public disclosure of sensitive information, including lek locations. Given the mixed land ownership pattern in certain population areas, enforcement of this decision would be difficult. This alternative would provide additional protection for breeding and nesting habitat by limiting route construction within a 4-mile buffer of leks, and compensatory mitigation would be required to offset impacts on GRSG. Together, these actions would further reduce impacts that are described in Alternative B.

Impacts from issuance of recreational permits would be similar to those described for Alternative B but would be applied to a larger area, all occupied habitat. Therefore, issuance of recreational permits would not contribute to GRSG habitat loss, degradation, or disruption to birds.

#### **Habitat Conversion for Agriculture and Urbanization**

Under Alternative C, management is similar to Alternative B except that all occupied GRSG habitat would be designated as PHMA (3,313,800 acres) and retained in public ownership, without exception. While this would result in retention of existing GRSG habitat, it would limit the BLM and Forest Service's ability to pursue exchanges in areas where there is mixed land ownership

(e.g., Box Elder and Rich Population Areas). Exchanges that result in more contiguous federal ownership could improve the consistency of management and ensure protection of important GRSG habitat.

#### ***ACEC and Zoological Area Designations***

Under Alternative C, the BLM and Forest Service would designate 15 ACECs and GRSG Zoological Areas to protect sagebrush and GRSG habitat. Large portions of most population areas would be covered by one or both of these special designations, particularly in the Box Elder, Sheeprocks, Uintah, Iapah, Hamlin Valley, Bald Hills, Panguitch, and Parker Mountain Population Areas. Management within these areas would focus on reducing anthropogenic surface disturbances and removing unneeded infrastructure. Such management would result in the removal of unneeded infrastructure in GRSG habitats (e.g., fencing, water structures, roads, and power lines). The benefits of removing unnecessary infrastructure in GRSG habitats could vary depending on a range of factors, including the extent of the infrastructure, the location of the infrastructure in GRSG habitat, and the magnitude that the infrastructure is impacting GRSG. Removal of fencing would generally decrease fence strike mortalities. Removal of power line infrastructure would likely increase the quality or connectivity of habitats and decrease predation rates by decreasing perching opportunities for avian predators. Removal of roads may result in many benefits to GRSG, including increasing habitat connectivity, decreased human disturbance, and decreased likelihood of spreading invasive weeds. Removal of water structures would decrease the likelihood of West Nile virus by removing the habitat water source for the vector, mosquitoes.

#### **4.3.5 Alternative D**

##### ***GRSG Habitat and Disturbance Thresholds***

Under Alternative D, 83 percent of the mapped occupied habitat in the Utah planning area would be managed as PHMA. This includes 97.5 percent of the mapped occupied habitat included in the USFWS-identified PACs. Under this alternative, leks associated with 95 percent of the GRSG in the planning area would be in PHMA. Under Alternative D, the BLM and Forest Service would not manage the southern portion of the Panguitch as a PHMA. This area includes the southernmost lek and southern wintering areas. The Alton area lek has low annual attendance and is affected by ongoing surface coal mining operations on private lands. The southern wintering areas are used by birds from as far away as the central portions of the population area. The next lek to the north is a larger lek that has had consistent lek attendance but is presumed to be reliant on habitat that is being impacted by coal mining to the south. The PHMA area would also exclude the southern portion of the Sheeprocks Population Area and includes a portion of the Emma Park-western Gordon Creek area and the Pilot Mountain portion of the southern Box Elder Population Area.

In regards to the Panguitch area, as more data is gathered on bird movements throughout the area, there could be an overall adverse impact on the Panguitch population if the southern portion of the population area is not protected as PHMA due to the potential importance of the winter habitats and the patches of habitat that link the southern wintering habitat to the central portions of the population area.

It is unknown what the potential impacts of excluding the southern portion of the Sheeprocks area may be since the existing limited data do not indicate whether there are movements between them.

In the Carbon Population Area, the inclusion of the Gordon Creek area is expected to increase the overall amount of disturbance calculated in the area due to the density of wells that exist in the area. As a result, fewer disturbances will likely be allowed in the Carbon area, which will presumably be beneficial for GRSG.

The impacts of including the Pilot Mountain portion of the Box Elder Population Area as PHMA is unknown at this time since very little is known about bird movements between the primary Box Elder area and the Pilot Peak area and how important the Pilot Peak area may be to the primary Box Elder area.

Unlike Alternatives B and C, this alternative would allow some new disturbances in PHMA outside protective lek buffers. Discrete anthropogenic disturbances would be limited to an aggregated 5 percent disturbance cap calculated for PHMA, regardless of land ownership. Fire is not counted as a discrete disturbance that is part of the 5 percent disturbance cap; however, fires, especially if substantial in size, would decrease the baseline acreage on which the 5 percent disturbance cap is calculated. For instance, if there is a 2,000-acre PHMA with no existing disturbance, 100 acres of disturbance would be allowed. If a 1,000-acre fire occurs in that PHMA, the burn area is subtracted from the baseline PHMA area until habitat functionality is restored. If a project were proposed in the remaining unburned habitat, allowable disturbance would be calculated using the remaining 1,000 acres. As a result, 50 acres of disturbance would be allowed. While fire is considered, in part, when determining how much additional disturbance would be allowed in a PHMA, in areas where there are many fires and recovery is slow, the amount of available habitat to birds could decrease substantially. Although Kirol (2012) did not include fire in his disturbance calculations, GRSG risk of daily brood loss started rapidly, increasing at 4 percent disturbance and no longer used an area once disturbance reached 8 percent.

As shown in **Table 3.53**, wildfire has resulted in a loss of 8 percent of sagebrush in the Bald Hills, 1 percent in the Sheeprocks, 4 percent of the GRSG habitat in the Box Elder, and 2 percent of the Ibapah Population Area. Depending on how much occupied sagebrush habitat was lost in the fire, the quality of those habitats, how the birds used the lost habitat, and how much of that specific seasonal habitat type remained, the resiliency of the GRSG population areas could be diminished. Larger impacts may occur in the smaller population areas with a higher percentage that has burned (e.g., Bald Hills and Sheeprocks).

In the Uintah and Carbon Population Areas, existing disturbance is already 1.7 and 1.1 percent, respectively. This would allow for additional development, up to 5 percent, similar to the other population areas, but Uintah and Carbon are the areas most likely to have energy-related development.

## **Minerals**

### *Nonenergy Leasables*

Under Alternative D, PHMA would be closed to new surface mining associated with new leasing or modifications to existing leases. Therefore, impacts from surface mining described under Alternative A would not occur. PHMA would still be available for underground mining, which primary would apply to the phosphate and gilsonite in Uintah Basin, the developable nonenergy leasable resources in GRSG habitats in the state. Impacts on GRSG could occur from underground phosphate mining in the Diamond Mountain area from construction of surface ancillary facilities (e.g., air vents, roads, power lines), but those activities and maintenance activities would not be allowed during GRSG sensitive time periods in associated habitats. Impacts from underground mining would be less than those described under Alternative A because additional stipulations would be attached to any new leases in PHMA. For example, no surface facilities or structures would be allowed within 1 mile of a lek. Structures or facilities located outside of the 1-mile lek buffer but in PHMA would have to meet noise and tall structure requirements and comply with the 5 percent disturbance cap. Application of RDFs and compliance with TLs would also lessen the impacts from disturbance-associated development of nonenergy leasable minerals.

Prospecting operations in PHMA could still result in surface disturbance within PHMA; however, prospectors would be required to follow many of the same avoidance and minimization measures discussed above. For example, prospectors would be required to remove all facilities associated with prospecting before the next breeding season in an attempt to reduce functional habitat loss. Prospecting activities in PHMA would be subject to TLs and the 5 percent disturbance cap. Impacts would further be reduced in PHMA under this alternative by requiring RDFs in Appendix I of the Draft LUPA/EIS to be applied to any lease.

Based on the analysis above, implementation of Alternative D would protect all GRSG habitats in PHMA from the effects of new leases for surface mining. While some disturbance associated with new leases for underground mining could occur in PHMA in the Diamond Mountain area, direct lek protection, requiring stipulations and restrictions, and compensatory mitigation would minimize impacts on existing GRSG populations in Diamond Mountain, especially given the limited amount of nonenergy solid minerals development within this area.

Within GHMA, areas within 1 mile of GRSG leks would be subject to no surface disturbance and seasonal stipulations (construction and maintenance). These stipulations could be waived in exchange for mitigation that directly benefits GRSG in PHMA. Gilsonite mining could occur in the East Bench and Deadman's Bench areas, but lek buffers would only apply in East Bench since the gilsonite development only overlaps with leks in that population. The inclusion of lek buffers and associated conservation measures in the East Bench area would prevent additional disturbance within that area but would allow noise and tall structures outside the buffers and in winter habitat in Deadman's Bench. Since there is already substantial development in the East Bench area (see Alternatives B and C) and the 10-year average lek counts for East Bench is 4 males, additional development is not likely to substantially change the declining status of this population. Similarly, by allowing gilsonite development with or without noise and tall structure

requirements in wintering habitat in Deadman's Bench, there will be more impacts on an already declining population (10-year average male count of 3 males).

*Solid Material - Coal*

All GRSG habitat outside of WSAs under Alternative D would be suitable for surface and underground mining of coal. The high coal development areas overlap portions of the Carbon, Emery, and Panguitch Population Areas (**Map 3.21-7**); impacts from leasing and subsequent mining activities would be reduced by applying stipulations. The restrictions on coal development and the impacts on the landscape would be similar to those described under the nonenergy leasable section for PHMA and GHMA, though the location of coal and subsequent impacts at a population level would be different from the nonenergy leasable resources.

The only area where surface mining of coal is anticipated is in the Panguitch Population Area. Because this area would be managed as GHMA, fewer stipulations would be attached to new leases. Areas within 1 mile of GRSG leks would be subject to no surface disturbance and TL stipulations (construction and maintenance). These stipulations could be waived in exchange for mitigation that directly benefits GRSG in PHMA. Given the above information, Alternative D provides less protection for birds and GRSG habitat in the Alton area than any other alternative except Alternative A. As a result, the birds using the Alton area may cease using the area and may be impeded from using the southern wintering areas if the Alton area habitat is important for connectivity to access the southern wintering areas. Due to the limited information on how much of the Panguitch population relies on the southern wintering areas (especially in high snow years), it is unknown how this may adversely affect the rest of the Panguitch, but there could be an adverse impact on some portion of the birds.

There would be some impacts within the PHMA in the Emery Population Area from development of new and existing subsurface coal leases. For discussion of existing leases, refer to Alternative A, Solid Minerals – Coal. New leases would be subject to a 1-mile no surface disturbance stipulation, noise and tall structure restrictions, seasonal restrictions (construction and maintenance), and required mitigation. As such, the impacts would be less than under Alternative A. Even though the impacts associated with aboveground ancillary infrastructure for underground coal is minimal, small impacts could adversely impact birds and decrease the likelihood of persistence for the Emery GRSG populations due to the limited amount of habitat available to this population and because the local GRSG rely on the same habitat for all aspects of their life cycle.

*Locatables*

Under Alternative D, all PHMA and GHMA would remain available for mineral entry unless it is already withdrawn or recommended for withdrawal. Efforts would specifically be made to work with claimants to decrease impacts on GRSG by recognizing spatial buffers, complying with seasonal restrictions, and maintaining disturbance under the 5 percent disturbance cap. In addition, the agencies would apply the BMPs, as described in Appendix I of the Draft LUPA/EIS, to notices and plans of operations. If applicants are willing to comply with GRSG conservation measures proposed by the BLM and the Forest Service the loss and fragmentation of habitat would be less than under Alternative A. However, since these things are voluntary, it is unknown how regularly these protection measures would be applied. As such, the impacts on

GRSG would likely be similar to those described in Alternative A. The amount of mining in the Utah planning area is relatively small compared with other mineral developments, and future development trends are expected to be similar to past development trends (see the Minerals - Locatables section of **Chapter 3**). As such, impacts from locatable mineral development are not expected to affect GRSG persistence.

#### *Mineral Materials*

Under Alternative D, PHMA would be closed to commercial mineral material development. All GRSG habitats would be open to noncommercial mineral material development outside a 1-mile buffer from leks. In PHMA, noncommercial mineral material development would only be allowed within 0.25 mile of an existing road. In addition, those operating sites would be required to meet noise restrictions, adhere to tall structure restrictions, avoid extraction during seasonally sensitive times for GRSG, and comply with the 5 percent disturbance cap.

By allowing development outside of 1-mile lek buffers in PHMA, some of the nesting and early brood-rearing habitat could have noncommercial mineral material development but only under a 5 percent disturbance cap. In addition, fragmentation is minimized by keeping development near existing roads (0.25 mile from an existing road).

Developments in PHMA may lead to habitat loss, habitat degradation, and disturbance to GRSG in nesting, brood-rearing, and wintering habitat. While these impacts may decrease nest success, chick survival, and adult survival, the scale and frequency of these types of developments are relatively small compared with other mineral developments, and future development trends are expected to be similar to past development trends. For context, throughout Utah in PHMA, there are 704 acres of disturbance from mineral material development. This type of mineral development is anticipated to be low and have a minimal impact on overall GRSG persistence.

The impacts on GHMA would be similar, but commercial mineral material development would also be allowed outside of 1 mile of a lek. Therefore, the magnitude and intensity of individual mineral material development impacts could increase. Commercial mineral materials developments are typically larger in size than noncommercial developments; however, there are currently few commercial operations in GRSG habitat. The agencies would implement BMPs such as anti-perch devices for raptors to reduce impacts on GRSG within GHMA, but all stipulations could be waived.

#### *Fluid Minerals (Including Geothermal)*

Under Alternative D, within GRSG occupied habitat, 1,829,980 acres would be open to fluid minerals with moderate constraints, 1,853,100 acres would be open with major constraints, and 138,500 acres would be closed to leasing. Under Alternative D, outside of GRSG occupied habitat but within population areas, 761,100 acres would be open to fluid mineral leasing, 765,300 acres would be open with minor constraints, 598,800 acres would be open with major constraints, and 196,800 acres would be closed.

When compared with Alternatives B and C, Alternative D would allow more development from new leases in PHMA; however, there would be a 4-mile buffer maintained by NSO stipulations around occupied leks. The 4-mile buffer would protect the majority of nesting and brood-rearing habitat from new leasing and associated development. In addition to providing

protections for brood-rearing and nesting habitat, based on the overlapping seasonal habitats in the Utah planning area, over 60 percent of winter habitat would be protected by the 4-mile buffer.

In PHMA but outside of the 4-mile lek buffer, restrictions listed in **Chapter 2** and discussed in the preceding sections would apply to fluid mineral development, which would provide additional protection to GRSG. For example, development outside of the 4-mile buffer would be subject to seasonal restrictions (construction and maintenance), noise and tall structure restrictions, as well as the 5 percent disturbance cap. In the Uintah and Carbon Population Areas, existing disturbance is already 1.7 and 1.3 percent, respectively, so additional disturbance would be limited under the proposed disturbance cap. Other population areas have approximately 1 percent or less of existing disturbance.

While some new development could occur in late brood-rearing, transition, and wintering areas, the disturbance cap would keep development at a level that research has indicated maintains brood and nest success, while limiting fragmentation and maintaining habitat. Application of TLs and other CSU stipulations would reduce the amount of disruption and effective habitat loss. Development of some existing leases in PHMA might become infeasible under the restrictions in this alternative.

RDFs (as identified in Appendix J of the Draft LUPA/EIS) would be attached as COAs to all development unless there are special circumstances that, through a NEPA analysis, are shown to be more protective of GRSG. The same RDFs would be applied to surface activities where the federal agencies own the surface but the mineral estate is in nonfederal ownership. This would lessen the amount of habitat loss, habitat degradation, disturbance to birds, and general fragmentation.

Development and associated disturbance would also be limited in PHMA because the BLM would only issue leases that are at least 640 acres in size or larger. BLM is required to allow for at least one well per lease. By increasing lease size, BLM has the ability to limit well density to one well per section (640 acres). In addition, operators would be required to submit site-specific plans of development prior to the agencies authorizing oil and gas-related actions in PHMA. In addition, unitization would be encouraged. By maximizing the size of new leases, requiring plans of development, and encouraging unitization, the BLM and Forest Service would have more flexibility in determining the appropriate location of wells and ancillary facilities and may be able to consolidate development. Strategic placement and consolidation of development on new leases could decrease loss, degradation, and fragmentation of habitat.

Smaller parcels may be leased based on noncompetitive regulations or when 640 contiguous acres of federal mineral estate is not available and leasing is necessary to remain in compliance with laws, regulations, and policy. As such, in limited circumstances, leases could be as small as 40 acres. Development of small leases could have some negative impact on the GRSG within PHMA, including disturbance at a density that typically exceeds one well per section. On the contrary, if smaller leases were issued to commit federal mineral estate to unit or communitization agreements, impacts on GRSG and the development could be reduced because there may be less duplicate infrastructure.

Unique to Alternative D, the BLM and Forest Service would place stipulations on new leases outside of PHMA to provide protection for leks that are located in PHMA but on the periphery of the mapped occupied habitat. No other alternative considers changes to management decisions outside of mapped occupied habitat. On new leases, all areas that are outside of mapped occupied habitat but within 1 mile of an occupied lek that is in PHMA would be managed with an NSO stipulation. Applying this NSO stipulation would provide leks on the edge of mapped occupied habitat with direct protection from fluid minerals development. In addition to a 1-mile NSO stipulation, lands that are within 4 miles of a lek that is in PHMA would be subject to CSU stipulations for tall structures and noise. These stipulations would minimize impacts of tall structures or disruptive noise on nesting hens and chicks.

Restrictions placed on new leases in PHMA could cause developers to look to private, tribal, and state lands within PHMA and develop those areas more heavily. Development of nonfederal lands could result in direct habitat loss, habitat degradation, and disturbance to birds and may cause functional habitat loss on federal lands. On the contrary, restriction placed on new fluid minerals leasing in PHMA could discourage new development of nonfederal lands because it may no longer be economically viable to develop nonfederal lands in PHMA. In such areas, restrictions on federal lands could provide protection for GRSG on nonfederal lands.

As has been discussed in previous sections, many areas with high oil and gas potential in GRSG habitats have already been leased. For existing undeveloped leases in PHMA, impacts on GRSG would be the same as those analyzed under Alternative B, where impacts would be reduced through the application of RDFs, which would be applied as COAs to APDs and other approvals. The agencies would strive to conserve GRSG habitat within PHMA and GHMA with the goal of minimizing habitat loss, fragmentation, and direct and indirect effects on GRSG and habitat. Written Orders (43 CFR 3161.2) may be used to require reasonable protective measures to avoid or minimize impacts on GRSG and habitat. The effectiveness of these actions cannot be assessed at this time because they would have to be consistent with the terms and conditions of the lease. Since each lease is different, the effectiveness of these could be different in each area. Overall, Written Orders would decrease impacts on GRSG, but the degree to which they would protect GRSG and increase likelihood of persistence is unknown. The agencies would also work to reduce the occurrence of West Nile virus by applying appropriate mitigation measures under their authority to decrease or eliminate the disposal of produced water on federal lands.

Restrictions on new leases in GHMA would be less than those described above for the PHMA (e.g., 1-mile buffer NSO stipulation) and may not be sufficient to maintain local population persistence. Within GHMA, waivers could be allowed for all stipulations except the seasonal stipulations, which would assist in reducing the temporary impacts of development during sensitive periods for GRSG but would not prevent permanent loss or degradation of their habitat. Waivers to restrictions in GHMA could be granted in exchange for mitigation that benefits GRSG in PHMA. Despite these limitations, when compared with other alternatives, Alternative D provides greater protection for GRSG in GHMA than Alternatives A, B, or E.

There are 238 fewer wells expected to be drilled under Alternative D than Alternative A, resulting in approximately 57 percent or 7,000 acres less of total disturbance (including well

pads, seismic lines, pipelines, roads, and ancillary features). Similar to all alternatives, the majority of the development under this alternative is expected to occur in the southern portion of the Uintah Population Area and Carbon Population Area. Most of the impacts would be similar to Alternative B, but Alternative D includes more areas in PHMA with existing undeveloped leases. Under this alternative, in contrast to Alternative B, some of the existing undeveloped leases in the West Tavaputs and the Brundage Canyon development areas are within PHMA and would receive additional protection because of the mandatory COAs and the 5 percent disturbance cap. Existing undeveloped leases in the southern portion of the Uintah Population Area and the Gasco area of the Carbon Population Area would be GHMA and would not receive any additional protections. Fluid mineral development impacts are expected to be the greatest in these areas, but actual impacts on GRSG are expected to be low because these populations already have been substantially impacted by development.

The impacts associated with geothermal leasing and development is essentially the same as those stated above because the acreage is already leased. The Bald Hills Population Area is the only population area where geothermal activity is anticipated. Geothermal activity would be managed consistently with the management described under PHMA. Impacts are not anticipated to be substantial.

### **Infrastructure**

As discussed in preceding sections, new infrastructure development can occur in conjunction with many different BLM and Forest Service programs, including lands and realty, minerals, grazing, travel and transportation management, and recreation. Impacts from minerals, grazing, travel and transportation, and recreation are discussed in detail in other sections. Therefore, this analysis is primarily focused on impacts from land and realty decisions.

Under Alternative D, many of the same restrictions that would be placed on minerals development would be placed on new ROWs. As such, impacts from new ROWs would be similar to impacts from minerals, which were described in the preceding section.

For example, aboveground linear ROWs would be excluded within 4 miles of active leks located in PHMA. Excluding new ROWs would protect breeding, nesting, and early brood-rearing habitat from habitat loss and fragmentation and maintain lek attendance and nest success rates. As discussed under Alternative A, impacts on leks are most severe near the lek, remained discernible out to distances of approximately 4 miles. In addition to protecting nesting and brood-rearing habitat, the 4-mile exclusion buffer would protect more than 50 percent of winter habitat due to the amount of overlapping seasonal habitats in the Utah Sub-regional planning area. These impacts are similar to those that were described under the fluid minerals section.

Areas beyond 4 miles of a lek in PHMA would be managed as avoidance areas for aboveground linear ROWs. ROWs in these areas would be avoided unless they could meet the criteria noted in **Chapter 2** (stable GRSG population trend, seasonal restrictions, limitations on tall structures and noise, less than 5 percent disturbance, and mitigation to offset impacts). Based on research conducted by Kirol (2012) in Wyoming, risk of population decline started increasing at 4 percent surface disturbance, and birds no longer used an area once disturbance reached 8 percent (fire was not included since fire did not occur in the study area). As such, compliance

with a 5 percent disturbance cap in areas beyond 4 miles in conjunction with other minimization measures would stop population decline.

Similar to fluid minerals management, the BLM and Forest Service would place restrictions on development of new aboveground linear ROWs outside of PHMA to provide protection for leks that are located in PHMA but on the periphery of the mapped occupied habitat. No other alternative considers changes to management decisions outside of mapped occupied habitat. All areas that are outside of mapped occupied habitat but within 1 mile of an occupied lek that is in PHMA would be ROW exclusion. This exclusion would provide leks on the edge of mapped occupied habitat with direct protection from infrastructure development. By extending the exclusion area for aboveground linear and ROWs outside of PHMA, breeding birds on the lek would be protected from noise and the potential for increased predation. In addition to a 1-mile exclusion, lands that are within 4 miles of a lek that is in PHMA would be ROW avoidance. Tall structures or disruptive noise would not be allowed, which would minimize impacts on nesting hens and chicks.

Under Alternative D, no site-type ROWs would be allowed in PHMA within 1 mile of a lek. The 1-mile exclusion buffer would provide direct protection to the lek itself; however, some disturbance could occur within nesting and early brood-rearing habitat. Outside of the 1-mile lek buffer, site-type ROWs would be avoided. The same avoidance criteria that would apply to aboveground linear ROWs would apply to site-type ROWs. Adherence to these criteria would provide direct protection from habitat loss, as well as protection from disruptions and increases in predation associated with tall structures.

With respect to on-the-ground or underground ROWs (e.g., roads, pipelines, fiber optics lines), all PHMA would be ROW avoidance. New authorization of actions would be subject to the same avoidance criteria discussed above (e.g., seasonal restrictions, stable population trends, and 5 percent disturbance cap). Authorization of linear underground ROWs could result in loss of sagebrush cover, increased opportunities for predation, and increased opportunities for spread of invasive species. These impacts could occur in nesting, brood-rearing, and winter habitats. While some maintenance of underground ROWs could be required, over time these areas would be restored and may recover to the point where they provide some habitat value. Impacts would be greatest in winter habitat, because of the amount of time it takes to restore sagebrush, and in areas where lack of winter habitat is a limiting factor. Impacts from human activity would not occur, because construction would not occur during seasons of use.

Impacts from new aboveground ROWs would be similar to those from underground ROWs; however, new roads would result in permanent habitat loss and fragmentation. In addition, there would be impacts associated with human activity. The magnitude of the impacts would depend on the size of the road as well as the frequency of use. Under Alternative D, some additional restrictions would be placed on new ROWs, which would minimize impacts. For example, new FLPMA Title V ROWs would only be granted for existing roads as long as they would remain in the same condition. ROWs would be collocated with existing ROWs where possible.

Construction of new linear ROWs (underground and aboveground) would be likely in designated corridors. In PHMA, the BLM would undesignate corridors that are not currently encumbered by existing linear ROWs. In addition, no aboveground linear ROWs would be

allowed in areas where there are currently only underground ROWs. Construction of new linear ROWs, and, in particular, construction of aboveground transmission lines, would have similar effects to those described under Alternative A. These effects would be most evident in areas close to leks, because research indicates that higher densities of transmission lines within 4 miles of a lek negatively influences likelihood of lek persistence (Walker et al. 2007a). To minimize the effects of new ROWs, new aboveground ROWs in designated corridors would be constructed as close as technically feasible to existing aboveground lines. In addition, construction of new lines would be subject to the 5 percent disturbance cap, seasonal restrictions would apply, and mitigation would be required. Placement of infrastructure as close as technically feasible to existing infrastructure would reduce the amount of new fragmentation and habitat loss. Direct disturbance would primarily occur in areas that are already indirectly impacted by existing infrastructure. The magnitude of impacts from new ROW authorizations would depend on whether or not birds are using an area and size of the proposed project. If existing ROWs in a corridor have indirectly impacted an area to a point where there is effective habitat loss, construction of a new ROW would have limited effect. On the other hand, if birds are acclimated to an existing ROW and use adjacent habitat for aspects of their life cycle, construction of new ROWs adjacent to an existing ROW could result in direct habitat loss, fragmentation, and displacement of GRS. Construction of small ROWs adjacent to larger ROWs would result in less direct disturbance than construction of large ROWs adjacent to small ROWs. Construction of large ROWs next to small ROWs could also result in behavioral avoidance due to the presence of tall structures and increased predation.

Under Alternative D, the BLM and Forest Service would also designate new corridors. In all cases the new corridors would be designated in areas where there are existing linear ROWs. Construction of new infrastructure in designated ROW corridors would result in similar impacts to those described above.

In addition to restrictions on new ROWs, restrictions on minerals development discussed in the preceding section would prevent or limit the amount of infrastructure in PHMA.

Impacts from infrastructure in PHMA would also be reduced by limiting motorized vehicle travel to existing roads and trails until additional travel management planning/route designation is completed. See the Minerals and Recreation sections for more discussion of infrastructure impacts from mineral development and OHV use.

Leks within GHMA would be protected by a 1-mile ROW avoidance area buffer. New ROWs would only be allowed in the 1-mile buffer if they meet noise and tall structure restrictions, impacts are offset by mitigation, and it complies with seasonal restrictions. Restrictions on new ROWs in GHMA could be waived in exchange for mitigation in PHMA. Areas outside of the 1-mile lek buffer would be open to new ROWs. Mitigation would be considered on a case-by-case basis, similar to current practices. Research suggests that conservation measures in GHMA would be insufficient to protect GRS in GHMA. In addition to insufficient lek protections, disturbance would be allowed to occur at levels where population decline is expected.

Impacts for infrastructure development would be greatest in areas managed as PHMA such as the southern-central portions of the Uintah Population Area where there is the greatest potential for minerals, road, pipeline, and transmission line development. Impacts would also

occur in portions of the Sheeprocks Population Area, based on transmission development. Both of these areas currently have low population numbers and poor habitat quality.

#### *Renewable Energy*

Impacts from wind energy development under Alternative D would be similar to those described under Alternative B. However, avoidance restrictions would also be applied to areas outside GRS habitat that fall within 4 miles of a lek that is inside PHMA. This would decrease the likelihood that wind developments outside, but adjacent to, breeding, nesting, and brood-rearing habitat would be avoided by GRS because of their proximity to the noise or presence of tall structures. Wind energy development within that avoidance area would be allowed if noise restrictions and tall structure restrictions are met. As a result, impacts that could occur from wind development outside PHMA but within 4 miles of a lek would be addressed to eliminate impacts over a larger area than Alternative B.

#### **Fire**

Under Alternative D, impacts from fire would largely be the same as Alternative B. Fire would not be included as part of the 5 percent disturbance cap. Suppression would be focused on protecting the largest blocks of contiguous sagebrush. The BLM and Forest Service would construct fuelbreaks to protect GRS habitat; however, efforts would be made to avoid creating breaks in large, contiguous sagebrush areas. These decisions would decrease direct removal of sagebrush associated with fire management activities, as well as potentially reduce the likelihood for fire in GRS habitats.

Similar to Alternative B, according to the VDDT model (**Table 4.8**), during the next 50 years implementation of Alternative D would result in a reduction in the average annual acres of GRS habitat burned. Impacts would be the greatest in the population areas that are most prone to wildfire, which are generally the areas in the Great Basin region. Restrictions placed on development would reduce the amount of human activity in GRS habitat, which could reduce the number of human-caused fire starts. However, more human activity would be allowed in GRS habitat under Alternative D than under Alternatives B and C.

**Table 4.9** shows changes in the percent of the modeled sagebrush in the mid- to late-seral stage. Under Alternative D, the VDDT modeling effort resulted in trends for GRS habitat similar to those described for Alternative A, except that an emphasis on fire prevention and preparation of proactive fire lines would result in a smaller loss of habitat. This is most pronounced in the Sheeprocks Population Area, where at 10 years the modeled decrease in mid- to late-seral stage sagebrush is only 3 percent under Alternative D compared with 7 percent under Alternative A. This is more pronounced at 50 years, where Alternative D sees a 4 percent decrease in mid- to late-seral stage sagebrush compared with a 15 percent decrease under Alternative A. The long-term decreases in other population areas would be similarly reduced, though to a lesser degree.

When compared with current conditions, the percent of sagebrush that would be in the mid- to late-seral stage at 50 years would decrease in the Uintah, Carbon, Sheeprocks, Rich, Lucerne, Wyoming-Uinta, and Wyoming-Blacks Fork Population Areas. The percent sagebrush that would be in the mid- to late-seral stage would remain the same in the Panguitch, Bald Hills, and Parker

**Table 4.8**  
**Alternative D VDDT Model Outputs- Average Changes in Fire, Juniper, and Annual**  
**Grasses Compared with Alternative A Over 50 Years**

Population Area(s)	Percent Change in Average Annual Acres Burned	Percent Juniper	Percent Change in Juniper	Percent Annual Grasses	Percent Change in Annual Grasses
Box Elder	-13	10	43	9	0
Hamlin Valley, Ibapah	-29	26	4	5	-29
Rich, Uintah, Wyoming-Uinta, Wyoming-Blacks Fork	-11	13	0	3	-25
Carbon	-5	27	-7	1	-50
Emery	0	3	0	0	0
Parker, Panguitch, Bald Hills	-15	18	0	0	-100
Strawberry	-13	12	0	0	0
Sheeprocks	-35	30	-15	15	-12

**Table 4.9**  
**Sagebrush Condition and Trend Analysis: Comparing Alternatives by Percent of Sagebrush**  
**in Mid- or Late-Seral Classes for Population Areas at 10 Years and 50 Years – Alternatives**  
**A and D**

Population Area	Percent of Sagebrush in Mid- and Late-Seral Class				
	Current Conditions	10 Years		50 Years	
		Alternative A	Alternative D	Alternative A	Alternative D
Uintah	80	76	77	67	69
Carbon	66	57	61	58	60
Emery	77	83	83	85	85
Parker Mountain	70	67	68	68	70
Panguitch	70	67	68	68	70
Bald Hills	70	67	68	68	70
Hamlin Valley	36	45	46	54	59
Ibapah	36	45	46	54	59
Sheeprocks	53	46	50	38	49
Box Elder	55	61	60	70	68
Rich	80	76	77	67	69
Strawberry	76	76	77	78	79
Lucerne	80	76	77	67	69
Wyoming-Uinta	80	76	77	67	69
Wyoming-Blacks Fork	80	76	77	67	69
<b>All</b>	<b>57</b>	<b>60</b>	<b>60</b>	<b>65</b>	<b>66</b>

Mountain Population Areas. The percent sagebrush that would be in the mid- to late-seral stage would increase in the Hamlin Valley, Ibapah, Box Elder, Strawberry, and Emery Population Areas. According to the model, at 50 years, all population areas would meet the GRSG habitat objective considered under Alternative D, which is to manage or restore PHMA so that at least 50 percent of the land cover provides adequate sagebrush habitat to meet GRSG needs.

As discussed in **Section 4.3.1**, Methods and Assumptions, information derived from the VDDT model provides valuable information on estimated trends; however, the model also has a number of limitations. While quantitative objectives for treatments were not included under Alternative D, an increase in treatment could be consistent with the goal, objectives, and management actions considered under Alternative D.

Under Alternative D, not all occupied GRSG habitat would be managed as PHMA. Some occupied GRSG habitat in the Carbon, Uintah, Sheeprocks, Panguitch, Wyoming-Uinta, and Wyoming-Blacks Fork Population Areas would be managed as GHMA. GHMA (approximately 17 percent of the mapped occupied habitat in the planning area) are areas that have been determined to have less conservation value than PHMA. Removal of GHMA from the model area would likely result in decreases in percent of juniper and annual grasses and increases in the amount of sagebrush in the mid- to late-seral stage in PHMA. Therefore, population areas that are not currently meeting objectives may be able to meet objectives in the future.

### ***Invasive Plant Species***

#### *Weeds*

Impacts from Alternative D would be similar to those described for Alternative B. However, the BLM and Forest Service would apply a 5 percent disturbance cap to anthropogenic disturbances in PHMA. This disturbance cap would not include fire. The spread of cheatgrass has increased the frequency and intensity of fires, and cheatgrass readily invades disturbed sites after wildfire, especially in drier, lower-elevation sites (Balch et al. 2013). Under Alternative D, there would be less surface disturbance in GRSG habitat than under Alternative A but more surface disturbance than Alternative B. As a result, the likelihood for introduction and spread of invasive plant species due to human activity would be slightly higher than under Alternative B. As shown in **Table 4.9**, the percent of annual grasses would decrease in the next 50 years under Alternative D compared with Alternative A. Estimated decreases in annual grasses closely correspond to estimated decreases in wildfire. Changes in annual grasses due to development were not accounted for in the model.

#### *Conifer Encroachment*

Impacts from Alternative D would be similar to those analyzed under Alternative B. **Table 4.9** shows changes in the percent of juniper in GRSG mapped occupied habitat. Treatment of encroaching juniper is expected to reduce the percent of juniper on the landscape in the Carbon Population Area. Despite efforts to prevent juniper encroachment, the percent of juniper is expected to increase in the Box Elder, Hamlin Valley, and Ibapah Population Areas. Reductions in juniper are expected in the Sheeprocks Population Area; however, these reductions are likely tied to increases in fire and annual grasses. The percent of juniper on the landscape is expected to remain stable in all other population areas.

**Grazing (Including Wild Horses and Burros)***Impacts from Domestic Livestock Forage Use (Herbivory)*

Impacts from livestock herbivory associated with Alternative D would be similar to those identified under Alternative B, except for adjustments in emphasis and prioritization that are noted below. Under Alternative D, specific objectives would be included for management of GRSG habitats, like under Alternative B, except that while the habitat indicators would use scientific literature (e.g., Connelly and Hagen), they would be adjusted, as applicable, based on documented regional variation of habitat characteristics, quantitative data from population and habitat monitoring, and evaluation of local research. This would allow GRSG habitat objectives to be tailored to the variations in the local vegetation communities (e.g., the differences between high-elevation areas like Rich and Parker Mountain Population Areas and lower elevation areas like Bald Hills and Hamlin Valley Population Areas). The approach would allow the habitat objectives to be tailored to reflect the biological capabilities of the area and allow adjustments to livestock grazing to be suited to those capabilities. Over time, this tailoring would result in livestock grazing being managed to maintain healthy GRSG habitat based on the local vegetation characteristics and ecological responses.

As with Alternative B, the BLM and Forest Service would manage PHMA to incorporate GRSG-specific habitat objectives and management considerations into permit renewals, allotment management plans, or annual operating instructions. However, under Alternative D, the allotments in PHMA would be assessed to determine if they are meeting the GRSG objectives, but the rangeland health standards evaluations would be focused on allotments that are not currently achieving rangeland health standards. During the assessment of habitat condition and rangeland health standards, annual adjustments would likely have to be made to meet the new GRSG objectives, which could result in changes to current grazing practices. While Alternative D could result in 100 percent of the permitted use being used, such use would only be permitted if climatic and environmental conditions resulted in forage production capable of supporting this level of use while meeting GRSG objectives. By not prioritizing habitat assessments in all GRSG habitat, as proposed under Alternative B, some GRSG habitats could be impacted by livestock grazing, as described under Alternative A, for several years until the regular assessment cycle results in a review of the area. This could result in GRSG habitat in some areas being affected in a negative trend before the issue is identified and steps are implemented to correct the trend. However, by focusing resources on allotments not meeting rangeland health standards, the areas most in need of evaluation and correction would receive the primary focus.

Under Alternative D, the ecological potential of various sites would be taken into account when determining livestock grazing management strategies, considering the different vegetative states capable of being supported in an area based on ESDs. Areas within PHMA that currently provide or could be managed to become GRSG habitat would be managed as such. This would maintain areas that currently provide habitat and would move areas that ecologically could become habitat to that end. Over time, this would increase the amount of GRSG habitat that meets the site-specific GRSG habitat objectives.

Managing grazing practices (e.g., rest-rotation, season of use, distribution, and intensity) to meet rangeland health standards and GRSG habitat objectives would result in a decrease in the potential for the impacts identified under Alternative A to occur. To align grazing practices with the needs of GRSG habitat, applicable terms and conditions would be added to grazing permits, based on the site-specific ecological conditions, to ensure that GRSG habitat objectives are met. This would ensure that GRSG habitat needs are considered during multiple levels of grazing administration, providing for maintaining or improving the quality of GRSG seasonal habitats.

Compared with Alternative B, livestock grazing in riparian and meadow complexes would not automatically be reduced. Instead, Alternative D would require assessing grazing in these areas to ensure they are maintained or are recovered. If recovery is not occurring and livestock grazing is identified as the causal factor, grazing pressure would be reduced through adjusting grazing management practices. Assessing areas rather than directly reducing use could result in some brood-rearing areas being reduced in quality while they are assessed and grazing adjustments are identified and implemented. These impacts would generally last only a season to two, and over the life of the plan, riparian and meadow complexes within PHMA would be maintained or improved.

Collectively, the requirements to protect GRSG habitat in Alternative D would maintain or improve GRSG habitat compared with Alternative A. Compared with Alternatives B and C, there could be impacts on GRSG habitat in portions of the decision area during periods between monitoring cycles. When the impacted areas are identified, however, actions would be implemented to resolve the issue and bring the area back to meeting GRSG objectives. Over the life of the plan, the quality of GRSG seasonal habitats would be maintained or improved given the focus on meeting GRSG habitat objectives.

*Impacts from Wild Horse Forage Use (Herbivory)*

Impacts from wild horse herbivory would be the same as described under Alternative B.

*Impacts from Wild Ungulate Forage Use (Herbivory)*

The impacts from wild ungulates would be the same as described under Alternative A.

*Impacts from Livestock Grazing Program Actions*

Impacts from livestock grazing program action associated with Alternative D would be similar to those identified under Alternative B, except for adjustments in emphasis and prioritization that are noted below.

Impacts on GRSG habitat from riparian management and water developments would be similar to those described under Alternative B, except that under Alternative D, new water developments that have neutral effects on GRSG would be allowed. This could result in more water developments within GRSG habitat compared with Alternative B (since that alternative only allows developments that are beneficial), but since an evaluation would have to determine that new development would be either beneficial or have no effect on GRSG, no change in impact is anticipated. In addition, Alternative D would require the evaluation of existing water developments to determine if modifications are necessary to maintain or improve wetlands (e.g., riparian areas, mesic areas, and wet meadows) and GRSG habitat. Requiring modifications to livestock water developments where necessary would allow for the improvement of areas

currently impacted by existing development, improving GRSG brood-rearing habitat in areas where this may occur.

Alternative D does not include specific language related to the location of livestock supplements. While supplement location is used to improve distribution of livestock and use levels in an area, they can also result in livestock congregating near the supplement location. Small areas of increased livestock density would result in localized increases in use and trampling, with corresponding reductions in grasses, forbs, and shrub cover and reduced functionality of GRSG habitat. Although Alternative D does not include a specific requirement to “conserve, enhance, or restore” GRSG habitat in relation to placement of supplements, it does include specific GRSG habitat objectives that must be met under the various grazing practices, including supplement location. Under Alternative D, there would be a potential for site-specific impacts associated with use of the areas surrounding the supplement locality during the period the supplement is available. These impacts could be greater than those anticipated for Alternative B because of the lack of specific requirements related to supplements, but application of the GRSG habitat objectives would provide for the long-term maintenance of GRSG habitat quality across the population area.

*Impacts from Wild Horse Program Actions*

Impacts from wild horse herbivory would be the same as described under Alternative B.

**Recreation**

Under Alternative D, impacts from area designations would be similar to those described under Alternative B. On BLM-administered lands, areas would be prioritized and activity-level travel plans would be completed based on where OHV use is having the greatest impact on GRSG, in accordance with BLM’s Travel and Transportation Management Planning timeline strategy. This would allow the BLM to reduce or eliminate impacts by changing area management in those areas where OHV use is having the greatest impact. Management would be focused on meeting access needs while emphasizing having a neutral or positive impact on GRSG habitat. Impacts would be reduced compared with Alternative A.

Impacts from recreational permits would be the same as those described for Alternative B.

Impacts from other types of recreation, including recreation at developed recreation sites and dispersed recreation would be the same as those described under Alternative A.

**Habitat Conversion for Agriculture and Urbanization**

Under Alternative D, management would be similar to Alternative B, except that 2,760,300 acres of GRSG habitat would be designated as PHMA, and potential land tenure adjustments would emphasize that it must be a net benefit for GRSG.

**ACEC Designation**

No special management areas would be designated to provide protection for GRSG under Alternative D. Any incidental protections under Alternative A would continue to occur.

#### 4.3.6 Alternative E

##### **GRSG Habitat and Disturbance Thresholds**

Under Alternative E, 82 percent of the mapped occupied habitat in the Utah planning area would be managed as SGMAs/core areas. This includes 100 percent of the mapped occupied habitat included in the USFWS-identified PACs. Under this alternative, 94 percent of the birds would be in SGMAs. Unique to Alternative E, SGMAs would not include the Anthro Mountain and West Tavaputs populations. These populations may be important for redundancy and may provide connectivity to northeastern Utah GRSG populations. While there is documented movement between these two areas and other population areas (e.g., Emma Park and portions of the Uintah Population Area on private and tribal lands), it is unknown what level of connectivity is necessary to prevent isolation of populations and how important these areas are to maintaining genetic viability.

Under Alternative E1, new disturbances on state and federal lands within SGMA would be limited by a 5 percent disturbance cap (not including existing disturbances). Impacts on GRSG would be avoided. When avoidance is not possible, minimization measures and mitigation at a 4 to 1 ratio would be required. In addition, similar to Alternative C, fires would be counted towards the disturbance cap. In the Bald Hills (12.8) and Box Elder (5.9) Population Areas, disturbance already exceed 5 percent of land area when fire history is taken into account. These areas would face greatly reduced potential for development under this alternative.

The inclusion of fire as a type of habitat loss counted in the disturbance cap would incentivize project proponents to restore burn areas, along with other disturbances, when the disturbance cap limit has been reached. Thus, under this alternative, when new disturbances reach 5 percent, industry may commit additional resources to assist with restoration efforts of GRSG habitat affected by wildfire as a way of ensuring disturbance would remain under the disturbance cap, thereby allowing development to be able to continue. Since there are already varying levels of existing disturbance in SGMAs, that would not count against the cap, and because the plan is not clear on whether disturbance on private lands would be counted against the disturbance cap, disturbance could surpass 5 percent in some areas. Based on research conducted by Kirol (2012) in Wyoming, risk of population decline started increasing at 4 percent disturbance and birds no longer used an area once disturbance reached 8 percent. Given the information above, allowable disturbances could exceed disturbance levels that the literature considers necessary to maintain GRSG habitats and populations, and could lead to population declines or abandonment of portions of a SGMAs (e.g., Alton, Wildcat Knolls).

Under Alternative E1, disturbance limits would be calculated across the SGMA. When there are multiple GRSG populations within a SGMA, disturbance could be disproportionately focused on one population. In this situation, the impacted population could decline. Declines in individual populations, as well as in individual SGMAs, are allowable under Alternative E so long as the statewide population objectives are met and each SGMA maintains a viable population.

Disturbance in GRSG habitat within SGMAs would be avoided unless the development cannot be moved outside of the GRSG habitat or SGMA based on resource constraints (e.g., high potential for mineral development). Exceptions to the avoidance requirements would be

evaluated on a case-by-case basis in coordination with the State. When compared with other alternatives, Alternative E would provide the BLM and Forest Service with more flexibility to authorize actions in SGMAs. While development levels in GRSG habitats would be less than under Alternative A because of the avoidance requirement, exceptions could result in some development in the nesting and early brood-rearing habitats, which could directly decrease reproductive success and potentially decrease population growth rates (Kiroi 2012). In addition, disturbances in winter habitats could decrease winter habitat use.

Although Alternative E1 could result in greater disturbance in GRSG habitat than is allowed under other action alternatives, the BLM and Forest Service would focus on expanding occupied GRSG habitat by enhancing an average of 25,000 acres per year and requiring mitigation (4:1 ratio) for all long-term surface-disturbing actions in SGMAs. Expansion of GRSG habitat in opportunity areas that are directly adjacent to occupied habitat would increase the amount of habitat available for GRSG. Expansion of habitat, tied to proactive restoration or project-specific mitigation could provide new seasonal habitat for contemporaneous GRSG populations supplanting habitat lost due to disturbance, fragmentation, or distressing events. For example, vegetation treatments that have reduced juniper encroachment in the Panguitch SGMA have resulted in documented use by GRSG within 2 years of the treatment (Frey et al. 2013). The success of mitigation efforts may depend on the quality of the habitat that is lost in juxtaposition to the quality of the habitat that is created. For example, creation of 4 acres of transitional habitat in exchange for 1 acre of frequently used winter habitat may not provide benefit to the local population. On the contrary, improving 4 acres of brood-rearing habitat in exchange for loss of 1 acre of transitional habitat could provide a net benefit to GRSG. Expansion of GRSG habitat has the potential to result in increases in GRSG populations within SGMAs; however, empirical evidence suggests that GRSG populations within Utah have slightly declined or held steady despite the fact that the BLM, Forest Service, NRCS, and the State of Utah have been actively treating GRSG habitat. Based on current knowledge, there has been limited success in restoring lost GRSG habitat (USFWS 2013). The likelihood of success would depend upon a number of variables, including the type and location of treatment. For example, vegetation treatments have been more successful in increasing the amount and quality of GRSG habitat at higher elevations than in low elevations. In addition, removal of juniper in areas where there is still a sagebrush understory has shown success.

For the National Forest System lands within the Utah EIS project boundary that extend into Wyoming, under Alternative E2, disturbances from oil, gas and mining activities would be limited to no more than an average of 1 location per 640 acres. Further, all surface disturbance, in any program area, would be limited to no more than 5 percent within core areas. This would be calculated using the Density Disturbance Calculation Tool developed by the Wyoming SGIT Team. Disturbance impacts on GRSG from Alternative E2 would be similar to those described for Alternative D. This limit to activities within core areas would help protect against further habitat loss, habitat degradation, and disruption to the GRSG. A recent study conducted by Copeland et al. (2013) determined that the Wyoming core area strategy would reduce declines in GRSG populations by approximately half when compared to a policy that would employ no GRSG protection measures. However, the study also concluded that under the core area strategy GRSG populations in Wyoming would decrease in the long term by 9 to 15 percent.

**Minerals**

The key to minerals management under Alternative E1 is avoiding disturbance in GRSG habitat within SGMAs. As part of the avoidance requirements, new permanent disturbance would not be allowed within 1 mile of a lek, unless it is not visible from the lek. Outside of the 1 mile lek buffer, if avoidance is not possible, project proponents must demonstrate why it is not, and the BLM/Forest Service Authorized Officer would determine whether such demonstration is sufficient on a case-by-case basis. Where avoidance is not possible and minerals development in GRSG habitat occurs, the impacts must be minimized and mitigated. The combination of avoidance, minimization, and application of compensatory mitigation would provide protection to GRSG habitat, though protection would not be ensured since there are exceptions to the avoidance requirement.

Unlike other action alternatives, under Alternative E1, the BLM and Forest Service would not require existing leaseholders to implement RDFs for nonenergy leasable or fluid minerals developments. Existing uses are explicitly recognized and are not affected by the implementation of this alternative. Conservation measures that protect GRSG habitat would be considered on a case-by-case basis. Because the majority of the reasonably foreseeable development anticipated in the planning area is associated with development on valid and existing rights, impacts from minerals development on existing leases would be the same as those described under Alternative A.

Another way in which Alternative E1 differs from other action alternatives is that no protections are afforded to GRSG habitat located outside of SGMAs. As such, habitat outside of SGMAs would be afforded a lesser level of protection that is currently provided under Alternative A. Any surface use or seasonal restrictions currently in place (see **Table 4.1**) would be eliminated. This would result in no protection from minerals development for approximately 18 percent of the occupied habitat in the planning area and 3 percent of the statewide GRSG population. Given the amount of existing and proposed development in GRSG habitat outside of SGMAs, extirpation of small local populations could occur.

Under Alternative E2, the Forest Service would stipulate NSO within 0.6 miles of a lek within core areas and 0.25 miles within noncore areas. The Forest Service would work with development project proponents to site projects in locations that would allow for development but contain the least sensitive habitats, whether inside or outside of core areas. According to the literature, Alternative E2 may include insufficient lek protections and could result in population declines. A recent study conducted by Copeland and others (2013) determined that the Wyoming core area strategy would reduce declines in GRSG populations by approximately half when compared to a policy that would employ no GRSG protection measures. The study also concluded that under the core area strategy GRSG populations in Wyoming would decrease in the long term by 9 to 15 percent. However, the USFWS has determined that lek protections, in combination with the Wyoming Governor's Core Strategy of protecting all lands within core areas, provides an acceptable level of protection for GRSG.

**Nonenergy Leasables**

Impacts from acres open to nonenergy leasable mineral leasing would be the same as those described for Alternative A. Any stipulations, COAs, or conservation measure proposed under

this alternative would only apply to GRSG habitat in SGMAs/core areas. Since the primary development potential for nonenergy leasable resources is gilsonite and phosphate which occur in the Uintah Basin (**Map 3.21-5**), the majority of the impacts would occur where those resources exist. Phosphate resources in the Diamond Mountain area could be further developed in SGMA, as it is still open for leasing. GRSG habitat outside of the SGMAs/noncore areas (East Bench and Deadman's Bench) would not be managed for the conservation of the species; therefore, impacts from such development could occur. The majority of the area has gas development with wells that ranging from 2 to 50 wells per square mile. Therefore, GRSG habitat loss, habitat degradation, and disturbance could add to the existing disturbances in the area and affect a small number of birds (10-year average male count is 1 male on BLM-administered lands lek and 4 males on both leks). These impacts would further impact a population that has been declining and already has substantial impacts from gas development on the landscape.

As mentioned in under Minerals, Alternative E would require ROW avoidance within GRSG habitat within SGMAs. As part of the avoidance requirements, no permanent disturbance is allowed within 1 mile of occupied leks, and disturbance in other areas of the SGMAs would be avoided. Avoidance requirements, including the 1-mile restriction, can be excepted.

Research suggests that 1 mile is not sufficient to adequately protect GRSG nesting habitat surrounding lek sites from oil and gas related infrastructure because between 75 percent (Doherty et al. 2010) and 95 percent (Coates et al. 2013) of a populations habitat use occurs within 3.1 miles of a lek. Allowing disturbance within 3.1 mile buffers of the lek could lead to decreased reproductive success and population declines in the Diamond Mountain area, specifically. For example, studies have shown negative effects on lek attendance from well sites and haul roads within 2 to 3 miles of a lek (Walker et al. 2007a, Johnson et al. 2011). In addition, natural gas development within 0.6 to 3 miles of occupied GRSG leks could lead to declines in breeding populations, lower nest initiation, and lower annual survival of chicks (Lyon and Anderson 2003; Holloran 2005; Aldridge and Boyce 2007; Walker et al. 2007a; Holloran et al. 2010).

TLs and CSU stipulations would be applied to new leases and geophysical operations within GRSG habitat in SGMAs/core areas. Avoiding activities during the important seasons would lessen the impacts on the birds for that season. Many of the impacts within GRSG habitat in SGMAs/core areas would be lessened through the application of the CSU stipulations (e.g., time of day and noise restrictions). These stipulations would protect the lek site itself and displaying males and may protect some of the nesting and early brood-rearing habitat depended upon how much they overlap temporally and spatially.

Despite efforts to reduce or eliminate impacts on GRSG through application of CSU and TL stipulations, oil and gas research suggests that GRSG persistence is negatively affected when well density within approximately 2 miles of a lek exceeds one disturbance per section and when infrastructure is placed in proximity to a lek (Tack 2009). Considering the characteristics that disturb GRSG from oil and gas well development and the similar nature of mineral facilities (e.g., direct habitat loss, roads, vehicle traffic, and noise), impacts from mineral facilities is anticipated to be similar.

While Alternative E1 would provide the BLM and Forest Service with greater flexibility in determining which actions would be allowed in SGMAs than is provided under other alternatives, the ability to accommodate development and grant exceptions to stipulations makes it difficult to determine the effectiveness of Alternative E1 at protecting GRSB populations from impacts of nonenergy development.

Under Alternative E, the BLM and Forest Service would attempt to offset impacts associated with actions authorized in SGMAs through proactive habitat restoration and compensatory mitigation. There have been instances where projects have been aimed to increase habitat for GRSB, for example, by removing pinyon-juniper adjacent to occupied GRSB habitat and documenting GRSB use (Frey et al. 2013). However, the effectiveness of impacting habitats and offsetting the loss of those habitats with restoration of other habitats has not been evaluated at a population-level. Therefore, assuming that compensatory mitigation would be required to offset the impacts of a disturbance, we must assume that it would be effective. The effectiveness of these management actions would be the same as discussed in the introduction of to the Alternative E analysis (GRSB Habitat and Disturbance Thresholds).

Based on the information above, decreased population growth is expected to continue to occur in the Uintah Population Area outside of the Uintah SGMA, East Bench and Deadman's Bench, and inside the Uintah SGMA, Diamond Mountain, where there is there is high potential for development of phosphate and gilsonite.

Under Alternative E2, impacts on nonenergy leasable minerals would be similar to those described under Alternative E1 except impacts on GRSB habitat in core areas would be limited by the 5 percent disturbance cap, as calculated by the Wyoming density disturbance calculation tool. Research suggests that maintaining disturbance at or near this level may be sufficient to maintain GRSB habitats and populations.

#### *Solid Material - Coal*

Under Alternative E1, the same acreage would be suitable for surface and underground mining of coal as under Alternative A. Both surface and underground mining would be allowed in both GRSB habitat in SGMAs and GRSB habitat outside of SGMAs, but there are no stipulations or conservation measures associated with GRSB habitat outside of SGMAs. As discussed in preceding sections, under Alternative E1, the BLM and Forest Service would avoid development in SGMAs. As part of this avoidance, no permanent disturbance would be allowed within 1 mile of occupied leks. The effectiveness of Alternative E at reducing impact from coal development would be similar to those described in the Nonenergy Leasable Mineral section. Under this alternative, future habitat loss, degradation, and disturbance are expected to continue to occur within the Carbon, Emery, and Panguitch Population Areas where coal potential is most likely to occur. Habitat loss in the Carbon and Emery Population Areas would be minimal because only underground mining occurs in these areas. Any habitat loss would be limited to construction of appurtenant facilities.

Under Alternative E2, surface and underground coal mining would be allowed in both core and noncore areas. On a site-specific basis, each project would be reviewed and after consultation with the State of Wyoming, Forest Service, and the BLM. Certain stipulations would be applied to minimize impacts on GRSB. Impacts from coal development would be similar to those

described under Alternative E1, except disturbance would be limited by the 5 percent disturbance as calculated by the Wyoming density disturbance calculation tool. Research suggests that maintaining disturbance at or near this level may be sufficient to maintain GRSG habitats and populations.

#### *Locatables*

Under Alternative E1, the same acreage would be suitable for locatable minerals as under Alternative A. Locatable mineral activities would be allowed in both GRSG habitat in SGMAs and GRSG habitat outside of SGMAs. However, the BLM and Forest Service would work with claimants to apply conservation measures to minimize impacts from activities in GRSG habitat in SGMAs. If claimants agree to implement conservation measures discussed in **Chapter 2**, impacts on GRSG habitat in SGMAs would be similar to those described in the Nonenergy Leasable Mineral section above. If claimants do not agree to implement conservation measures, there would be a loss of GRSG habitat and impacts would be similar to those described under Alternative A. Actual impacts from locatable minerals development in GRSG habitat would be low based on the amount of existing and projected development in the planning area.

There would be no impacts from locatable mineral development in the Wyoming-Blacks Fork Population Area because the Flaming George NRA is congressionally withdrawn from mineral entry. Under Alternative E2, within the Wyoming-Uinta Population Area, withdrawals could be considered if locatable mineral development poses a risk to GRSG. If lands are withdrawn, there would be no impacts from locatable mineral development. If lands remain open for entry, impacts would be same as those described above under Alternative E1. No mineral withdrawals would be considered within noncore areas; therefore, there could be a loss of GRSG habitat from locatable development.

#### *Mineral Materials*

Under Alternative E1, mineral materials disposal would be allowed in both GRSG habitat in SGMAs and GRSG habitat outside of SGMAs, but development in GRSG habitat in SGMAs would have stipulations and conservation measures. Impacts on GRSG and their habitat would be similar to those describe in the Nonenergy Leasable Minerals section above.

Under Alternative E2, mineral materials exploration, sales, and extraction would be allowed in both core and noncore areas. Mineral material extraction or crushing operations would be prohibited in core areas during seasonal restriction times; however, removal of material from existing stockpiles would be allowed. Under this alternative, future habitat loss, degradation, and disturbance in core and noncore areas are expected to continue throughout the decision area and would be similar to Alternative A. While these impacts may decrease nest success, chick survival, and adult survival; the scale and frequency of these types of developments are small compared with other mineral developments in GRSG habitats and future development trends are expected to be similar to past development trends of few, small scale mineral material development sites. Therefore, this type of mineral development is anticipated to be low and have a minimal impact on overall GRSG persistence.

#### *Fluid Minerals (Including Geothermal)*

Under Alternative E1, 247,200 acres within GRSG habitat would be open to leasing, subject to standard stipulations; 2,637,600 acres would be open to leasing, with minor constraint; 688,100

acres would be open to leasing, subject to NSO stipulations; and 138,500 acres would be closed to leasing. All GRSG habitats that would remain open with standard stipulation are located outside of SGMAs. Impacts on these areas would be the same as described under Alternative A. Within SGMAs, areas within 1 mile of an occupied lek would be managed with an NSO stipulation; all other areas would have CSU and TL stipulations similar to those discussed above under Nonenergy Leasable Minerals section. As such, impacts on GRSG and their habitat would be similar to those describe in the Nonenergy Leasable Minerals section, above.

As discussed in the General Minerals section above, some existing leases may be affected by management actions considered under Alternative E1. Mitigation would be considered during the site-specific NEPA process, which is the current practice under the No Action Alternative. Application of mitigation measures identified through site-specific NEPA analysis that intended to reduce or eliminate impacts on GRSG have been inconsistent from project to project and resulted in varying levels of success.

The RFD scenario under Alternative E1 is the same as the reasonably foreseeable development under Alternative A. Impacts from fluid minerals would be greatest in the Carbon Population Area and southern portion of the Wyoming-Uinta Population Area. Specifically, development is most likely to occur in areas such as the existing West Tavaputs, Brundage Canyon, and Gasco fields. Impacts would be the greatest in these areas because they have high oil and gas potential, the majority of the lands have already been leased, and they include GRSG habitat outside of SGMAs and not afforded any protection under this alternative.

The impacts associated with geothermal leasing and development is essentially the same as those stated above because the acreage is already leased. The Bald Hills Population Area is the only population area where geothermal activity is anticipated. Geothermal activity would be managed constantly with the management described under GRSG habitat in SGMAs/core areas. Impacts are not anticipated to be substantial.

Under Alternative E2, core areas within 0.6 miles of lek would be managed with an NSO stipulation. In noncore areas within 0.25 miles of a lek would be managed with an NSO stipulation. Outside of these lek buffers, there would be CSU and TL stipulations. Impacts from fluid mineral development would be similar to those described under Alternative E1 except impacts on GRSG habitat in core areas would be limited by the 5 percent disturbance cap, as calculated by the Wyoming density disturbance calculation tool and no more than more than an average of 1 location per 640 acres would be allowed. Research suggests that maintaining disturbance at or near this level may be sufficient to maintain GRSG habitats and populations.

### **Infrastructure**

As noted elsewhere, infrastructure development could include authorizations such as transmission lines, fences, roads, and appurtenant facilities associated with minerals development. This broad category of actions stems across many BLM and Forest Service programs including lands and realty, minerals, comprehensive travel and transportation management, and livestock grazing. As such, impacts on GRSG from many infrastructure related authorizations are discussed in other sections. This section is primarily focused on impacts tied to lands and realty related decisions.

Under Alternative E, new infrastructure development would be more restrictive than Alternative A, but the least restrictive of all the action alternatives. Approximately 632,200 acres of GRSG habitat would be open to new ROWs, 2,654,000 acres would be avoidance areas, and 27,600 acres would be excluded.

All GRSG habitats open to ROW development would be outside of SGMAs. Construction of new infrastructure could result in additional habitat loss and fragmentation in these areas. Because of the amount of disturbance and fragmentation that already exists in many of these areas, population declines would be expected to continue. This would impact approximately 18 percent of the total GRSG habitat in the planning area and approximately 3 percent of the birds.

Under Alternative EI, construction of new infrastructure, including authorization of new ROWs in GRSG habitat in SGMAs would be avoided when possible. As part of the avoidance requirements, no permanent disturbance would be allowed within 1 mile of occupied leks. Avoidance requirements, including the 1 mile restriction, could be excepted. Construction of new ROWs/ is most likely to occur adjacent to existing ROWs/. All designated corridors would be retained. It is unclear whether or not the restrictions outlined under Alternative (e.g., avoidance or disturbance cap) would apply to proposed developments in designated corridors.

As discussed in the Minerals section above, research has shown that 1 mile is not sufficient to adequately protect GRSG nesting habitat surrounding lek sites, and could lead to decreased reproductive success and population declines in these areas.

Under Alternative EI, the 5 percent disturbance limit would be applied only to new disturbance, which could result in the loss of additional GRSG habitat in SGMAs/core areas. In some cases, population persistence may be compromised when disturbance is greater than 5 percent (Kiorl 2012).

TLS and CSU stipulations would be applied to any authorizations within GRSG habitat in SGMAs. Avoiding activities during the important seasons would lessen the impacts on the birds for that season. Many of the impacts within GRSG habitat in SGMAs would be lessened through the application of the surface use restrictions (e.g., time of day and noise). These restrictions would protect the lek site itself and some of the nesting and early brood-rearing habitat. Additional measures such as collocating new ROWs next to existing ROWs may minimize and, in some cases, offset habitat impacts in GRSG habitat in SGMAs.

Despite efforts to reduce or eliminate impacts on GRSG through application of surface use and timing restrictions, research suggests that GRSG persistence is negatively affected when facilities occur within approximately 2 miles of a lek exceed 1 disturbance per section and when infrastructure is placed in proximity to a lek (Naugle et al. 2011).

While Alternative EI provides the BLM and Forest Service with greater flexibility in determining which actions would be allowed in SGMAs than is provided under other alternatives, the ability to accommodate development and grant variances to stipulations makes it difficult to determine the effectiveness of Alternative EI at protecting GRSG populations from infrastructure development.

Under Alternative E, the BLM and Forest Service would attempt to offset impacts associated with actions authorized in SGMAs through proactive habitat restoration and compensatory mitigation. The effectiveness of these management actions would be the same as discussed in the introduction of to the Alternative E analysis (GRSG Habitat and Disturbance Thresholds).

Under Alternative E1, some loss of nesting, brood-rearing and wintering habitat in GRSG habitat in SGMAs could occur. This habitat loss would primarily occur in areas where existing leases and infrastructure are present. This includes areas such as the Sheeprocks, Uintah, and Carbon Population Areas where the greatest potential for minerals, road, pipeline, and energy-related transmission line infrastructure development exists. Neither of the high development potential areas in the Uintah or Carbon Population Areas fall within SGMAs.

Under Alternative E2, core areas would be an exclusion area for new SUAs, with the following exceptions: New transmission lines would be considered within core areas where it can be demonstrated that declines in GRSG populations could be avoided. New transmission lines would be allowed within 0.5 miles on either side of existing 115-kV or larger transmission lines, creating a disturbance corridor no wider than 1 mile. Under Alternative E2, exiting routes within core areas would not be upgraded to a point that the route category would be improved to the next level of development, unless there would be minimal impact on GRSG or there is a public safety issue. Additionally, new primary and secondary roads would avoid areas within 1.9 miles of the perimeter of occupied GRSG leks. Construction would not be allowed during important seasons.

Noncore areas would be managed as an avoidance area for SUAs. Additionally, new primary and secondary roads would avoid areas within 0.6 miles of occupied leks.

The environmental consequences of implementing Alternative E2 would be similar to those described under Alternative E1. Namely, authorization of infrastructure development would be allowed to occur under certain conditions, which could result in loss and fragmentation of nesting, breeding, and winter GRSG habitat. According to the literature, Alternative E2 may include insufficient lek protections and could result in population declines. A recent study conducted by Copeland and others (2013) determined that the Wyoming core area strategy would reduce declines in GRSG populations by approximately half when compared to a policy that would employ no GRSG protection measures. The study also concluded that under the core area strategy GRSG populations in Wyoming would decrease in the long term by 9 to 15 percent. However, the USFWS has determined that lek protections, in combination with the Wyoming Governor's Core Strategy of protecting all lands within core areas, provides an acceptable level of protection for GRSG.

On the contrary, any authorizations would be required to comply with the 5 percent disturbance cap, which includes existing disturbance. Research suggests that maintaining disturbance at or near this level may be sufficient to maintain GRSG habitats and populations.

#### *Renewable Energy*

Under Alternative E, GRSG habitat in SGMAs/core areas would be designated as an avoidance area for wind energy development. While permanent wind energy development facilities are discouraged from directly impacting leks, nesting, brood-rearing, and wintering habitats, there is

no guarantee that these protections would be implemented. Given the availability of areas with high potential for wind energy development outside of GRSG habitat, it is likely that development within GRSG habitat could be avoided by simply locating the development elsewhere.

Alternative E1 does not allow permanent disturbance within 1 mile of occupied leks, which can be waived if the development is not visible from the lek. In addition, the same seasonal and surface use restrictions that would be applied to other lands and minerals actions would be employed. Beyond these restrictions, no more than 5 percent new surface disturbances would be allowed and minimization and compensatory mitigation would be required of any actions authorized in SGMAs. The effectiveness of these management actions would be the same as discussed in the sections above.

Under Alternative E2, wind energy development would not be allowed inside core areas unless it could be sufficiently demonstrated that the development activity would not result in declines in GRSG populations or loss or disruption to habitat.

### **Fire**

Under Alternative E, impacts from fire would largely be the same as described under all other alternatives. Approximately 2,711,200 of GRSG habitat within SGMAs and core areas would be prioritized for suppression. The BLM and Forest Service would emphasize reducing wildland fire in GRSG habitat through fuels treatments, construction of fuelbreaks (especially around important GRSG habitat), and using targeted livestock to reduce fine fuels. These activities would decrease the likelihood of large fires in GRSG habitats.

Impacts from fire management actions under Alternative E would be similar to the impacts from Alternative D. Based on the similarities between the fire management decisions under Alternatives D and E, they were not modeled separately (see **Table 4.9**). Under Alternative E, an emphasis on fire prevention and preparation of proactive fire lines would result in a smaller loss of habitat. This is most pronounced in the Sheeprocks Population Area, where at 10 years the modeled decrease in habitat is only 3 percent under Alternative E compared with 7 percent under Alternative A. This is more pronounced at 50 years, where Alternative E sees a 4 percent decrease in habitat compared with a 15 percent decrease under Alternative A. The long-term decreases in habitat in other population areas would be similarly reduced, though to a lesser degree. Alternative E and the Proposed Plans are the only alternatives that include quantifiable treatment objectives. The treatment of objectives considered under the Proposed Plans are slightly more specific than those included under Alternative E, in that they are broken out by land ownership and by population area. Nonetheless, the cumulative number of acres that the BLM, Forest Service, and the State of Utah propose to treat (working in cooperation with other agencies, private landowners, and partners) under these alternatives is very similar. VDDT modeling conducted for the Proposed Plans indicate the improvement of 25,000 acres of GRSG habitat within SGMAs and expansion of 50,000 acres of GRSG habitat within and outside of SGMAs should be sufficient to maintain a minimum of 70 percent of land capable of producing sagebrush with 10 to 30 percent sagebrush canopy cover. Research indicates that when 50-70 percent of the landscape includes sagebrush, the likelihood of GRSG persistence increases (Aldridge et al. 2008; Wisdom et al. 2011). Given the amount of treatment that is proposed

under Alternative E, it is anticipated that there would be a slight reduction in the amount of wildland fire when compared to Alternative D.

As previously discussed, all alternatives were modeled using GRSG mapped occupied habitat, which provides a consistent baseline for impact analysis. However, under Alternative E, not all areas would be managed as SGMAs/core areas (approximately 18 percent of the mapped occupied habitat in the planning area). Removal of lands outside of SGMAs/noncore areas from the model area would likely result in decreases in percent of juniper and annual grasses and increases in the amount of sagebrush in the mid- to late-seral stage.

### ***Invasive Plant Species***

#### *Weeds*

Impacts from Alternative E1 would be similar to those described for Alternative D. However, the addition of existing surface disturbance would allow result in more than 5 percent disturbance. Because more surface disturbance is allowed under Alternative E1, the likelihood for introduction and spread of invasive plant species would be also higher. Under Alternative E1, newly reported weed infestations would be aggressively responded to keep the species from spreading. By focusing on infestations while they are still small, the amount of GRSG habitat degraded or lost to conversion to invasive species would be limited. For existing infestations located in or near sagebrush habitat, the strategy would be to contain and limit further spread. The more an invasive species becomes a component of a vegetation community, the more the ability to remove it decreases. By curtailing existing infestations and averting the spread of new infestations, the amount of GRSG habitat degraded or lost to conversion to invasive species would be decreased. Further, rehabilitating areas currently affected by invasive species, including cheatgrass, would provide for additional GRSG habitat and limit the loss of adjacent areas from changed vegetation composition and fire regimes.

Under Alternative E2, effects on GRSG with respect to treatment of invasive weeds would be the similar to Alternative D. The actions would minimize the likelihood for exotic annual weed invasions in some areas. However, cheatgrass and the subsequent annual grass fire cycle would remain a major threat to GRSG. Nevertheless, there are no expected losses or degradation of GRSG habitats or disruption of populations due to the treatment of invasive weeds, rather, it is anticipated that treatment of these area would improve habitat conditions. Further, Alternative E2 gives priority to GRSG habitat restoration projects on areas infested with exotic annual grasses.

As shown in **Table 4.9**, the percent of annual grasses would decrease in the next 50 years under Alternative E when compared with Alternative A. Estimated decreases in annual grasses closely correspond to estimated decreases in wildfire. Changes in annual grasses due to development were not accounted for in the model.

#### *Conifer Encroachment*

Under Alternative E1, impacts would be similar to Alternative D. Habitat improvement projects would be conducted specifically for GRSG each year, with particular emphasis on areas where conifers are encroaching. Encroaching conifers and other plant species would be treated to expand GRSG habitat where ecologically possible (emphasis would be placed on treatments in

Phase I and Phase II juniper encroached areas). Sagebrush treatment projects within nesting and winter habitat in SGMAs could be limited to maintain these areas of sensitive habitat. Any treatments in these areas would require consultation with the State of Utah to ensure that the treatment is conducted in a manner that would maintain the habitat components necessary for the GRSG in the treatment area. Sagebrush treatment projects would also be encouraged to maintain 80 percent of the available habitat as sagebrush within the project area, with 20 percent of the habitat to be treated and managed for younger age classes of sagebrush. This would maintain larger areas of sagebrush and the existing GRSG habitat values while building a mosaic into the landscape's vegetation. Since dense stands of sagebrush reduce the biodiversity of forbs and grasses in the understory (West 1993 in Utah Greater Sage-Grouse Working Group 2013), allowing areas of sagebrush to be treated and creating a mosaic would provide additional cover and nutrition for GRSG, increasing the potential for survival of GRSG. Coordination requirements with the State of Utah would ensure broader biological considerations could be taken into account during project design (e.g., if areas proposed for treatment where necessary for winter habitat). This would eliminate potential vegetation treatments that could reduce winter habitats. Alternative E and the Proposed Plans are the only alternatives that include quantifiable treatment objectives. The treatment of objectives considered under the Proposed Plans are slightly more specific than those included under Alternative E, in that they are broken out by land ownership and by population area. Nonetheless, the cumulative number of acres that the BLM, Forest Service, and the State of Utah propose to treat (working in cooperation with other agencies, private landowners, and partners) under these alternatives is very similar. VDDT modeling conducted for the Proposed Plans indicate the improvement of 25,000 acres of GRSG habitat within SGMAs and expansion of 50,000 acres of GRSG habitat within and outside of SGMAs should be sufficient to maintain a minimum of 70 percent of land capable of producing sagebrush with 10 to 30 percent sagebrush canopy cover. Research indicates that when 50-70 percent of the landscape includes sagebrush, the likelihood of GRSG persistence increases (Aldridge et al. 2008, Wisdom et al. 2011). Given the amount of treatment that is proposed under Alternative E, it is anticipated that there would be a slight reduction in the amount of wildland fire when compared to Alternative D. Under Alternative E2, there are no specific management actions with regard to the encroachment of conifers. However, habitat improvement projects specific to restoring GRSG habitat is encouraged. Therefore, impacts on GRSG would be similar to those described for Alternative D. Under Alternative E2, vegetation treatments in sagebrush within core areas would be required to use WGFDs Protocols for Treating Sagebrush to Benefit Sage-Grouse. These protocols would be used to determine whether the proposed treatment constitutes a "disturbance" that would contribute toward the 5 percent disturbance cap for habitat maintenance. Additionally, these protocols would help determine whether the proposed treatment configuration would be expected to have neutral or beneficial impacts for priority populations or if they represent additional habitat loss or fragmentation. With these evaluations, the potential for vegetation treatments to improve the quality and quantity of GRSG habitat would be high. Alternative E2 also includes a decision that encourages consideration of changes to seasons of use before or after the summer growing season to manage riparian areas for GRSG habitat needs. Where implemented, this could result in increases in forbs and invertebrates necessary for early- and late-brood-rearing habitats.

**Table 4.9** shows changes in the percent of juniper in GRSG mapped occupied habitat. Treatment of encroaching juniper is expected to reduce the percent of juniper on the landscape

in the Carbon Population Area. Despite efforts to prevent juniper encroachment, the percent of juniper is expected to increase in the Box Elder, Hamlin Valley, and Irapah Population Areas. Reductions in juniper are expected in the Sheeprocks Population Area; however, these reductions are likely tied to increases in fire and annual grasses. The percent of juniper on the landscape is expected to remain stable in all other population areas.

### ***Grazing (Including Wild Horses and Burros)***

#### *Impacts from Domestic Livestock Forage Use (Herbivory)*

The impacts on GRS habitat from livestock herbivory described under Alternative A would continue to have potential to occur under Alternative E. Active livestock AUMs would continue to be made available within GRS habitat at the same levels identified for Alternative A. Adjustments to active AUMs would continue to be made through annual authorizations and would be based on site-specific evaluations to respond to variations in vegetation conditions (e.g., climactic trends, allotment conditions, and permittee operational considerations drought). Grazing strategies that are incompatible with the maintenance of GRS habitat would be addressed through the established rangeland management practices (e.g., Rangeland Health Standards and State of Utah's BMPs identified by the Department of Agriculture and Food's Grazing Improvement Program). Making these annual adjustments could maintain or improve GRS habitat insofar as such habitat is benefitted by rangelands that meet Rangeland Health Standards and guidelines for livestock grazing in Utah.

Alternative EI does not include specific GRS habitat objectives (e.g., sagebrush percent cover in different seasonal habitats, grass/forb percent cover, or residual grass heights) or the framework for such to be developed. However, it does include information to guide livestock grazing in seasonal GRS habitats (i.e., leks, nesting/early brood-rearing, late brood-rearing, winter), and identifies general descriptions of each seasonal habitat and guidance and considerations when grazing in each habitat type. Though there are no specific management actions in regards to GRS habitat, consideration of the general guidance for GRS habitat could provide direction to the types of grazing practices. While the average annual use number would not be anticipated to change, the grazing strategies could be adjusted to accommodate the guidance. Based on this, the current trends in seasonal GRS habitat conditions could be improved as the grazing strategies are adjusted to consider GRS habitat.

Under Alternative EI, livestock grazing practices in GRS habitat would be managed to consider the time (duration), timing (season of use), and intensity of livestock use to address special needs or weak links in GRS biological year. Where time-controlled grazing is not an option at the site-specific level, livestock use would be managed for moderate use (40 percent) after the period of rapid vegetation growth. Rather than focusing on the number of authorized livestock, the emphasis would be on improving GRS habitat through rest and deferment, or in some cases, specific use levels. In addition, if possible, up to 20 percent of nesting and early brood-rearing habitat would be left ungrazed periodically. As described under Alternative A, carefully managing timing, deferment, and use levels could result in improved habitat conditions in some seasonal habitats and areas, based on site-specific conditions. However, to facilitate this type of range management, rangeland improvements (e.g., fences, watering facilities, or supplement blocks) could be more common to ensure grazing takes place when and where it is appropriate.

While this could displace some birds from preferred locations, the encouragement to leave some areas ungrazed (periodically) could, if the timing of no grazing aligned, provide areas for birds to select. Depending on how frequently areas are periodically left ungrazed, this could provide for increased grass and forb presence and resulting improved clutch success. In addition, use levels would minimize forage competition and help provide hiding cover for GRSG.

Alternative E1 would encourage the use of short-duration high-intensity grazing strategies in areas where comprehensive grazing strategies are in place. While the other alternatives would not prohibit this grazing strategy, Alternative E1 would specifically provide for this strategy under conditions that the areas of higher use have areas of rested vegetation nearby. Implementing a short-duration high-intensity rotational landscape-level grazing system may require construction of fences and/or water developments to facilitate its proper execution. Increased herding requirements could be substituted for increases in infrastructure if the livestock herds were large enough to justify the required investment in full-time personnel. In either instance, increased human presence in the form of infrastructure or riders could affect the use of specific areas by birds. Implementing this type of grazing strategy in a portion of the Rich Population Area (Deseret Land and Livestock Ranch) has tended to result in healthy GRSG habitat, maintaining sagebrush while providing grasses and forbs for nesting and brood-rearing habitat. As with most grazing strategies, site-specific ecology, soils, and vegetation condition could affect whether this type of strategy would result in improvements to GRSG habitats.

The potential for maintaining and improving GRSG habitat, as described above, would be reduced by other decisions in Alternative E1. One decision notes that if site-specific concerns are raised about the effect of grazing in GRSG habitat, the effects must be documented over a sufficiently long period. The alternative language is not clear on how long impacts must be documented. In addition, there are no requirements to perform assessments on the condition of GRSG habitat and no prioritization or focus for completing Rangeland Health Standards evaluations in SGMAs. As a result, Rangeland Health Standards evaluations would be conducted on a case-by-case basis, usually associated with permit renewals. When the evaluations would be completed, the lack of a GRSG habitat assessment could result in insufficient information to determine whether the existing grazing practices are incompatible with the maintenance or enhancement of GRSG habitat. Further, the lack of specific habitat objectives would result in a lack of clarity of what type of vegetation conditions would be needed to lead to the maintenance or enhancement of GRSG habitat. These decisions would have the combined effect of delaying the identification of potential areas that are being impacted by livestock grazing, as well as the implementation of revised grazing strategies to eliminate the impact. This could result in GRSG habitat in some areas being affected by livestock grazing, resulting in a negative trend in habitat condition. Depending on the length of time between the initiation of the negative habitat trend and the implementation of corrective grazing strategies, the size of the area affected could continue to increase and the degree to which key habitat components and functionality are affected could increase.

Under Alternative E2, site-specific adjustments to active AUMs would continue to be made through annual authorizations and would be based on practices outlined in *Grazing Influence, Management, and Objective Development in Wyoming's Greater Sage-Grouse Habitat*, and Wyoming Executive Order 2013-03. Within core areas, GRSG habitat objectives would be

incorporated into allotment management plans, permit renewals and annual operating instructions. Because this alternative includes GRSG habitat objectives, the impacts would be similar to those described under Alternative D.

*Impacts from Wild Horse Forage Use (Herbivory)*

Under Alternative E1, impacts from wild horse herbivory would be the same as that described under Alternative A. There are no wild horses or burros on the National Forest System lands in Wyoming within this project area (Wyoming-Blacks Fork or Wyoming-Uinta Population Areas), therefore there would be no impacts on GRSG from decisions within this resource area.

*Impacts from Wild Ungulate Forage Use (Herbivory)*

The impacts from wild ungulates would be the same as under Alternative A.

*Impacts from Livestock Grazing Program Actions*

Compared with Alternative A, impacts from the livestock grazing program would be decreased under Alternative E. Alternative E would result in water developments that provide for GRSG brood-rearing habitat needs. In addition to designing developments that enhance mesic habitats and maintain adequate vegetation in wet meadows, consideration of GRSG needs in these areas would take precedence over stipulations for other species, if conflicts occur. This prioritization of GRSG habitat needs would provide assurance that brood-rearing habitat components would be provided for. This could increase the success of brooding and an increase in the number of chicks that survive to adulthood.

The impact of fences described under Alternative A would be reduced under Alternative E1 by locating livestock fences away from leks and employing the NRCS fence standards. The language in this alternative is not specific to how far away from leks a fence should be located or what modifications would be applied, so while the risk of GRSG collision would be reduced compared with Alternative A, the potential for continued bird strikes would not be removed. Employing the NRCS fence standards under Alternative E1 would also reduce the risk of bird strikes and associated mortalities.

Under Alternative E1, the number of fences could increase based on the grazing practices implemented. Increasing the number of fences in GRSG habitat could also increase the potential for bird strikes, though until specific grazing strategies are identified, the magnitude of this impact on GRSG populations is not known. Regardless of the level, by locating fences “away from leks” and employing NRCS fence standards would decrease the potential for bird strikes compared with Alternative A.

*Impacts from Wild Horse Program Actions*

Impacts from wild horse program actions would be the same as that described under Alternative A. There are no wild horses or burros on the National Forest System lands in Wyoming within this project area (Wyoming-Blacks Fork or Wyoming-Uinta Population Areas), therefore there would be no impacts on GRSG from decisions within this resource area.

**Recreation**

Under Alternative E1, the BLM would manage 351,700 acres as open to cross-country travel. All National Forest System lands would remain limited to designated routes. Within GRSG habitat

in SGMAs, nesting and winter habitat areas open under Alternative A would be changed to limited to existing routes. GRSG habitats outside of nesting and winter habitats would be open. Impacts associated with cross-country travel would be similar to those described under Alternative A, though a smaller area would be subject to those impacts. Open travel impacts would be reduced in the Box Elder, Rich, Hamlin Valley, and Bald Hills Population Areas.

Under Alternative E1, some restrictions would be placed on permitted uses, including recreation, including seasonal and time of day restrictions. This would reduce the likelihood of direct disturbance to birds but would not likely change the amount of habitat loss or degradation compared with Alternative A.

Impacts from other types of recreation, including recreation at developed recreation sites and dispersed recreation, would be the same as those described under Alternative A.

All acres within the planning area in Wyoming are on National Forest System lands. These lands are open to travel on designated routes only, and are closed to cross-country travel. Under Alternative E2, exiting routes within core areas would not be upgraded to a point that the route category would be improved to the next level of development, unless there would be minimal impact on GRSG or there is a public safety issue. Additionally, new primary and secondary roads would avoid areas within 1.9 miles of the perimeter of occupied GRSG leks within core areas and 0.6 miles of occupied leks within noncore areas. Further, Forest Service SUAs would not be issued within core areas if there are anticipated impacts on GRSG, or unless impacts can be mitigated. Therefore, loss of GRSG habitat or habitat degradation and disruption are not expected to occur from the management actions within Recreation and Transportation resource area.

#### ***Habitat Conversion for Agriculture and Urbanization***

Under Alternative E1, management would be similar to Alternative A. Lands currently available for FLPMA 203 sales would remain available.

Under Alternative E2, there would be no impacts from agricultural conversion or urbanization. National Forest System lands with core GRSG habitat would be retained in public ownership. Land exchanges would be considered only if GRSG were improved through more contiguous federal ownership or private conservation easement. Therefore, there would be no loss of GRSG habitat, habitat degradation, or disruption to GRSG through land tenure decisions and the possible conversion of sagebrush habitat to agricultural lands or urbanization.

#### ***ACEC and Zoological Area Designation***

No special management areas would be designated to provide protection for GRSG under Alternative E. Any incidental protections under Alternative A would continue to occur.

There are no Zoological Area designations proposed for the National Forest System lands in Wyoming within this project area (Wyoming-Blacks Fork or Wyoming-Uinta Population Areas), therefore there would be no impacts on GRSG from decisions within regard to new ACEC designations.

#### 4.3.7 Proposed Plans

##### **GRSG Habitat and Disturbance Thresholds**

Under the Proposed Plans, 72 percent of the mapped occupied habitat in the planning area would be managed as PHMA. This includes 72 percent of the mapped occupied habitat included in the USFWS-identified PACs. Under this alternative, leks associated with 96 percent of the GRSG in the planning area would be in PHMA. In most cases, the lands managed as PHMA in individual population areas are the same as what was considered in one or more of the alternatives in the Draft EIS. However, in a few instances, the lands identified as PHMA vary slightly from what was considered under any alternative. A brief description of the PHMA in each population area as it relates to other alternatives is included below. The total acreage for each of these areas is included in **Section 2.6.2**, BLM Proposed Plan Amendment, (MA-GRSG-1). These areas are also shown on **Map 2.6**.

- *Box Elder*. Areas managed as PHMA would be the same as the areas managed as SGMA under Alternative E1. A portion of the population area would include additional SFA management.
- *Rich*. The area would be managed the same under Alternative D with two exceptions. First, west of Bear Lake, near the Idaho Utah border, the PHMA boundary was adjusted to be the same as the SGMA boundary considered under Alternative E1. Second, an area that was not previously identified as mapped occupied habitat east of Ant Flat, covering portions of the Monte Cristo mountain range, would be treated as PHMA, with SFA management.
- *Sheeprocks*. The area managed as PHMA would be the same as under Alternative D.
- *Ibapah*. The area managed as PHMA would be the same as under Alternatives B and D.
- *Hamlin Valley*. The area managed as PHMA would be the same as under Alternatives B, C, and D.
- *Bald Hills*. The area managed as PHMA would be the same as Alternatives B and D with one exception; a small area that includes primarily private agricultural lands was changed from GHMA to PHMA. GPS collar information indicates GRSG are currently using this area.
- *Panguitch*. The area would be managed the same as under Alternatives B and C. The southern portion of the population area, which includes the Alton coal mine, would be managed as PHMA.
- *Parker Mountain*. The area would be managed the same as under Alternatives B and D with one exception; approximately 30,400 acres of lands near the town of Loa were removed because they are no longer considered occupied habitat by the State, BLM, or Forest Service.
- *Emery*. The area would be managed the same as Alternatives B and D with one exception. A small segment of disconnected habitat located west of Horn Mountain was changed from PHMA to GHMA.

- *Carbon*. The Emma Park and Gordon Creek areas would be managed the same as under Alternatives D and E. In the West Tavaputs area, mapped occupied habitat within 3.1 miles of occupied leks would be managed as PHMA. The remainder of this area would be managed as GHMA. The portions of Anthro Mountain on National Forest System lands would be neither PHMA nor GHMA. Rather it would be identified as “occupied Anthro Mountain.” Management of this area would be similar to PHMA. The alignment of PHMA and GHMA is different from under any alternatives, but is within the range of alternatives considered in the Draft EIS. During the development of the Proposed Plans, the BLM and Forest Service met with the State of Utah to discuss management options for the West Tavaputs and Anthro Mountain area. The State of Utah’s *Conservation Plan for Greater Sage-Grouse in Utah* does not identify these areas as SGMAs because the State does not consider them as essential for connectivity. In addition, these areas, to varying degrees, have and will continue to be impacted by oil and gas development. The West Tavaputs and Anthro Mountain areas were not identified as PACs in the USFWS in the COT report. Despite the fact that these areas are not within a PAC, the BLM, Forest Service, and the Utah USFWS consider these areas to be important GRS habitat because they have stable to increasing GRS populations of comparable size to other populations that are identified as PACs within the COT report. Based on disagreement regarding the importance of these areas to GRS, the BLM and Forest Service, in coordination with the State of Utah, identified the management described above.
- *Uintah*. The same areas would be managed as PHMA as under Alternative D with two exceptions. The PHMA in the Halfway Hollow area was expanded to include three additional leks that are located on private and tribal lands, but was also contracted on the southwest corner to exclude areas with existing fluid mineral leases and development.
- *Strawberry*. The area that would be managed as PHMA would be the same as under Alternatives B and D.
- *Lucerne*. The area that would be managed as GHMA would be the same as under Alternatives B and D.
- *Wyoming-Blacks Fork*. The area that would be managed as PHMA would be the same as under Alternatives B, D, and E2.
- *Wyoming- Uinta*. The area that would be managed as PHMA would be the same as under Alternatives B, D, and E2.

With regards to management, the Proposed Plans include elements of all action alternatives considered in the Draft EIS. In addition, the Proposed Plans include some new management actions, which were developed in response to public comments, to ensure greater levels of consistency across GRS habitat in other sub-regions, and to account for new scientific information published after completion of the Draft EIS. Some notable decisions included under the Proposed Plans not specifically considered in other alternatives are discussed below.

- The Proposed Plans include quantifiable treatment objectives. Previously, Alternative E was the only alternative that included quantifiable treatment objectives. The acres that the BLM and Forest Service would attempt to treat is equal to the number of acres that the VDDT model indicates are necessary to maintain a minimum of 70 percent of land capable of producing sagebrush with 10 to 30 percent sagebrush canopy cover. Research indicates that when 50-70 percent of the landscape includes sagebrush, the likelihood of GRSG persistence increases (Aldridge et al. 2008; Wisdom et al. 2011).
- The Proposed Plans include more specific vegetation objectives, which are included in vegetation objectives tables. These objectives are based on the ecology of GRSG population areas within the planning area. In developing these objectives, the BLM and Forest Service started with guidelines included in Connelly et al. 2000 and made adjustments based on local nesting and brood-rearing data that have been collected in conjunction with research projects conducted in Utah. In the Draft EIS, the BLM and Forest Service had included a more generalized objective for desired cover percentages and heights for sagebrush, grasses, and forbs in seasonal habitats. The general objectives included under Alternatives B and D stated that seasonal habitats would be managed to meet habitat guidelines from scientific literature (e.g., Connelly et al. 2000 and Hagen et al. 2007). Inclusion of more specific objectives could result in increased certainty and greater levels of consistency when considering implementation-level actions, such as term permit renewals. Following these objectives could prevent improper grazing practices. In addition, following more specific vegetation objectives may, in some cases, improve the quality of habitat and decrease opportunities for predation. Improved habitat conditions and decreases in predation should increase nest success and chick survival.
- The Proposed Plans include some lands that have been identified as SFA. SFA are areas that have been determined to be highly important landscapes across the GRSG range. Management that is more restrictive has been placed on lands within SFA to emphasize protection of GRSG in these areas. SFA include approximately 228,500 acres surface estate and 4,900 acres of split-estate federal minerals in the Box Elder and Rich Population Areas.
- The Proposed Plan include lek buffers that will be applied to PHMA and GHMA. For lands managed according to the BLM and the Forest Service-Utah Proposed Plans, these buffers are consistent with the lek buffer distances identified in the USGS Report, *Conservation Buffer Distance Estimates for Greater Sage-Grouse - A Review* (see **Appendix F**, Applying Lek Buffer Distances). The buffer distances identified in the USGS report are based upon the best available scientific information and are summarized to provide an easy guide for land managers and inform management decisions in GRSG habitats. Modifications to the buffer distances could be made if such modifications meet the criteria outlined in **Appendix F**. On National Forest System lands in the Wyoming portion of the planning area a lek buffer of 0.6 miles in PHMA and 0.25 miles on GHMA will be applied. Following this guidance for lek buffers will reduce disruption to GRSG, minimize habitat loss, and reduce habitat degradation, which should result in maintaining nesting habitat effectiveness and brood survival over conditions described in Alternative A.

- On National Forest System lands in the Wyoming portion of the planning area, a 5 percent disturbance cap would be applied, using the Density Disturbance Calculation Tool process or its replacement, as described in Appendix I of the WY-9 Plan (incorporated in this analysis by reference). For lands managed according to the BLM and the Forest Service-Utah Proposed Plans, a 3 percent disturbance cap would be applied at two levels. Disturbance would be calculated at the project level, meaning that the amount of disturbance allowed could not exceed 3 percent of the site-specific project area. Project level disturbance would be calculated using a density disturbance calculation tool (**Appendix E**, Greater Sage-Grouse Disturbance Cap Guidance) that is similar to the tool that is currently used in Wyoming. In addition to calculating disturbance at the project-level, disturbance would also be calculated for each BSU. In Utah, the BSU is synonymous with the PHMA boundary in each population area (in other words, the BSU in the Carbon Population Area is the same as PHMA in the Carbon Population Area). No alternative in the Draft EIS considered this multi-step approach. Alternatives B and C do not specify how disturbance would be calculated. In general, Alternatives D and E specify that disturbance will be calculated only at the BSU level. Calculating disturbance at the project-level may prevent some development that could occur if disturbance is only calculated at the BSU level. Relative to other alternatives that provide protection for GRSG at a larger population level, the Proposed Plans include protection for both the larger population and individual leks and their surrounding habitat.
- The Proposed Plans include hard and soft adaptive management triggers for population decline and habitat loss within PHMA and specifies appropriate management responses (**Appendix B**, Adaptive Management). For example, if a hard trigger is reached in the Sheeprocks Population Area, the BLM would expand the PHMA boundary to include the southern portion of the Sheeprocks (Tintic). By expanding the PHMA, more restrictive management would be applied in this area and it would be prioritized for fuels reduction treatments, habitat improvement and restoration, which could benefit GRSG habitat. In addition, the 3 percent disturbance cap would apply at the project level and the larger Sheeprocks BSU.

While the management actions described for the Proposed Plans are anticipated to reduce impacts on GRSG, an adaptive management approach is included in the event that habitat or populations continue to decline to the point that triggers are met. In that event, measures that are more restrictive could be applied. The goal of adaptive management is to detect effects on GRSG and take action in an appropriate timeframe to effectively offset impacts.

The Proposed Plans would incorporate an adaptive management strategy composed of soft and hard triggers that are based on population and habitat changes. The BLM and Forest Service would rely on data from several sources to track and identify population changes to assess the population trigger in the adaptive management approach. Triggers would be determined by population area, making the strategy more locally responsive than if triggers were determined on a sub-regional or statewide basis. Responses to soft triggers may require the adjustment of future project level/plan implementation activities in the short or long term, as consistent with the individual site-specific NEPA analyses. Soft trigger responses can come in the form of terms,

conditions, RDFs, or site-specific mitigation measures. Hard triggers represent a threshold indicating that immediate action is necessary to stop a severe deviation from GRSG conservation objectives set forth in the Proposed Plans. As such, the Proposed Plans include a “hard-wired” plan-level response; that is, it provides that, upon reaching the trigger, a more restrictive alternative, or an appropriate component of a more restrictive alternative analyzed in the EIS will be implemented in the area where the trigger is reached. **Appendix B** provides more detail on the adaptive management approaches, triggers, and responses. The use of adaptive management would benefit GRSG by allowing flexible resource management decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood.

Except in limited circumstances (e.g., wind development), the Proposed Plans do not include allocation based decisions that extend beyond PHMA boundaries. However, during the implementation level planning process, if a project is proposed in an area adjacent to PHMA (either within the SGMA/PAC or within 4 miles of a lek located in PHMA), the BLM and Forest Service would evaluate those lands to determine whether there is any GRSG habitat present using the process described in the Proposed Plans for GRSG management outside of PHMA/GHMA. If habitat is present, the BLM and Forest Service would consider the impacts of the proposed action on that habitat and consider whether mitigation is needed to minimize impacts on the habitat or protect GRSG that may use the area. Similar requirements were considered under Alternatives D and E in the Draft EIS. The impacts of this decision would generally be the same as described in those sections.

### **Minerals**

#### *Nonenergy Leasables*

In PHMA, on National Forest System lands in the Wyoming portion of the planning area, federal mineral interests would remain open to leasing while on lands managed according to the BLM and the Forest Service-Utah Proposed Plans, federal mineral interests would be closed to leasing. However, expansion of existing operations could be considered if the new lease is contiguous with an existing operation and includes all conservation measures (e.g., net conservation gain, disturbance cap, density of energy/mining facilities, restrictions for noise, tall structures, and season of use, and lek buffers).

The impacts from this alternative would be similar to Alternative B, except in areas where new developments, contiguous with existing development, could occur. Where additional development is allowed to occur, impacts would be similar to those described under Alternative D.

Currently the phosphate mines located north of Vernal in the Diamond Mountain area are the only existing nonenergy leasable mineral operations in PHMA. Under the Proposed Plans, operators of existing mines could potentially be allowed to obtain new leases and expand their operations; however, given the amount of disturbance associated with existing operations, and the proximity of those operations to occupied leks on Diamond Mountain, it may be difficult for operators to expand their mining operations while meeting the GRSG conservation measures.

Should the BLM and Forest Service issue new leases in the area, conservation measures would limit the intensity of development and avoid, minimize, and mitigate impacts on GRSG.

The requirement to be adjacent to an existing operation will expand disturbance but would not introduce additional noise (though noise would be in a different location), different visual disturbances, or increased operational traffic (though it could be in a different location). Each of these measures, as well as the 3 percent disturbance cap (5 percent on National Forest System lands in the Wyoming portion of the planning area), would ensure that mining activities remain consolidated and that contiguous areas of habitat remain available for GRSG.

Prior to initiating development on any new leases, onsite or near-location compensatory mitigation will be required to offset the impacts of additional habitat loss. Mitigation ratios would be determined on a case-by-case basis and depend on quality and quantity of habitat lost. Requiring the mitigation to be completed prior to project initiation would negate the loss of habitat. Individual GRSG may be displaced by new development adjacent to the existing operations; however, new areas of suitable habitat may be established (previously pinyon-juniper dominated) to produce a long-term net gain in available habitat acreage.

Existing phosphate development in PHMA is occurring primarily on state and private lands. The BLM anticipates that there are sufficient phosphate reserves on existing leases for development to continue at the current rate for the next approximately 15 years. As such, impacts on GRSG that are currently occurring from phosphate development are likely to continue regardless of the alternative selected. There are pending leases on federal minerals adjacent to the existing development. If approved, they would be subject to conservation measures (e.g., net conservation gain, lek buffers, and RDFs). Because of the existing development, while not on federal minerals, the disturbance in the project area would likely not be under the disturbance cap. There would, however, be opportunities for underground mining. In either case, the leases, if approved in the future, would not result in additional surface disturbance that would impact GRSG.

Under the Proposed Plan in GHMA, leasing and development could occur under conservation measures.

Lek buffers would be applied to new development, subject to applicable laws, regulations, and valid existing rights. Because PHMA would be closed to nonenergy mineral leasing the lek buffers would de facto be applied in GHMA and for new development associated with existing leases or operations in PHMA. Application of lek buffers would provide protection for the lek and some surrounding nesting and brooding habitat from the impacts of new development. Seasonal restrictions would minimize operational impacts such as noise, traffic, and human activity, thereby preventing displacement of GRSG during seasons of use. Requiring compensatory mitigation to achieve a net conservation gain would improve habitat conditions. Depending on the location of the mitigation (on- or off-site), this could improve habitat conditions for the population directly impacted by development or for other larger populations located in other parts of the State.

Continued gilsonite development in southern portions of Deadman's Bench and northern portions of East Bench is anticipated to be the only area where nonenergy leasable mineral

development occurs in GHMA. Despite the above-mentioned GRSG conservation measures, leasing and development in these areas could result in human alteration, direct loss, and fragmentation of seasonal GRSG habitats, which, in most cases, have already been fragmented by mineral development activities. Fragmentation could further limit the amount of usable habitat available for the small and declining population of GRSG (3 leks with a combined 10-year average of 7 males and a 3-year average of 2 males) that occupy this area.

#### *Solid Material - Coal*

##### Surface Coal Mining

In PHMA, the 22,900 acres with coal potential that is currently unacceptable for further consideration for coal leasing would continue to be unacceptable for further consideration for coal leasing. In the remainder of PHMA, unsuitability determinations would be made when the BLM conducts environmental analysis for specific lease applications (43 CFR 3461.3). If during the leasing application process the BLM or Forest Service decide to issue a new lease allowing surface mining, the lease would include all conservation measures (e.g., net conservation gain, disturbance cap, density of energy/mining facilities, restrictions for noise, tall structures, and season of use, and lek buffers). Impacts from surface coal mining would be less than those described under Alternative D, because conservation measures attached to any new lease issued under the Proposed Plans would be more restrictive. In particular, implementation of lek buffers (unless justifiable departures exist); seasonal, noise, and tall structure restrictions; limiting the amount and density of energy development; and requiring compensatory mitigation that results in a net conservation gain would minimize the impacts of any new development.

Despite these conservation measures, surface coal mining could result in the localized fragmentation and direct loss of existing occupied seasonal habitats. The general effects of fragmentation and habitat loss are discussed under **Section 4.3.2**, Alternative A.

The Alton coal mine, an existing operation located on state and private lands in the Panguitch Population Area, is currently the only surface coal mine operating in the planning area. Expansion of the existing operation, which is currently being considered in an EIS being prepared by the BLM, is the only reasonably foreseeable surface coal mining action in PHMA. Site-specific impacts on GRSG are considered in that EIS.

Under the Proposed Plans, the operator of the Alton coal mine could potentially obtain new leases and expand their operations. However, given the amount of disturbance associated with the existing operation, and the proximity of the current operation to occupied leks, there would likely be size and locational constraints on the expansion of any surface mining activity, especially in the short term. Based on current mining practices, as well as information included in the Alton Coal Draft EIS (2011), there may be opportunities for continued coal mining using other extractive methods, including high wall and underground mining methods. Both of these activities would result in fewer disturbances than surface mining.

Regardless of which mining method is employed, the expansion of the existing coal operation into existing occupied GRSG seasonal habitats would result in displacement of GRSG from current use areas. As discussed in **Chapter 3**, coal mining has been occurring since 2010 in this area. Surface mining has resulted in a presumed shift of the Sink Valley lek from private to BLM-

administered land. In addition, limited GPS data indicates that GRSG from the central Panguitch area are using the habitat around and south of the existing mine operations for wintering habitat. Mitigation (some connected and some unassociated with the mining operation) has been and is currently occurring to expand and improve existing habitat and improve connectivity with other GRSG habitats north of the Alton mining area. Despite the direct habitat loss of yearlong seasonal habitats, and proximity of the mining operations to the Sink Valley lek, populations have remained relatively stable (see **Section 3.3.5**, Conditions in Population Areas).

Although data collected to date shows that GRSG using the Alton area have persisted, it is unknown how past and ongoing operations will impact the birds in the long term. Literature indicates that the impacts from oil and gas development may not have an immediate impact, but that impacts could be realized between 2 and 10 years (Harju et al. 2010; Naugle et al. 2011). A similar lag effect could occur in the Alton area.

As previously mentioned, expansion of the coal mine into currently unleased areas would only occur if the BLM were to issue a new lease. Any lease issued would include conservation measures (e.g., net conservation gain, lek buffers, disturbance cap, and restrictions for noise, tall structures, and season of use). These measures, which are based on the best available scientific information, should provide adequate protection for GRSG using the Alton area and allow for continued survival; however, impacts are difficult to predict, especially given the small size of the population and susceptibility of GRSG to a multiplicity of threats including stochastic events.

#### Underground Mining

Impacts from underground mining would be nearly identical to those described under Alternative B and similar to those described under Alternative D, except any new permanent surface facilities that are located in PHMA would be subject the conservation measures which would further limit adverse impacts on GRSG. Appurtenant surface facilities would not be allowed in PHMA unless there are no feasible alternatives. If construction of new facilities is required, they would be collocated with facilities in existing disturbed areas. If collocation is not possible, new facilities would be located in an area determined to be the least harmful to GRSG. Any new surface disturbances in PHMA would be subject to disturbance threshold (3 percent) and density stipulations (1 energy or mining disturbance per 640 acres), which would reduce the amount of direct habitat loss and fragmentation and ensure areas with contiguous habitat remain intact.

In GHMA, new coal leases would be allowed if conservation measures (e.g., net conservation gain, lek buffers, and RDFs) and are implemented. This includes application of compensatory mitigation that would result in a net conservation gain of GRSG habitat. Mitigation for actions in GHMA could occur off-site in PHMA; the location of mitigation would be determined through coordination between the BLM or Forest Service and the State of Utah. Allowing off-site mitigation would provide opportunities to offset impacts occurring in GHMA by improving habitat in PHMA. Off-site mitigation could provide a net benefit to GRSG in the planning area, but result in unmitigated impacts on some small populations.

Coal exploration activities would be required to comply with the 3 percent disturbance cap in PHMA (5 percent on National Forest System lands in the Wyoming portions of the planning area). Exploration activities typically disturb minimal acreage and are completed in a short time

period. Under the Proposed Plans, these activities would be conducted outside of sensitive time periods; any facilities associated with exploration activities would be removed before the next season of use; and disturbances would be reclaimed. This would eliminate noise and visual impacts. There are minimal anticipated impacts on populations from exploration activities.

#### *Locatables*

SFA would be recommended for withdrawal from locatable mineral entry. The impacts on GRSG from withdrawing lands identified as SFA from the Mining Law of 1872, as amended, would be the same as those described under Alternatives B and C.

In the remainder of PHMA, impacts on GRSG would be similar as those described under Alternative D, except the BLM and Forest Service-Utah would attempt to limit surface disturbance to 3 percent rather than 5 percent (National Forest System lands in the Wyoming portions of the planning area would still be subject to the 5 percent disturbance cap as under Alternative D). In PHMA, the BLM and Forest Service would also work with claimants to include other GRSG conservation measures (e.g., RDFs and restrictions on noise, tall structures, and season of use). These measures would be applied to the maximum extent allowable by law.

In GHMA, impacts on GRSG are expected to be the same as those described under Alternative D, except the BLM would work with claimants and where possible apply lek buffers. Where applied, lek buffers would minimize some impacts of disturbance on lekking, nesting, and brooding habitat.

#### *Mineral Materials*

For lands managed according to the BLM and the Forest Service-Utah Proposed Plans, PHMA would be closed to mineral materials sales, but would remain open for free use permits. In addition, operators of existing mines would be allowed to expand existing pits. Development of new free use sites and the expansion of pits would only be allowed if GRSG conservation measures are implemented. PHMA is not closed to mineral material disposal on National Forest System lands in the Wyoming portion of the planning area.

Under the Proposed Plans, the impacts from mineral materials development on GRSG in PHMA are expected to be similar to but less than those analyzed under Alternative D because of the conservation measures, which include lek buffers (unless justifiable departures are present); seasonal, noise, and tall structure restrictions; limitations on the amount (3 percent for the BLM and Forest Service-Utah Proposed Plans and 5 percent for the Forest Service-Wyoming Proposed Plan) and density (one mineral disturbance per 640 acres) of disturbance; and compensatory mitigation resulting in a net conservation gain. Applying these stipulations to any new authorizations would reduce habitat fragmentation and prevent GRSG disruption.

As discussed under the nonenergy leasable and coal sections, any new surface disturbance in GRSG habitat could still result in localized fragmentation and direct loss of some occupied GRSG seasonal habitats, which could result in displacement of GRSG from current use areas. The general effects of fragmentation and habitat loss are discussed in **Section 4.3.2**.

*Fluid Minerals (Including Geothermal)*

For lands managed according to the BLM and the Forest Service-Utah Proposed Plans, leasing of fluid minerals would be allowed in PHMA, subject to NSO stipulations. In SFA, which cover portions of the Box Elder and Rich Population Areas, there would be no exceptions, waivers, or modifications allowed. In PHMA outside of SFA, no waivers or modifications would be allowed; however, exceptions could be considered on a very limited basis, and only in circumstances where granting an exception would have either have no impacts or would reduce impacts on GRSG. Given strict conditions under which an exception can be granted, it is not expected that the subtle difference between management in SFA and PHMA would have any noticeable impacts on GRSG.

In general, NSO stipulations on new leases would protect PHMA from surface-disturbing activities, ensure that connectivity between leks would be preserved, and not contribute to fragmentation. GRSG would not be exposed to disruption that is often associated with the noise and human activity that accompanies construction, development, or production activities.

In some instances, NSO restrictions placed on federal mineral estate in PHMA could cause operators to develop private, tribal, and State lands in PHMA more heavily. Development on nonfederal lands could potentially occur in important seasonal habitats and disproportionately impact brooding habitat because private lands often have more water and riparian resources than more arid public lands. Closing public lands to fluid mineral leasing, as considered under Alternatives B and C, would offer slightly greater protection to GRSG than the Proposed Plans because it is more likely to deter leasing of State and private lands in PHMA, particularly in areas where there is predominately federal land ownership. In other circumstances, designating federal lands as NSO has been sufficient to discourage development of other lands; thereby providing secondary protection for habitat found on nonfederal lands.

When compared with allocations for PHMA under the other alternatives, the Proposed Plans are slightly less restrictive than Alternatives B or C, but more restrictive than Alternatives A or E. Impacts would be similar to those described under Alternative B because no surface disturbance would be allowed in PHMA.

Under the Proposed Plans, impacts from development of existing leases in PHMA would be very similar to those described under Alternative B. Where possible, development would be located outside of PHMA. If locations outside of PHMA are not possible, to the extent it is consistent with existing lease rights, the BLM and Forest Service would require operators to comply with the suite of GRSG conservation measures included (e.g., application of lek buffers, restrictions on the amount and density of disturbance, seasonal, noise, and tall structure restrictions, and compensatory mitigation resulting in a net conservation gain). These measures vary slightly from those included under Alternative B, but would afford GRSG similar levels of protection.

In GHMA, new leases would continue to be subject to stipulations found in current LUPs. Development of existing leases would be subject to the stipulations that are attached to those leases. As discussed under Alternative A, existing stipulations provide inconsistent levels of protection that in many cases have been found to be inadequate to protect GRSG from significant threats identified in the USFWS listing determination. The impacts of continuing to manage GRSG habitat under the current management is discussed in detail under Alternative A.

During implementation-level planning, in GHMA, conservation measures outlined in MA-GRSG-5 would be applied as COAs to APDs. These measures include placement of lek buffers on energy development, requiring compensatory mitigation that results in a net conservation gain, and consideration of RDFs. With the addition of these requirements, the Proposed Plans would provide more assurance that habitat requirements would be met compared with Alternatives B or D.

Development of fluid mineral resources in GHMA would still result in the localized direct loss and fragmentation of seasonal habitats and displacement of GRSG from current use areas outside of the applicable lek buffers. The general effects of fragmentation, habitat loss, and displacement are discussed in **Section 4.3.2**. Application of lek buffers as required conservation measures or COAs would be sufficient to protect lekking, most nesting, and some brooding and winter habitat; however, nesting, brooding, and winter habitat located outside of the buffer would be afforded no specific protections.

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

Impacts from the development of new and existing oil and gas leases on GRSG in GHMA are likely to be greatest in the West Tavaputs and Anthro Mountain areas. The PHMA boundaries for these areas include all mapped occupied habitat within 3.1 miles of existing leks. Much of the Anthro Mountain population that was PHMA in Alternative D falls within the 3.1-mile lek buffer. In the small areas that fall outside of PHMA boundary there may be slightly more impacts on GRSG than under Alternative D. The remainder of the GRSG habitat in these areas is GHMA. Given that all of the GHMA falls outside of the 3.1 mile lek buffers, winter habitat that has high development potential on the West Tavaputs Plateau and on Anthro Mountain would only be afforded protection via 1) existing lease stipulations or stipulations included in the existing LUP; 2) COAs identified in previously completed oil and gas development EISs; and 3) potentially, on- or near-location mitigation that may be completed in the area. In West Tavaputs, in particular, there would be more impacts in wintering habitat than under Alternatives D because under Alternative D these areas would be protected to some degree by the 5 percent disturbance cap and NSO restrictions on new leasing. Development density could occur consistent with an existing EIS, which allows one well per 160 acres in most GRSG habitat. As a result, GRSG may avoid using the wintering habitats (Naugle et al. 2011).

Impacts from fluid minerals development would also be expected in GHMA in the Uintah Population Area, and in particular, in GRSG habitat found in the Halfway Hollow, Deadman's Bench and East Bench/Book Cliffs areas. Impacts in these areas would be same as in the West Tavaputs and Anthro Mountain areas; however, habitat loss and displacement in these areas would impact small portions of populations or smaller GRSG populations as these areas are already impacted by various energy-related disturbances and/or have leks that are declining at rates not observed in less-impacted surrounding leks. For South Slope Uintah, due to the lack of

regulatory discretion that the BLM or Forest Service have on resources in this area because of tribal and private lands, impacts on GRSG from oil and gas development are difficult to analyze.

The RFD scenario for the Proposed Plans is nearly identical to Alternative D. The majority of reasonably foreseeable development would occur in the above-mentioned GHMA areas. While the Proposed Plans include additional protection measures for GRSG, the most prominent measure, application of lek buffers, would not substantially alter the expected amount of development because of the limited number of leks in areas that are both GHMA and have high oil and gas potential.

### ***Infrastructure***

As discussed under other alternatives, new infrastructure development can occur in conjunction with many different BLM and Forest Service programs including lands and realty, minerals, grazing, travel and transportation management, and recreation. Impacts from minerals, grazing, travel and transportation management, and recreation are discussed in other sections. Therefore, this analysis is primarily focused on the impacts from lands and realty decisions.

Under the Proposed Plans, PHMA would be managed as an avoidance area for ROWs, permits, and leases. In general, this is less restrictive than what was considered under Alternatives B and C because under those alternatives PHMA is designated as an exclusion area.

The effects of the Proposed Plans are similar to Alternative E in that, under that alternative, all SGMAs would be avoidance areas. However, the avoidance criteria included in the Proposed Plans is more specific and restrictive than under Alternative E. Therefore, the impacts would be less than those described under that alternative.

Impacts from infrastructure development under the Proposed Plans would be most similar Alternative D, although there are a number of notable distinctions. In some cases, Alternative D, which excludes portions of PHMA from certain types of infrastructure development, is slightly more restrictive than the Proposed Plans. In other cases, the Proposed Plans are more restrictive because it includes more stringent conservation measures, such as limiting surface disturbance to 3 percent, rather than 5 percent in most areas.

Under the Proposed Plans, new infrastructure development would be subject to the GRSG conservation measures. These conservation measures, which apply to all discretionary actions in PHMA, require a net conservation gain of GRSG habitat; include lek buffers; include seasonal, noise, and tall structure restrictions; limit the amount of disturbance to 3 percent; and minimize opportunities for predation.

In general, these conservation measures, which are based on the best available science, provide various levels of protection in lekking, nesting, early brooding habitat, and wintering habitat within 3.1 miles of leks; minimize and apply compensatory mitigation measures to mitigate the loss and fragmentation of other seasonal habitat; and aim to minimize the effects of disruptions and displacement to GRSG.

Because the Proposed Plans give the BLM and Forest Service the discretion to authorize some lands and realty actions in PHMA when avoidance is not possible, there is potential for localized

impacts on GRSG. In general, those impacts would be the same as those discussed in the Minerals section and include direct loss and fragmentation of seasonal habitats, and displacement of GRSG from current use areas, especially outside of the applicable lek buffers. A more detailed discussion on the effects of specific lands and realty decisions is included below.

#### *Above-Ground Linear and Site Type ROWs*

Under the Proposed Plans, tall structures would be avoided in PHMA. Where avoidance is not possible, placement of tall structures would only be allowed under the conditions outlined in the Proposed Plans. As described in the Proposed Plans and in **Appendix F**, tall structures would not be allowed within 2 miles of occupied leks in PHMA. This 2-mile buffer would apply to most site type ROWs, such as communications sites, as well as aboveground transmission lines. Regarding transmission lines, the 2-mile buffer being considered under the Proposed Plans is less restrictive than the 4-mile exclusion buffer considered under Alternative D. However, the 2-mile buffer is more restrictive than the 1-mile buffer considered under Alternative D for site-type ROWs such as communication sites.

Under the Proposed Plans, additional restrictions would be placed on the development of high voltage transmission lines (100 kV or greater). If avoidance of a high voltage line in PHMA is not possible, the line would have to be located in a designated corridor. If location in a designated corridor is not possible, the line would have to be collocated with an existing line, and constructed as close as technically feasible to the existing line to minimize habitat fragmentation. This decision would likely prevent the construction of new cross-county high voltage transmission lines through unfragmented GRSG habitat. Under adaptive management, if a hard trigger is tripped in PHMA outside of corridors, high voltage transmission lines (100 kV or greater) would be excluded; within existing corridors the size of new lines would be limited to the same as existing structures, or not larger than 138 kV. This adaptive management response would help conserve existing sagebrush habitat by limiting fragmentation, which would benefit GRSG and its habitat within the affected PHMA.

Under Alternative A, an existing designated utility corridor was aligned to intersect two major leks in the Panguitch area but currently does not have any power lines in a portion of it. Therefore, to minimize further habitat fragmentation, under the Proposed Plans, the vacant portion of the corridor is being realigned closer to Highway where there are existing power lines. Because of this realignment, if a new transmission line (100 kV or greater) cannot avoid PHMA, which is the principle management approach, the next option would be to locate it in a designated corridor. By placing a potential new line next to an existing power line, there would be less new disturbance and impacts would be concentrated where there is already some disturbance. Where large pipelines could be located in GRSG habitat, application of other conservation measures would minimize the impacts on GRSG and ensure net conservation gain. Under the Proposed Plans, no new ROW corridors would be designated. However, with requirements mentioned above and in MA-GRSG-3, impacts would not be noticeably different from under Alternative D where ROW corridors would be designated.

The general impacts of transmission lines were discussed in detail in **Section 4.3.2**. When placed in landscapes that have limited natural perching opportunities, power lines may provide predator perching/nesting opportunities giving a strategic advantage for avian predators of

GRSG (Steenhof et al. 1993, Atamian et al. 2007). GRSG may be displaced by the introduction of tall structures, especially in areas where GRSG populations have evolved without tall structures as part of their landscape (e.g., trees or rugged terrain) (LeBeau 2012). In addition, GRSG collisions with distribution lines have been documented (Beck et al. 2006). The Falcon-Gondor 345 kV line research project initially concluded that nest locations were not affected by the installation of the line but once the study took habitat quality into consideration, nest location and female survival showed the line had a substantial effect (Gibson et al. 2014). Repeated, experimental data is generally lacking to evaluate power lines and transmission lines (Messmer et al. 2013). In lieu of extensive research on the impacts of power lines on GRSG, there are primarily anecdotal reports and observations to rely on. Based on these reports and observations, only neutral to negative effects have been observed (Ellis 1985; Beck et al. 2006; Walker 2007a; LeBeau 2012).

The Proposed Plans would limit but not eliminate tall structures (predator perching/nesting opportunities) from GRSG breeding and nesting habitat. However, power lines placed in PHMA would be subject to tall structure restrictions as described in MA-GRSG-3 as determined on a case-by-case basis.

In GHMA, the BLM and Forest Service would continue to manage lands in accordance with current LUPs. Lands that are open to new ROW placement would remain open. The impacts of continuing to manage GRSG habitat under the current management is discussed in detail under Alternative A.

During implementation level planning, required conservation measures (i.e., net conservation gain, lek buffers, and RDFs) would be added to new ROW authorizations in GHMA. These measures include placement of the above-mentioned 2-mile lek buffer on tall structures, compensatory mitigation that results in a net conservation gain, and consideration of RDFs. With the addition of these requirements, the Proposed Plans would be more restrictive than Alternative D, which considers a 1-mile avoidance buffer and no unmitigated loss of GRSG habitat.

Locating new ROW facilities in GHMA would result in some direct loss and fragmentation of seasonal habitats. Placement of tall structures could displace GRSG from current use areas, especially outside of the applicable lek buffer (2 miles).

Impacts of development outside the 2-mile buffer area could be offset by near-location mitigation because companies would be required to mitigate impacts until there is a net conservation gain. However, mitigation may be conducted off-site if it is determined that it would provide greater benefit to GRSG as a whole in the planning area, thus potentially resulting in unmitigated impacts on local populations in GHMA.

#### *Roads and Pipelines*

Under the Proposed Plans, PHMA would be an avoidance area for all ROWs, including ROWs for new roads and pipelines. Where avoidance is not possible, roads and pipelines should be aligned in existing ROWs or as near as possible to existing ROWs. Where this is not possible, new roads and pipelines would only be allowed with GRSG conservation measures. Under adaptive management, if a hard trigger is tripped in PHMA outside of designated corridors,

major pipelines (greater than or equal to 24 inch) would be excluded. This response would help conserve existing sagebrush habitat by limiting fragmentation and benefit GRSG and its habitat within the affected PHMA.

As discussed in **Appendix F**, roads (linear features) and pipelines (infrastructure related to energy development) are limited by lek buffers (3.1 mile lek buffer in PHMA for lands managed according to the BLM and the Forest Service-Utah Proposed Plans and 0.6 miles in PHMA and 0.25 miles in GHMA on National Forest System lands in the Wyoming portion of the planning area). When compared to the Alternative D, the Proposed Plans are more restrictive, thus reducing potential impacts on GRSG more than Alternative D. Under Alternative D, PHMA would be designated as ROW avoidance area; however, there would be no lek buffers that provide direct protection for nesting and breeding habitat. In addition, under Alternative D, a greater amount of surface disturbance (5 percent) would be allowed in PHMA in most areas.

Because the Proposed Plans give the BLM and Forest Service the discretion to authorize new road and pipeline ROWs in PHMA in some circumstances (when avoidance is not possible), there is potential for impacts on GRSG. In general, the impacts, which are tied to surface disturbance, are the same as those discussed in the Minerals section, and include direct loss and fragmentation of seasonal habitats, and displacement of GRSG from current use areas, especially outside of the applicable lek buffers. Abiding by timing restrictions would prevent disruption of GRSG during seasons of use. However, authorization of both pipelines and roads could result in localized loss of sagebrush cover, increase opportunities for predation, and increase opportunities for spread of invasive species.

Any impacts caused by placement of new roads or pipelines in PHMA would have to be mitigated. The amount of mitigation would be determined on a case-by-case basis, but must be sufficient to result in a net conservation gain. Application of compensatory mitigation resulting in a net conservation gain should provide for continued persistence of GRSG in PHMA.

As mentioned under other sections, in GHMA, the BLM and Forest Service would continue to manage lands in accordance with current LUPs. Lands that are open to new ROW placement would remain open. During implementation level planning conservation measures would be added to new ROW authorizations in GHMA. These measures include application of lek buffers, RDFs, and requiring mitigation that results in a net conservation gain. With the addition of these requirements, the Proposed Plans would provide more assurance than Alternative D that GRSG habitat needs would be met.

Locating new pipelines and roads in GHMA outside of the lek buffer area would result in some direct loss and fragmentation of seasonal habitats. The long-term disturbance associated with roads would result in the permanent habitat loss, increase opportunities for predation, and increase the number of GRSG and vehicle collisions. Such impacts could be offset by mitigation because ROW holders would be required to mitigate impacts until there is a net conservation gain. However, mitigation may be conducted off-site if it provides greater benefit to GRSG as a whole in the planning area, thus potentially resulting in unmitigated impacts on local populations in GHMA.

#### *Land Tenure Adjustments*

Impacts from land tenure adjustments are the same as those described under Alternative D.

#### *Renewable Energy*

All PHMA would be designated as exclusion areas for wind energy development on lands managed according to the BLM and the Forest Service-Utah Proposed Plans and avoidance areas on National Forest System lands in the Wyoming portion of the planning area. Within the exclusion areas, this would eliminate direct impacts from potential wind development on GRSG in PHMA. In addition, no wind development would be allowed in GRSG opportunity areas within 5 miles of occupied leks that are within PHMA. Excluding wind development from all areas within 5 miles of occupied leks, regardless of whether the area includes GRSG habitat, would ensure that wind developments outside of PHMA would have no indirect impact on GRSG located in PHMA. The Proposed Plans would offer more protection from wind energy development than under Alternatives B and D because more area would be excluded from wind energy development, extending beyond PHMA.

In Utah, there is a limited amount of GRSG habitat with high wind potential. All of the areas that have high wind potential would be managed as PHMA, therefore it is not anticipated that there will be any wind energy developments in PHMA. In the event that there is proposed wind energy development in GHMA, wind development would be allowed so long as the area is open to renewable energy development in an existing LUP. During the implementation-level planning process, compensatory mitigation measures would be applied. This includes the application of lek buffers (infrastructure related to energy development) and mitigating impacts so that there is a net conservation gain. These measures are more protective than the measures considered in either Alternative B or D.

#### **Fire**

Fire management decisions considered under the Proposed Plans are similar to those included under Alternative D; as such, impacts would be the same as discussed in **Section 4.3.5**, Alternative D, with the exception of items discussed below.

**Table 4.10** shows the modeled habitat trends, including the changes in the percent of the modeled sagebrush in the mid- to late-seral stage. Under the Proposed Plans, modeling indicates that the decadal average for acres of proposed treatment are sufficient to improve or maintain GRSG habitat conditions to meet desired habitat conditions for each population area. Further, the VDDT modeling effort shows the Proposed Plans can maintain trends for sagebrush in the mid- to late-seral class stages better than those described for Alternative A. This is due to including specific vegetation treatment objectives for areas within PHMA, as well as treating adjacent opportunity areas, which would result in increases in available habitat and improved habitat condition, similar to Alternative E1. Additionally, providing an emphasis on fire prevention and preparation of proactive fire lines would result in a smaller loss of habitat.

As discussed in **Section 4.3.1**, information derived from the VDDT model provides valuable information on estimated trends; however, the model also has a number of limitations. It is also important to note that for some areas, the current level of vegetation meeting the 10-30 percent sagebrush cover may be above the long-term dynamic average. For example, if an area

**Table 4.10**  
**Sagebrush Condition and Trend Analysis: Comparing Alternatives by Percent of Sagebrush in Mid- or Late-Seral Classes for Population Areas at 10 Years and 50 Years – Alternatives A and the Proposed Plans**

Population Area <sup>2</sup>	Percent of Sagebrush in Mid- and Late-Seral Class <sup>1</sup>				
	Current Conditions <sup>3</sup>	10 Years		50 Years	
		Alternative A <sup>3</sup>	Proposed Plans <sup>3</sup>	Alternative A <sup>3</sup>	Proposed Plans <sup>3</sup>
Uintah	84%	77%	80%	67%	73%
Carbon	71%	68%	72%	67%	74%
Emery	54%	51%	55%	62%	70%
Parker Mountain	71%	66%	71%	71%	78%
Panguitch	54%	51%	55%	62%	70%
Bald Hills	54%	51%	55%	62%	70%
Hamlin Valley	77%	72%	74%	55%	71%
Ibapah	77%	72%	74%	55%	71%
Sheeprocks	63%	62%	66%	61%	71%
Box Elder	73%	70%	72%	62%	70%
Rich	84%	77%	80%	67%	73%
Strawberry	71%	68%	72%	67%	74%
Lucerne	84%	77%	80%	67%	73%
Wyoming -Uinta	84%	77%	80%	67%	73%
Wyoming -Blacks Fork	84%	77%	80%	67%	73%

<sup>1</sup>The percentages in this table are not directly comparable to those presented under the other alternatives. For the other alternatives, the BLM and Forest Service VDDT vegetation modeling used a combination of reGAP and LANDFIRE sagebrush inputs and limited the model to occupied GRSG habitat. The Proposed Plans were modeled using LANDFIRE sagebrush inputs, as well as other LANDFIRE vegetation classes that have sagebrush sub-components. Modeling the Proposed Plans also included the entire population areas to capture those areas adjacent to PHMA/GHMA that could ecologically support sagebrush. This included areas that are not currently GRSG habitat, but that, through treatment could meet the vegetation objective of 70 percent of lands capable of supporting sagebrush doing so with 10-30 percent canopy cover. The Proposed Plans were modeled differently to be consistent with modeling efforts being conducted for other GRSG planning efforts in the west. Alternative A was re-modeled similarly to the Proposed Plans to allow comparison and determine change from the effects of existing management.

<sup>2</sup> Trends reflect the combined treatment acres in both BLM and Forest Service Proposed Plans.

<sup>3</sup> Habitat condition percentages are the amount of the modeled area that meets the 10-30 percent sagebrush cover.

has experienced less than its long-term average wildfire rates in recent years, it may have more than its normal amount of mid and late seral sage. A return to normal wildfire burn rates associated with the treatment rates in the Proposed Plans may reduce the percentage of mid and late seral sage, and the percentage in mid to late seral stage will go down. However, the VDDT sagebrush condition and trend analysis indicate that vegetation management in the Proposed Plans will maintain the levels of sagebrush on the landscape needed to provide for GRSG habitats.

In contrast, the VDDT sagebrush condition and trend analysis conducted for Alternatives A through D in the Draft EIS indicated that, despite changes in wildfire management and increases

in the amount of vegetation treatment, at 50 years the percent of sagebrush in the mid- or late-seral class would likely decrease in many population areas.

Given concern over the potential decrease in sagebrush in the mid- or late-seral class, in developing the Proposed Plans, the BLM and Forest Service used VDDT to determine the approximate number of acres that would have to be treated to meet the 70 percent objective in all population areas at 50 years. According to the model, the number of acres of conifer and annual grasses that would have to be treated is the same as what is included in the Proposed Plans. In other words, treating the number of acres included identified in the Proposed Plans should be sufficient to meet the identified GRSG sagebrush habitat objectives. Research indicates that when 50-70 percent of the landscape includes sagebrush, the likelihood of GRSG persistence increases (Aldridge et al. 2008; Wisdom et al. 2011).

Using VDDT the BLM and Forest Service also predicted the percent change in acres of juniper and grasses burned for Alternative B through E. Fire prevention actions considered under Alternative D, which as previously mentioned, are nearly identical to those included in the Proposed Plans, would result in a reduction in the average annual acres of GRSG habitat burned. The average percent change in average annual acres burned predicted under Alternative D is included in **Table 4.8**. Though not specifically modeled, the percent change in acres burned annually under the Proposed Plans would likely be greater (in other words, fewer acres would be burned) than under Alternative D because increasing the amount of conifer and annual grasses treatments would decrease the number of acres burned on an average annual basis.

The Proposed Plans include a 3 percent disturbance cap (5 percent on National Forest System lands in Wyoming) and other measures that would reduce the amount of human activity in PHMA. Decreases in the amount of human activity could reduce the number of human-caused fire starts. Fuels management treatments and post-fire rehabilitation projects in PHMA would focus on maximizing benefits on GRSG habitat using the resistance and resilience concepts in Chambers et al. (2014) coupled with the FIAT assessments. These concepts would reduce impacts from invasive annual grasses and altered fire regimes on the sagebrush ecosystem as well as reduce the rate of conifer encroachment in order to reduce GRSG habitat fragmentation and maintain or re-establish habitat connectivity over the long term and at a landscape scale. Fuelbreaks would also be implemented to better contain wildfires, and during firefighting operations, sagebrush habitat would be protected to the extent possible, as a valuable resource. Under adaptive management, if a hard trigger is tripped in PHMA, fuels management treatments would become top priority in the affected population area.

The Proposed Plans include an adaptive management strategy based on population and habitat triggers for each conservation area. Adaptive management would expand more restrictive management based on specific and measurable triggers relating to habitat and population metrics, for example, grazing may be restricted in areas adjacent to burns in order to restore habitat capable of supporting GRSG. Enhanced monitoring would be conducted in restoration areas under the Proposed Plans. These policies are designed to limit the prevalence of wildfire in sagebrush areas and would reduce damage to GRSG habitat more than current management.

In total, management actions considered under the Proposed Plans would reduce the size and frequency of fires more than any other alternative. Nonetheless, as discussed under Alternative

A, fire is the primary threat to GRSG in the Great Basin region and would likely continue to impact GRSG habitat, especially in arid low elevation areas where there is a cheatgrass-fire cycle. BLM and Forest Service planning decision may not be able to prevent loss or degradation of habitat in these areas or alter existing trends.

### ***Invasive Plant Species***

#### *Weeds*

Impacts from implementing the 3 percent disturbance cap would be the same as those described under Alternative B on lands managed according to the BLM and the Forest Service-Utah Proposed Plans. On National Forest System lands in the Wyoming portions of the planning area, implementing the 5 percent disturbance cap would produce impacts similar to Alternatives E1 and E2.

Under the Proposed Plans, the BLM and Forest Service would treat the amount of annual grasses identified in the Proposed Plans. Treatment of annual grasses, following RDFs, and aggressive treatment and rehabilitation of areas with weeds would reduce the extent of invasive species in PHMA.

The Proposed Plans include management actions aimed at preventing the establishment and spread of invasive species; however, given the prevalence of certain invasive species, such as cheatgrass, invasive species would continue present a threat to GRSG habitat, especially in the population areas located in the Great Basin, and at lower elevations where there are already cheatgrass dominated landscapes that are prone to wildfire.

#### *Conifer Encroachment*

Under the Proposed Plans, impacts would be similar to those described in Alternative D, except the Proposed Plans identify a systematic method to delineate treatment priorities and determine treatment objectives.

Objectives for acres of conifer treatments are identified in the Proposed Plans. Conifer treatment priorities are based on the potential to improve or restore GRSG habitats (e.g., phase 1 or 2 states of encroachment), with specific emphasis on areas near leks, nesting habitats, and brood-rearing habitats. For example, under the Proposed Plans, an emphasis would be placed on reducing conifer within 0.6 miles of a lek to less than 5 percent canopy cover. Reducing the percent of conifer within 0.6 miles of leks could increase lek attendance because studies have shown that GRSG lek attendance is impacted at very low levels of conifer encroachment (Baruch-Mordo et al. 2013).

Based on the vegetation objective for the Proposed Plans, which are based on results of VDDT modeling, the rate of conifer reduction should be equal to or greater than the rate of encroachment. Conifer treatments, in combination with treatment of annual grasses and wildfire prevention and suppression, would give the BLM and Forest Service the ability to maintain a minimum of 70 percent of land capable of producing sagebrush with 10 to 30 percent sagebrush canopy cover. Research indicates that when 50-70 percent of the landscape includes sagebrush, there is a higher likelihood of GRSG persistence (Aldridge et al. 2008; Wisdom et al. 2011). The

Proposed Plan is the only alternative that includes specific quantifiable treatment objectives that are directly linked to the aforementioned 70 percent sagebrush cover objective.

### ***Grazing (Including Wild Horses and Burros)***

#### *Impacts from Domestic Livestock Forage Use (Herbivory)*

Under the Proposed Plans, PHMA and GHMA would still be available for livestock grazing. Active AUMs for livestock grazing would be the same as under Alternative A.

Generally, impacts from domestic livestock grazing would be similar to those described under Alternative D. Grazing systems in PHMA would be designed to meet BLM Utah Standards for Rangeland Health and achieve GRSG habitat objectives. The Proposed Plans include more specific vegetation objectives than what was included under Alternative D. These objectives are based on the ecology of GRSG population areas within the planning area. In developing these objectives, the BLM and Forest Service started with guidelines included in Connelly et al. 2000 and made adjustments based on local nesting and brood-rearing data that has been collected in conjunction with research projects conducted in Utah. Requiring livestock grazing to meet both land health standards and the GRSG vegetation objectives would reduce the impact of livestock grazing on GRSG habitat.

Under the Proposed Plans, permits/leases in SFA would be prioritized for processing, followed by permits/leases in PHMA outside of SFA. In PHMA, priority would be given to permits/leases for allotments that are not meeting rangeland health standards where livestock grazing is identified as a causal factor, with a focus on those containing riparian resources. Under adaptive management, allotments within PHMA where a soft trigger is tripped would become top priority. Prioritization would help the BLM and Forest Service identify issues that may be associated with improper grazing and implement corrective actions in the areas that have the greatest habitat value.

In addition to the more specific objectives included in the Proposed Plans, when conducting implementation-level NEPA analysis for renewals and modifications of livestock grazing permits/leases, the BLM and Forest Service would be required to identify specific management thresholds based on GRSG habitat objectives and identify responses that would allow the BLM and Forest Service to make adjustments to livestock grazing practices without conducting additional NEPA. This would allow for impacts to be identified and changes in management to be implemented more quickly than under current BLM practices whereby management changes are typically implemented during permit renewal or based on land health determinations. Permits are available for renewal every 10 years. Land health determinations are also generally made on a consistent evaluation cycle, usually every 10 years. Development of implementation-level management thresholds and appropriate responses would give the BLM and Forest Service the ability to expeditiously implement actions needed to reverse negative trends observed during monitoring.

The inclusion of more specific planning-level objectives in the Proposed Plans creates additional parameters that could increase the amount of certainty and improve the level of consistency when considering on the ground actions, such as term permit renewals. Following these more specific planning-level objectives could prevent improper grazing practices. Having more specific

vegetation objectives may, in some cases, improve the quality of habitat and, potentially, decrease opportunities for predation, which in turn should increase nest success and chick survival.

On National Forest System lands in nesting habitat, livestock grazing would be managed to maintain residual grass height by limiting forage use to 7 inches of perennial grass height during the nesting season. In wet meadows and riparian areas, livestock grazing would be managed to retain a 4-inch stubble height in brood rearing and summer habitat. This management direction would benefit GRSG more than Alternative A by increasing hiding cover during nesting and early brood-rearing seasons. Increased hiding cover would likely increase nest success and brood survival.

Monitoring of vegetation objectives would be conducted as discussed in the Greater Sage-Grouse Monitoring Framework (**Appendix C**). As part of the monitoring plan, the BLM and Forest Service would evaluate the effectiveness of vegetation management objectives every 5 years. Monitoring of sagebrush, grasses, and forbs in different seasonal habitats could occur in conjunction with rangeland health evaluations, but may also in conjunction with other monitoring activities.

Impacts on wetlands and riparian areas are similar to those described under Alternative B. The Proposed Plans require the development of specific objectives to conserve, enhance, or restore GRSG habitat based on ESDs and assessments within wetlands and riparian areas. If an effective grazing system that meets GRSG habitat requirements is not already in place, under the Proposed Plans, the BLM and Forest Service would design a grazing program to ensure wetlands and riparian areas are meeting proper functioning condition. To ensure recovery or maintenance of appropriate vegetation and water quality is achieved, where livestock grazing can be shown as the causal factor, similar to Alternative D, the Proposed Plans identify grazing management practices such as fences, herding techniques, or changes in seasonal use or livestock distribution of which mitigate impacts on wetland/riparian vegetation.

#### *Impacts from Wild Horse Forage Use (Herbivory)*

Most impacts from wild horse herbivory would be the same as that described under Alternative D. Under the adaptive management strategy, if a hard trigger is tripped in PHMA, an emergency gather could be initiated to reduce wild horse populations. If the population is within AML and the area does not meet GRSG habitat objectives, AML would be reduced up to 25 percent. This response could help facilitate meeting GRSG habitat objectives for the HMA within the affected PHMA.

#### *Impacts from Wild Ungulate Forage Use (Herbivory)*

The impacts from wild ungulates would be the same as under Alternative A.

#### *Impacts from Livestock Grazing Program Actions*

Impacts from the livestock grazing program actions would be similar to those described under Alternatives B and D. New structural range improvements would only be allowed if they have a neutral effect or conserve, enhance, or restore GRSG habitat.

On lands managed according to the BLM and the Forest Service-Utah Proposed Plans, the BLM and Forest Service would apply a 1.2-mile lek buffer to low structures, which include fences and facilities such as ponds. This is more restrictive than what was considered under Alternatives B or D. Low structures, including range improvements, would not be allowed within 1.2 miles of a lek unless a justifiable departure exists. Variations to the lek buffer distance would require appropriate environmental analysis.

The application of a 1.2-mile lek buffer would avoid adding perching opportunities for potential predators of GRSG and would avoid the addition of the potential for fence collisions. As discussed under Alternative A, research conducted during the GRSG breeding season in Idaho documented that terrain ruggedness and distance from the leks were the primary factors associated with the high fence collision risk (Stevens et al. 2013). In the Rich Population Area, 36 GRSG carcasses were found along a 2-mile stretch of fence within 3 months of the fence being constructed (Call and Maser 1985).

On National Forest System lands in the Wyoming portion of the planning area, a buffer of 0.6 miles in PHMA and 0.25 miles in GHMA would be applied near occupied leks.

Under the Proposed Plans, the BLM and Forest Service would also mark fences in high-risk areas, including new (those allowed because of justifiable departures) and existing fences that are located within 1.2 mile of a lek. In Wyoming, Christiansen (2009) placed fence markers on a portion of fence after 143 GRSG collisions were documented within a two-year timeframe and found that the markers decreased collisions by 70 percent over unmarked fences. More recently, Stevens (2011) conducted research in Idaho GRSG breeding habitat to specifically test the efficacy of fence markers by identifying numerous high fence collision areas and marking them. Results were similar to Christiansen, marking of high-risk fences decreased collision rates, but by 83 percent (Stevens et al. 2012).

Based on the abovementioned information, limiting the number of new fences, removing fences that are no longer necessary, and marking any existing or new fences should limit impacts on GRSG under the Proposed Plans compared with Alternatives B and D.

#### *Impacts from Wild Horse Program Actions*

Impacts from wild horse program actions would be the same as that described under Alternative B.

#### **Recreation**

Impacts from OHV area designations would be similar to those described under Alternative D. Except, under the Proposed Plan the BLM would continue to manage two small OHV open areas within PHMA (525 total acres) as open to cross-country motorized vehicle travel. Given the size, and location of the OHV open areas and the type of cross-country OHV use occurring, habitat needs for GRSG would still be met; there would be no noticeable impact on GRSG populations.

Under the Proposed Plan implementation-level travel and transportation planning would be completed after completion of this LUPA in accordance with National BLM Travel Management guidance. Route designations would be made specific to travel management needs and seasonal

habitat needs of GRSG. Routes considered unnecessary would be closed while other routes could be designated as limited with seasonal or daily access restrictions. Travel systems would be managed with an emphasis on improving the sustainability of the travel network in a comprehensive manner to minimize impacts on GRSG and maintain motorist safety. Under adaptive management, if a hard trigger is tripped in PHMA, travel management planning would become top priority or designated routes would be re-evaluated and revised if determined to be causing population level impacts. This response could reduce direct and indirect impacts and benefit GRSG within the affected PHMA.

On lands managed according to the BLM and the Forest Service-Utah Proposed Plans, impacts from issuing SRPs and SUAs would be similar to those described under Alternative D with one exception. The BLM and Forest Service would not allow disruptive activities, such as motorized recreation events, within 0.25 miles of occupied leks. On National Forest System lands in the Wyoming portions of the planning area, disruptive activities would not be allowed in all PHMA and within two miles of occupied leks in GHMA. Application of the lek-buffer would provide some protection for GRSG from noise related disruptions.

#### ***Habitat Conversion for Agriculture and Urbanization***

Under the Proposed Plans, management would be similar to Alternative B, except that slightly more acres of GRSG habitat would be designated as PHMA, and potential land tenure adjustments would emphasize that it must be a net conservation gain for GRSG. Retaining PHMA in federal ownership unless disposal would result in an overall net conservation gain for GRSG would limit conversion of habitat currently in federal ownership for agriculture and urbanization.

#### ***ACEC Designations***

No special management areas would be designated to provide protection for GRSG under the Proposed Plans. Any incidental protections provided to GRSG by current ACEC management would continue to occur as described under Alternative A.

## **4.4 AIR QUALITY**

### **4.4.1 Methods and Assumptions**

Air quality has been identified as a resource that would primarily have indirect, beneficial impacts from the implementation of most GRSG conservation measures. As such, this section focuses mainly on describing the nature and type of beneficial impacts that would result from implementing each of the alternatives being considered. In some cases, GRSG conservation measures may have an indirect, adverse impact on air quality; these impacts are also discussed.

Implementing management for the protection of GRSG generally involves reducing or otherwise restricting land uses and activities that generate air pollutants. Actions that emit air pollutants can result in negative effects on air resources, including increased concentrations of air pollutants, decreased visibility, increased atmospheric nitrogen and sulfur deposition on soils and vegetation, and acidification of sensitive water bodies.

Livestock grazing, travel, mineral extraction, wildland fires, and construction activities within ROW grants have all been identified as actions that generate pollutants that affect air quality.

Protecting areas from these activities for the purpose of protecting GRSG would also protect air quality from an increase in particulates, decreased visibility, and increased deposition. Whether these activities are allowed and the degree to which these activities would occur constitute the indicators used in this analysis. These indicators are listed below.

### **Indicators**

Indicators of impacts on air quality are as follows:

- Increase or decrease in livestock grazing AUMs and associated support activities such as trucking, trailering, and construction of new or maintenance of range improvements
- Acres closed to fluid mineral leasing
- Acres found unsuitable for surface coal mining
- A substantial change in the likelihood or severity of wildland fire (based on level of restrictions on uses that may introduce sources of ignition)
- Acres managed as ROW exclusion areas

### **Assumptions**

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

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

### **4.4.2 Alternatives Analysis**

All of the action alternatives and the Proposed Plans would result in restrictions on activities that emit air pollutants as compared with the continuation of existing management under Alternative A. These restrictions include such measures as reductions in acres available for livestock grazing, closure of areas to solid and fluid mineral leasing and development, and management of ROW exclusion areas. Alternative C places the greatest level of restrictions on actions that would emit air pollutants compared with the other alternatives, and consequently could be expected to have the smallest impact on air quality. Alternative C identifies all mapped occupied habitat as PHMA and limits many uses in that area. Under Alternative C, no air pollutant-emitting actions associated with fluid mineral development, solid mineral development (i.e., coal, nonenergy leasables, and mineral materials disposal), utility corridor development, or other ROW development would occur. The same would be true under Alternative CI for livestock grazing, as livestock grazing would be prohibited in all mapped occupied habitat. In addition, under Alternative C, a portion of mapped occupied habitat on BLM-administered lands would be closed to OHV travel, reducing the presence of fugitive dust and exhaust emissions in those areas. Alternative B also greatly restricts air pollution-generating actions, but not to the same degree as Alternative C. Alternative E would have the fewest restrictions of the action alternatives. The Proposed Plans would have similar restrictions to those under Alternative D, particularly in PHMA. Generally, there would be fewer restrictions in GHMA under the Proposed Plans than under Alternative D. The Proposed Plans would have greater restrictions

than under Alternative E, and fewer restrictions than under Alternatives B and C. Indirect impacts on air quality under the Proposed Plans would consequently be greater than those under Alternative C and B but less than under Alternative E. Differences across alternatives in the number of AUMs, the number of acres closed to fluid mineral leasing, the number of acres closed to road construction, the number of acres identified as unsuitable for coal mining, and the number of acres in ROW exclusion areas are displayed in **Table 2.3**, and provide a quantitative basis for an analysis of how impacts on air quality may vary across alternatives.

While many GRSG conservation measures would have an indirect, beneficial impact on air quality as described above, some measures would have indirect, adverse effects. Under Alternatives B, C, and D, and the Proposed Plans, the BLM would increase ROW exclusion and avoidance areas compared with Alternative A, including the removal of some existing ROWs and the prohibition of new ROWs in some areas. Within oil and gas development areas such as the Uinta Basin, limiting ROWs would limit the development of power lines needed to run production equipment. Absent a source of electricity, new and existing well equipment would continue to be powered by natural gas- and diesel-fired compressors and generators. Under Alternative A, operators have been encouraged to develop ROWs for power lines in order to reduce the number of natural gas- and diesel-fired compressors and generators that operate in the Uinta Basin in order to improve air quality. Alternatives B, C, and D, and the Proposed Plans would limit the ability to achieve these improvements compared with Alternative A.

Restrictions on mineral material development under Alternatives B, C, and D, and the Proposed Plans would also have indirect adverse effects on air quality to the extent that construction materials such as sand and gravel could not be sourced close to a construction site, resulting in increased fugitive dust and exhaust-related emissions from longer haul distances.

## 4.5 CLIMATE CHANGE

### 4.5.1 Methods and Assumptions

#### *Indicators*

The indicator of impacts on climate change is changes in GHG emissions.

The indicator of impacts on GRSG from climate change is changes in climate trends and changes in ecological conditions due to changes in climate.

#### *Assumptions*

In addition to the assumptions in **Section 4.2.1**, this analysis includes the assumption that there is a correlation between global concentrations of GHGs and climate change.

### 4.5.2 Alternatives Analysis

#### *Effects of Greater Sage-Grouse Management Decisions on Climate Change*

All of the action alternatives would result in greater restrictions on activities that emit GHGs as compared with the continuation of existing management under Alternative A, including such measures as reductions in acres available for livestock grazing (Alternative C), management of ROW exclusion and avoidance areas, and closure or restrictions on mineral leasing and

development. Alternative B and Alternative C tend to place greater restrictions on actions that would generate GHGs than the other alternatives, and consequently could be expected to have the smallest impact on climate change. The Proposed Plans also greatly restricts GHG generating actions, but to a slightly lesser extent than Alternatives B or Alternative C. Differences across alternatives in the number of acres closed to fluid mineral leasing, the number of acres closed to OHV travel, the number of acres identified as unsuitable for coal mining, and the number of acres in ROW exclusion areas are displayed in **Table 2.3** and provide a quantitative basis for an analysis of how impacts on climate change may vary across alternatives. In addition to limiting activities that would reduce GHG emissions, each alternative would seek to limit the encroachment of pinyon-juniper into mapped GRSG habitat. Woodlands tend to store more carbon due to greater aboveground biomass and greater total root biomass (Pinno and Wilson 2011). Due to this, a conversion of habitat type from woodland to shrubland could result in a decrease in carbon-storage capacity. The Proposed Plans would have the greatest potential to effect this change, as this alternative would emphasize removal of encroaching pinyon-juniper to a greater extent than the other alternatives that seek to limit encroachment. Alternative E also focuses on removal of encroaching pinyon-juniper to a greater extent but with slightly less acres treated. Alternative C would have the least potential to effect climate change because an emphasis would be placed on passive restoration rather than active restoration.

#### ***Effects of Climate Change on Greater Sage-Grouse***

Sagebrush remains one of the vegetation communities most vulnerable to climate change. In habitat areas that are expected to be most impacted by climate change, an estimated 12 percent of the current distribution of sagebrush would be lost with each 1°C increase in temperature (Bryce et al. 2012). Climate change models predict that semi-arid regions will experience more severe weather events, higher temperatures, drier summer soils conditions, and wetter winters in the future. These shifts in precipitation, soil conditions, and temperature may impact sagebrush communities and affect when and where sagebrush is able to thrive (Connelly et al. 2004).

Climate change also increases the likelihood of erosion, wildfire, and the encroachment of invasive plants, all of which would negatively impact sagebrush habitat. Soil erosion in particular is a concern, as it is considered the greatest threat to shrubland sustainability (Society for Range Management 1995). Additionally, habitat encroachment will be a concern as vegetation communities shift upwards in elevation in response to the warmer climate. This can cause habitat fragmentation, which would have detrimental effects on GRSG populations. It is anticipated that climate change may interact with other change agents in the future to degrade and reduce GRSG habitat (Bryce et al. 2012).

The long-term potential for climate change to affect GRSG in the Colorado Plateau Ecoregion was mapped in the Central Basin and Range Rapid Ecoregional Assessment (BLM 2012a). The population areas in the Colorado Plateau ecoregion with the greatest potential to be impacted by climate change are the Uintah, Strawberry, and Carbon Population Areas. The potential impact would primarily be an increase in pinyon-juniper invasion of existing sagebrush communities. This would result in the degradation of existing habitat. Potential acres in each alternative that could be affected are shown in **Table 4.11**. Potential impact is expected to be mitigated to some extent by GRSG habitat restoration treatments, such as those that conducted

**Table 4.1 I**  
**Potential for Future Climate Change in the Colorado Plateau Ecoregion (Long-Term)**  
**and Habitat Alignment by Alternative**

Population Area	Climate Change Class	Alternative A	Alternative B		Alternative C	Alternative D		Alternative E		Proposed Plans	
		Acres in Mapped Occupied Habitat	Acres in PHMA	Acres in GHMA	Acres in PHMA <i>(all mapped occupied habitat)</i>	Acres in PHMA	Acres in GHMA	Acres in GRSG Habitat in SGMA/ Core Areas	Acres in GRSG Habitat outside of SGMA/ Noncore Areas	Acres in PHMA	Acres in GHMA
Carbon	Very High	28,333	27,864	468	28,333	28,309	24	22,789	5,544	27,965	651
	Moderately High	0	0	0	0	0	0	0	0	0	0
	Moderate	182,501	164,606	17,896	182,501	167,366	15,136	56,658	125,843	108,975	75,716
	Moderately Low	77,042	35,759	41,282	77,042	46,858	30,184	36,987	40,055	39,514	37,808
	Very Low	0	0	0	0	0	0	0	0	0	0
Emery	Very High	15,273	14,302	972	15,273	14,302	972	14,302	972	14,812	971
	Moderately High	598	598		598	598	0	598	598	0	597
	Moderate	36,768	34,930	1,838	36,768	34,930	1,838	34,930	2,084	34,869	2,077
	Moderately Low	40,380	34,351	6,029	40,380	34,351	6,029	34,351	6,029	34,364	6,024
	Very Low		0	0	0	0	0	0	0	0	0
Panguitch	Very High	2,431	2,431	0	2,431	0	2,431	0	0	2,430	0
	Moderately High	3,635	3,635	0	3,635	0	3,635	3,635	0	3,634	0
	Moderate	24,046	24,046	0	24,046	0	24,046	24,046	0	24,050	0
	Moderately Low	5	5	0	5	0	5	5	0	5	0
	Very Low	0	0	0	0	0	0	0	0	0	0

**Table 4.11**  
**Potential for Future Climate Change in the Colorado Plateau Ecoregion (Long-Term)**  
**and Habitat Alignment by Alternative**

Population Area	Climate Change Class	Alternative A	Alternative B		Alternative C	Alternative D		Alternative E		Proposed Plans	
		Acres in Mapped Occupied Habitat	Acres in PHMA	Acres in GHMA	Acres in PHMA <i>(all mapped occupied habitat)</i>	Acres in PHMA	Acres in GHMA	Acres in GRSG Habitat in SGMA/ Core Areas	Acres in GRSG Habitat outside of SGMA/ Noncore Areas	Acres in PHMA	Acres in GHMA
Parker	Very High	15,746	15,746	0	15,746	15,746	0	15,746	0	15,736	0
	Moderately High	5,391	5,391	0	5,391	5,391	0	5,391	0	5,387	0
	Moderate	135,402	135,402	0	135,402	135,402	0	134,167	0	134,082	0
	Moderately Low	5,043	5,043	0	5,043	5,043	0	5,043	0	5,040	0
	Very Low	0	0	0	0	0	0	0	0	0	0
Strawberry	Very High	53	0	53	53	0	53		53	0	53
	Moderately High	0	0	0	0	0	0	0	0	0	0
	Moderate	24,216	24,216	0	24,216	24,216	0	24,214	2	24,197	0
	Moderately Low	16,419	15,998	422	16,419	15,998	422	15,996	423	16,708	421
	Very Low	0	0	0	0	0	0	0	0	0	0
Uintah	Very High	74,616	64,708	9,907	74,616	64,708	9,907	64,701	9,915	64,721	9,903
	Moderately High	0	0	0	0	0	0	0	0	0	0
	Moderate	93,367	9,732	83,635	93,367	9,732	83,635	9,732	83,635	9,727	83,595
	Moderately Low	509,806	240,526	269,280	509,806	240,526	269,280	230,492	279,314	231,401	279,159
	Very Low	64,112	60,870	3,242	64,112	60,870	3,242	60,865	3,247	60,955	3,241

Source: BLM 2012a

by the Utah Watershed Restoration Initiative. In the Proposed Plans, Vegetation Objective VEG-1, the desired condition is to maintain a minimum of 70 percent of lands capable of producing sagebrush with 10 to 30 percent sagebrush canopy cover in all SFA and PHMA. While all alternatives allow for restoration of GRSG habitat, the Proposed Plans and Alternative E place the most emphasis on restoration. Both alternatives include mapped opportunity areas and quantitative objectives for the number of acres treated annually; however, the Proposed Plans conduct slightly more vegetation treatments resulting in greater opportunity to reach objective. On the other hand, Alternative C places greater emphasis on passive restoration, which would be less effective at mitigating juniper encroachment. All alternatives consider similar management actions regarding fire and fuels management and invasive plant species. Implementation of management actions would not necessarily result in notable changes in on the ground conditions because protection of sagebrush habitats and weed treatments are already a BLM and Forest Service priority.

Impacts of vegetation (including invasive species) and fire management on GRSG are discussed in **Section 4.3**.

The changes in climate in the Central Basin and Range ecoregion are projected to have the greatest potential impact on GRSG habitat in the northwest and southwest areas of Utah and cause a contraction of GRSG habitat throughout much of that portion of the Central Basin and Range ecoregion, as shown in **Map 3.5-1**. The impacts would occur primarily from fire and invasive species, predominately cheatgrass, in conjunction with climate change. This would occur because of the larger and more frequent occurrence of wildfires that have very high potential to reduce habitat quality and quantity of sagebrush communities. GRSG habitat in entire population areas could be lost, at least temporarily in a single event because of the vulnerability of sagebrush communities to wildfire and invasive species. It is difficult to quantify the impacts because of the uncertainty of site-specific fire occurrence and the influence of climate conditions. Impacts could be partially mitigated by management actions such restoration treatments and creation of fuelbreaks. Mapped GRSG habitat for each alternative that could be affected is shown in **Table 4.12**. The other potential impact associated with climate change in the Central Basin and Range and Northern Great Basin ecoregions would be an increase in pinyon-juniper invasion of existing sagebrush communities in the northwest and southwest areas of Utah, which, as in the Colorado Plateau ecoregion area, would result in the degradation of existing occupied habitat. However, the potential impact would be mitigated by GRSG habitat restoration treatments as priority treatment areas for the Utah Watershed Restoration Initiative, which is being done very proactively in the Central Basin and Range and Northern Great Basin ecoregions.

The compilation of climate change information from all sources for the Utah Sub-region planning area, primarily from the Colorado Plateau and Central Basin and Range Ecoregional Assessments, indicate a moderate to moderately low potential impact on GRSG habitat, with the exception of the Bald Hills and Sheeprocks Population Areas where 70 percent or more of the areas are predicted to be impacted by climate change (see **Table 4.11** and **Table 4.12**). Existing rapid ecoregional assessment data indicate that the Rich and Parker Mountain Population Areas could also be impacted by climate change; however, existing data do not provide

**Table 4.12**  
**GRSG Occupied and Climate Space Trends (Long-Term) in the Central Great Basin Ecoregion by Habitat Alignments**

Population Area	Climate Change Class	Alternative A		Alternative B		Alternative C		Alternative D		Alternative E		Proposed Plans	
		Acres in Decision Area	Acres in PHMA	Acres in GHMA	Acres in PHMA (all occupied habitat)	Acres in PHMA	Acres in GHMA	GRSG Habitat in SGMAs/ Core Areas	Acres in GRSG Habitat outside of SGMAs/ Noncore Areas	Acres in PHMA	Acres in GHMA		
Bald Hills	0.0-0.3	106,286	100,575	5,711	102	100,575	5,711	133,562	2,771	103,474	3,773		
	0.31-0.6	65,200	61,110	4,090	53	61,110	4,090	80,947	1,470	62,031	4,090		
	0.61-1.0	102,568	100,139	2,430	92	100,139	2,430	128,307	244	99,344	1,659		
Box Elder	0.0-0.3	131,714	119,236	12,476	227	126,581	5,131	290,040	3,679	145,620	0		
	0.31-0.6	145,390	124,801	20,585	266	137,877	7,511	334,774	1,896	157,444	0		
	0.61-1.0	160,755	130,592	30,062	253	158,197	2,457	332,142	5,024	166,806	0		
Carbon	0.0-0.3	19	0	19	1	0	19	0	150	0	19		
	0.31-0.6	4	0	4	1	0	4	0	4	0	4		
	0.61-1.0	210	0	210	1	0	210	0	1,522	0	209		
Hamlin Valley	0.0-0.3	34,389	34,389	0	44	34,389	0	50,061	2	38,313	0		
	0.31-0.6	26,431	26,431	0	31	26,431	0	31,625	0	22,590	0		
	0.61-1.0	46,652	46,652	0	56	46,652	0	61,426	1	47,117	0		
Ibapah	0.0-0.3	12,263	10,553	1,711	12	10,553	1,711	16,300	1,717	11,347	1,712		
	0.31-0.6	17,280	14,843	2,437	19	14,843	2,437	17,397	3,123	14,855	2,439		
	0.61-1.0	28,145	22,242	5,904	18	22,242	5,904	32,851	5,955	22,578	5,909		
Panguitch	0.0-0.3	11,410	11,410	0	15	11,410	0	13,083	0	13,009	0		
	0.31-0.6	14,841	14,841	0	15	14,841	0	18,174	0	13,623	0		
	0.61-1.0	15,655	15,366	0	36	15,366	0	19,434	0	11,993	0		
Parker	0.0-0.3	1,808	1,673	135	12	0	135	992	2,734	364	135		
	0.31-0.6	3,478	140	3,338	12	0	3,338	1,072	5,061	117	2,416		
	0.61-1.0	1,286	1,024	263	8	0	263	147	8,292	1,023	263		
Rich	0.0-0.3	14,254	13,824	430	65	13,824	430	32,347	13,098	24,145	1,418		
	0.31-0.6	6,537	5,950	587	33	5,950	587	11,385	5,859	10,979	772		
	0.61-1.0	6,175	4,624	1,551	27	4,624	1,551	6,225	21,271	6,214	3,834		
Sheeprocks	0.0-0.3	183,222	165,332	17,890	251	141,450	41,773	177,206	97,238	155,703	41,784		
	0.31-0.6	117,875	102,976	14,837	180	82,892	34,921	110,861	81,104	80,028	34,510		
	0.61-1.0	255,319	221,154	34,143	357	203,449	51,848	247,382	119,815	201,789	51,670		

Source: BLM 2012b

enough coverage of these areas to draw any analysis conclusions. Impacts could range from total loss of suitable habitat to reduced population size and resiliency due to changes in habitat conditions unless mitigation is applied.

Given the uncertainties associated with the impact of climate change on sagebrush habitats, as well as potential threats for fire, invasive species, and development activities in or near sagebrush ecosystems, management actions that increase and enhance the number, quality, and connectivity of sagebrush habitats, while limiting fragmentation from anthropogenic sources, will be particularly important for maintaining viable GRSG populations. The uncertainty of climate projections result from the imperfect knowledge of initial conditions such as sea surface temperatures that are difficult to measure; the levels of future anthropogenic emissions, which are unknowable since they are dependent on current and future political decisions and social choices and not on physical laws of nature; and general system behavior (such as clouds and ice sheet melt) that continues to be the subject of basic climate research and that constitutes the “known unknowns” of the climate system (Bryce et al. 2012). However, even with the uncertainty associated with the climate models and projections, the climate change assessment does provide valuable information to assess climate trends and potential effects that will assist identifying areas and possible mitigation actions for further management consideration.

The resiliency of vegetative communities and their ecological condition and associated habitat quality as discussed in **Chapter 3** as intactness has the potential to be affected by both climate change and anthropogenic disturbances. Intactness classes for each population area and habitat management areas by alternatives are shown in **Table 4.13** for the Colorado Plateau Ecoregion and **Table 4.14** for the Central Basin and Range Ecoregion. Data from the two ecoregional assessments indicate very little change in intactness in the Central Basin and Range Ecoregion and a slight downward trend in intactness in the Colorado Plateau Ecoregion in population areas from climate change and anthropogenic disturbances such as oil and gas development, road construction, transmission lines and livestock grazing (see **Figure 4.1**). However, the potential impacts would be mostly mitigated by the use of identified RDFs, stipulations, and the management prescriptions identified in each alternative, except for the impacts from climate change, which will only be partially mitigated because of the nature of climate change and its uncertainty.

The intactness information by alternatives as displayed in **Table 4.13** and **Table 4.14** indicate very little difference in the amount of intact GRSG habitat and potential gain or loss of habitat, especially mapped GRSG habitat in SGMAs/core areas, except for Alternatives C and E and the Proposed Plans. Alternative C would provide the greatest amount of intact PHMA because of the very restrictive prescriptions for use and development and the amount of acres closed to development and use. However, the greatest potential for expansion of intact habitat would be under Alternative E and the Proposed Plan due to the emphasis placed on improving or expanding GRSG habitat. This is most apparent in the Central Basin and Range as shown in **Table 4.14**. The greater number of intact acres of mapped GRSG habitat is a result of the broad boundaries of the SGMAs and the inclusion of unoccupied habitat, but more importantly the inclusion of opportunity areas, which would expand GRSG habitat through implementation of restoration treatments identified in the alternative. The threat of fire has the greatest

**Table 4.13**  
**GRSG Occupied Habitat and Ecological Integrity in the Colorado Plateau Ecoregion by Habitat Alignments**

Population Area	Ecological Intactness Class	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E		Proposed Plans			
		Acres in Decision Area	Acres in PHMA	Acres in GHMA	Acres in PHMA <i>(all occupied habitat)</i>	Acres in PHMA	Acres in GHMA	Acres in GRSG Habitat in SGMAs/ Core Areas	Acres in GRSG Habitat outside of SGMAs/ Noncore Areas	Acres in PHMA	Acres in GHMA
Carbon	Very High	3,280	0	3,272	3,272	0	3,280	0	3,272	0	3,270
	High	84,980	33,354	18,013	51,367	70,028	14,952	37,263	14,104	37,235	14,093
	Mod High	127,221	76,900	15,403	92,303	113,931	13,290	54,694	37,610	60,820	32,174
	Mod Low	135,266	85,481	17,424	102,906	117,050	18,216	23,988	78,918	58,817	45,802
	Low	43,233	29,533	5,534	35,067	37,109	6,125	491	34,576	18,147	17,316
	Very Low	3,111	2,961	0	2,961	3,111	0	0	2,961	1,447	1,519
Panguitch	Very High	6,786	5,564	0	5,564	0	6,786	5,564	0	5,563	0
	High	9,889	6,950	0	6,950	0	9,889	6,950	0	6,957	0
	Mod High	21,238	15,515	0	15,515	0	21,238	15,515	0	15,512	0
	Mod Low	2,797	2,021	0	2,021	0	2,797	2,021	0	2,020	0
	Low	81	64	0	64	0	81	64	0	64	0
	Very Low	0	0	0	0	0	0	0	0	05	0
Emery	Very High	0	0	0	0	0	0	0	0	0	0
	High	10,328	8,680	1,644	10,325	8,680	6,164	8,443	1,882	8,436	1,880
	Mod High	22,016	17,028	4,063	21,091	17,028	4,063	17,028	4,063	17,014	4,060
	Mod Low	59,736	54,685	2,836	57,521	54,685	2,836	54,079	3,442	54,809	3,433
	Low	4,117	3,787	296	4,083	3,787	296	3,787	296	3,784	295
	Very Low	0	0	0	0	0	0	0	0	0	0
Uintah	Very High	254,038	14,537	95,001	109,538	14,537	95,001	14,148	95,390	14,146	95,363
	High	229,099	61,578	70,588	132,166	61,578	70,588	56,946	75,220	57,021	75,195
	Mod High	420,427	142,417	83,022	225,439	142,417	83,022	139,249	86,189	140,228	86,099
	Mod Low	471,802	118,553	99,358	217,911	118,553	99,358	116,704	101,208	116,669	101,156
	Low	119,538	37,174	15,279	52,453	37,174	15,279	37,166	15,287	37,165	15,271
	Very Low	17,391	1,575	2,817	4,391	1,575	2,817	1,574	2,817	1,575	2,815
Strawberry	Very High	4,694	0	0	0	0	0	0	0	0	0
	High	52,034	0	3,358	3,358	0	3,358	3,358	0	3,356	0
	Mod High	63,306	307	21,467	21,774	307	21,467	21,467	307	21,995	307
	Mod Low	61,449	168	15,389	15,557	168	15,389	15,385	172	15,555	168
	Low	2	0	0	0	0	0	0	0	0	0
	Very Low	0	0	0	0	0	0	0	0	0	0

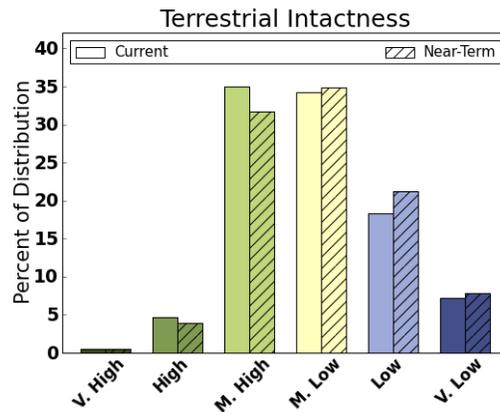
**Table 4.13**  
**GRSG Occupied Habitat and Ecological Integrity in the Colorado Plateau Ecoregion by Habitat Alignments**

Population Area	Ecological Intactness Class	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E		Proposed Plans			
		Acres in Decision Area	Acres in PHMA	Acres in GHMA	Acres in PHMA (all occupied habitat)	Acres in PHMA	Acres in GHMA	Acres in GRSG Habitat in SGMAs/ Core Areas	Acres in GRSG Habitat outside of SGMAs/ Noncore Areas	Acres in PHMA	Acres in GHMA
Parker	Very High	24,872	20,301	0	20,301	20,301	0	19,589	0	19,572	0
	High	76,058	62,310	0	62,310	62,310	0	62,223	0	62,185	0
	Mod High	44,658	38,589	0	38,589	38,589	0	38,152	0	38,124	0
	Mod Low	58,083	39,566	0	39,566	39,566	0	39,566	0	39,540	0
	Low	784	784	0	784	784	0	784	0	784	0
	Very Low	31	31	0	31	31	0	31	0	31	0

**Table 4.14**  
**GRSG Occupied Habitat and Landscape Condition Class in the Central Great Basin Ecoregion by Habitat Alignments**

Population Area	Landscape Condition Class	Alternative A	Alternative B		Alternative C	Alternative D		Alternative E		Proposed Plans	
		Acres in Decision Area	Acres in PHMA	Acres in GHMA	Acres in PHMA (all occupied habitat)	Acres in PHMA	Acres in GHMA	Acres in GRSG Habitat in SGMA/ Core Areas	Acres in GRSG Habitat outside of SGMA/ Noncore Areas	Acres in PHMA	Acres in GHMA
Bald Hills	0.0 - 0.3	106,286	100,575	5,711	106,286	100,575	5,711	133,562	2,771	103,474	3,773
	0.31 - 0.6	65,200	61,110	4,090	65,200	61,110	4,090	80,947	1,470	62,031	4,090
	0.61 - 1.0	102,568	100,139	2,430	102,568	100,139	2,430	128,307	244	99,344	1,659
Box Elder	0.0 - 0.3	131,714	119,236	12,476	131,714	126,581	5,131	290,040	3,679	147,092	0
	0.31 - 0.6	145,390	124,801	20,585	145,390	137,877	7,511	334,774	1,896	159,450	0
	0.61 - 1.0	160,755	130,592	30,062	160,755	158,197	2,457	332,142	5,024	167,918	0
Carbon	0.0 - 0.3	19	0	19	19	0	19	0	150	0	19
	0.31 - 0.6	4	0	4	4	0	4	0	4	0	4
	0.61 - 1.0	210	0	210	210	0	210	0	1,522	0	209
Hamlin Valley	0.0 - 0.3	34,389	34,389	0	34,389	34,389	0	50,061	2	38,313	0
	0.31 - 0.6	26,431	26,431	0	26,431	26,431	0	31,625	0	22,590	0
	0.61 - 1.0	46,652	46,652	0	46,652	46,652	0	61,426	1	47,117	0
Ibapah	0.0 - 0.3	12,263	10,553	1,711	12,263	10,553	1,711	16,300	1,717	11,347	1,712
	0.31 - 0.6	17,280	14,843	2,437	17,280	14,843	2,437	17,397	3,123	14,855	2,439
	0.61 - 1.0	28,145	22,242	5,904	28,145	22,242	5,904	32,851	5,955	22,578	5,909
Panguitch	0.0 - 0.3	11,410	11,410	0	11,410	11,410	0	13,083	0	13,755	0
	0.31 - 0.6	14,841	14,841	0	14,841	14,841	0	18,174	0	14,292	0
	0.61 - 1.0	15,655	15,366	0	15,655	15,366	0	19,434	0	14,077	0
Parker	0.0 - 0.3	1,808	1,673	135	1,808	0	135	992	2,734	1,631	135
	0.31 - 0.6	3,478	140	3,338	3,478	0	3,338	1,072	5,061	117	3,335
	0.61 - 1.0	1,286	1,024	263	1,286	0	263	147	8,292	1,023	263
Rich	0.0 - 0.3	14,254	13,824	430	14,254	13,824	430	32,347	13,098	25,412	1,423
	0.31 - 0.6	6,537	5,950	587	6,537	5,950	587	11,385	5,859	11,706	772
	0.61 - 1.0	6,175	4,624	1,551	6,175	4,624	1,551	6,225	21,271	6,637	3,835
Sheeprocks	0.0 - 0.3	183,222	165,332	17,890	183,222	141,450	41,773	177,206	97,238	155,703	42,576
	0.31 - 0.6	117,875	102,976	14,837	117,875	82,892	34,921	110,861	81,104	80,028	34,510
	0.61 - 1.0	255,319	221,154	34,143	255,319	203,449	51,848	247,382	119,815	201,789	52,823

**Figure 4.1**  
**Colorado Plateau Ecoregion**



potential to reduce the number of intact GRSG habitat because of the unpredictable and uncontrollable nature of wildland fire. However, the conservation measures identified in the alternatives would minimize the potential loss of intact habitat and, under Alternative E, would increase the acres of intact habitat if the prescribed conservation measures and mitigation are implemented.

## 4.6 SOIL RESOURCES

### 4.6.1 Methods and Assumptions

Soils have been identified as a resource that would have only beneficial impacts from the implementation of GRSG conservation measures. As such, this section focuses on qualitatively describing the nature and type of beneficial impacts that would result from implementing the action alternatives, Alternatives B through E, and the Proposed Plans. The analysis is focused on the effects of the action alternatives on sensitive soils within the population areas, the acreages of which are provided in the Soil Resources section of **Chapter 3**.

#### **Indicators**

Indicators of impacts on soil resources are as follows:

- Acres of land added to or removed from specific grazing practices
- Acres of land protected from or open to surface-disturbing activities
- Increases or decreases in vegetation treatments, prescribed burns, and potential for wildfire, which can decrease infiltration and increase erosion

#### **Assumptions**

This analysis is based on the assumptions in **Section 4.2.1**.

### 4.6.2 Alternatives Analysis

Activities that disturb, compact, contaminate, or remove vegetation from soils are generally considered to negatively affect soil health. In some cases, soil compaction aids in plant

establishment and growth. However, too much compaction decreases water infiltration rates and gas exchange rates. Decreased gas exchange rates can cause aeration problems, induce nitrogen and potassium deficiency, and negatively impact root development, which is a key component of soil stabilization. As soil compaction increases, the soil's ability to support vegetation diminishes because the resulting increase in soil strength and change in soil structure (loss of porosity) inhibit root system growth and reduce water infiltration. As vegetative cover, water infiltration, and soil stabilizing crusts are diminished or disrupted, the surface water runoff rates increase, further accelerating rates of soil erosion.

Impacts on soil resources can result from a number of causes, including improper livestock grazing practices, recreation, mineral resource activities, renewable energy development, and road construction. The intensity and extent of impacts on soil resources are determined in part by the type and location of the surface-disturbing activities and surface occupancy. Impacts on soil resources can also be affected by any applicable stipulations and plans of operations that address site-specific environmental concerns and require mitigation to stabilize soil, to prevent unnecessary erosion, and to revegetate disturbed surfaces. Impacts on soil resources can be mitigated by avoiding or minimizing the impact. This can be done by managing certain lands as closed or unavailable for surface-disturbing activities, or by restricting the activity by managing certain lands as ROW avoidance areas or attaching such stipulations as NSO or CSU to fluid minerals leases. Impacts that cannot be avoided can be minimized through project design and the application of COAs and BMPs. In addition, to protect GRSG, disturbance cap requirements and the application of lek buffers can locally eliminate impacts from disturbance. However, there could be impacts elsewhere if the disturbance is pushed to another location to minimize impacts on GRSG.

Grazing activities alter vegetative and biological soil crust communities. Livestock grazing can cause adverse impacts on soils, particularly during high-intensity low-duration grazing systems in small pastures. Impacts from clearing vegetation and increasing rates of wind erosion and water erosion during storm events may be more severe on sensitive soils (identified in the Soil Resources section of **Chapter 3**). Livestock grazing may also decrease the depth to hardpan or bedrock by increasing soil compaction, particularly during spring months or when soils are wet. Modified grazing management practices can be necessary to maintain soil health where soils are found to be sensitive to livestock disturbances (for example, soil on steep slopes). Properly managed grazing can protect soils and help provide healthy plant communities. Currently livestock grazing impacts on soil resources are measured according to the Utah BLM Public Land Health Standards.

The use of the landscape by wild horses can have a similar impact on soils as described for livestock grazing. Adjustments in AMLs can be necessary to maintain a thriving natural ecological balance and multiple-use relationships for the area.

The designation of utility corridors would encourage the disturbance of soils within those corridors and would be protective of soils outside of the corridors. Utility lines would be encouraged to be parallel to one another, resulting in more intense disturbance within the corridors than in other areas.

Vegetation treatments, which include herbicide application, targeted grazing, tillage, and prescribed fire, can have both beneficial and adverse effects on soils. Their effects vary by application and situation.

Travel in the planning area could adversely impact soils through compaction, vegetation removal, and erosion, particularly in areas of fragile soils (e.g., steep slopes), saline and selenium soils, within riparian areas, and along stream banks.

Implementing GRSG conservation measures generally involves reducing or otherwise restricting land uses and activities that remove vegetation and that compact and erode the soil. Conservation measures include implementing RDFs and BMPs when authorizing or permitting site-specific activities and projects for wildland fire management actions, travel and transportation management, lands and realty, and energy and mineral development.

All of the action alternatives and the Proposed Plans would result in greater restrictions on compaction and erosion activities as compared with continuation of existing management under Alternative A, including such measures as reductions in acres available for livestock grazing, management of ROW exclusion areas, and closure to mineral leasing and development. **Table 2.3** provides a quantitative overview of how management actions would vary across alternatives. As such, all of the action alternatives are likely to be more protective of soils within the decision area through reducing compaction and erosion, particularly on areas with sensitive soils. Differences across alternatives in the number of AUMs, AMLs for wild horses, and the number of acres closed to fluid mineral leasing, closed to road construction, identified as unsuitable for coal mining, and in ROW exclusion areas displayed in **Table 2.3** provide a quantitative basis for an analysis of how impacts on soils may vary across alternatives.

Alternative C would have the greatest restrictions on new ROWs, fluid mineral leasing, and coal surface mining and thus on development in these areas that would otherwise have the potential to impact soils. However, Alternative C would emphasize passive restoration, which may cause some resource damage that leads to soil instability or erosion. Alternative B would also greatly limit soil-disturbing activities, but not to the same degree as Alternative C. Alternative E would have the fewest restrictions of the action alternatives.

Alternative C would also close a portion of mapped occupied habitat to OHV travel, something not considered under the other alternatives, reducing the threat of erodibility and compaction from this type of use. Impacts would be limited to the closure areas, which are spread throughout the decision area.

Differences across alternatives in the acres designated as utility corridors are unlikely to result in differences in the amounts of disturbed soils because utility lines can still be constructed outside of the corridors on a case-by-case basis.

Differences across alternatives with respect to vegetation treatments can have varied effects on soils, although no clear relationship is identified to distinguish the effects of one alternative versus another.

Implementing a disturbance cap under all of the action alternatives would reduce impacts on soils, particularly sensitive soils, compared with Alternative A by limiting the amount of disturbance in a population area. Impacts would be reduced the most under Alternative C where a 3 percent disturbance cap would apply to all mapped occupied habitat and would include fire, heavily grazed areas, and vegetation treatments. The calculated disturbance would include all lands, regardless of ownership. Impacts would be reduced the least under Alternative E where a 5 percent disturbance cap would apply and would exclude fire. The disturbance cap would also not be calculated on all lands, regardless of ownership, but rather only federal and state lands. By calculating the disturbance cap across such a large area, locally significant impacts could still occur even if the disturbance cap is not reached. Under the Proposed Plans, a 3 percent disturbance cap would be calculated at the BSU and at a project level. This would reduce the likelihood of locally significant impacts because no further anthropogenic disturbance would be permitted in the proposed project analysis area until disturbance in the area is reduced to below the cap. Anthropogenic disturbances in PHMA and GHMA would be also mitigated to ensure a net conservation gain to GRSG, thereby preserving the potential for these areas to provide GRSG habitat.

In addition to the disturbance cap, under the Proposed Plans a limit would be placed on the density of energy and mining facilities which would reduce impacts caused by such disturbances as described above. In addition, numerous conservation measures would be implemented in PHMA and GHMA such as RDFs and lek buffers (**Appendix F**) to reduce impacts from human activities in PHMA and GHMA.

The Proposed Plans would retain existing AUMs and would continue to manage livestock to meet the Standards and Guidelines for Rangeland Health, site descriptions, science-based GRSG habitat objectives, or Forest Service equivalent standards. HMAs in GRSG habitat would be managed at the AML ranges to achieve and maintain GRSG habitat objectives as outlined in **Appendix V**, Great Basin Vegetation Modeling using Vegetation Dynamics Development Tool, and rangeland health assessments containing GRSG habitat objectives would be completed for the HMAs. Establishing and maintaining healthy vegetation cover would help protect soil stability and overall health across the landscape, especially in GRSG habitat.

The Proposed Plans would reduce potential impacts on PHMA and GHMA over current management by managing additional acres as ROW avoidance and exclusion. This would concentrate impacts on soil resources from ROW permitting and construction to limited areas compared current management, where impacts could be distributed throughout the decision area. The application of additional RDFs to meet GRSG objectives would reduce the impact of the ROWs that are permitted in these areas, over current management. The Proposed Plans would also have greater restrictions on mineral development by closing areas of PHMA and GHMA to fluid mineral leasing, nonenergy development, coal leasing, salable, and locatable mineral, and managing some open areas with NSO and CSU restrictions, which would prevent impacts on soils resources from these uses. Finally, the Proposed Plans would manage more areas as limited or closed to travel and transportation over current management, which would reduce the threat of erosion or compaction of soil resources from this use. The protection of soils resources from travel restrictions would be limited to areas that are closed or restricted to designated routes, which are spread throughout the decision area.

Vegetation management under the Proposed Plans would aim to maintain a minimum of 70 percent of lands capable of producing sagebrush with a 10 to 30 percent canopy cover. Treatment of vegetation to enhance vegetation communities would inadvertently enhance soils resources, prevent excessive erosion, and protect sensitive soils by providing adequate stability and cover.

## 4.7 WATER RESOURCES

### 4.7.1 Methods and Assumptions

Water has been identified as a resource that would have only beneficial impacts from the implementation of GRSG conservation measures. As such, this section focuses on qualitatively describing the nature and type of beneficial impacts that would result from implementing the action alternatives, Alternatives B through E and the Proposed Plans.

#### *Indicators*

Indicators of impacts on water resources are as follows:

- Stream miles that meet state and federal water quality standards and designated beneficial uses
- Acres of lakes and reservoirs that fully support beneficial uses
- Acres of land open or closed to surface-disturbing activities
- Volume of water stored in the landscape as surface water and groundwater
- Changes to water sources for GRSG to a point at which water availability is affected
- Restoration of water sources for GRSG
- Changes to water features that may change their ability to serve as mosquito-breeding habitat

#### *Assumptions*

This analysis is based on the assumptions in **Section 4.2.1**.

### 4.7.2 Alternatives Analysis

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 and contaminants into streams due to surface-disturbing activities such as ROWs, energy, or mineral development, improperly managed livestock grazing or recreation, wild horse and burro use of the landscape above AMLs, introduction of waste matter into streams from domestic livestock, and “low-water” crossing points of roads, routes, and ways used by motorized vehicles. ROW, fluid mineral, locatable and salable mineral, and

energy development can impact waterways by disturbing land surface, clearing vegetation, increasing rates of erosion and sedimentation into waterways, compacting soils and increasing rates of run off, and increasing water consumption for some operation activities (BLM 2014). Manure from horses and livestock can locally impact water resources by introducing pathogens and excessive nutrients such as phosphorus and nitrogen. Excessive nutrients can spark growth within water resources which results in depleted oxygen levels, and sometimes anoxic environments that result in mass fish kills (Commonwealth of Massachusetts 2014). Activities that introduce chemicals into the natural environment also have the potential to degrade surface and water quality through leaks, accidents, and broken well casings. Energy and mineral development can impact water resources by increasing areas of cleared and compacted ground.

The quantity of water stored in the landscape either as surface water or groundwater varies over time dependent upon precipitation and human extractions of that water. Management measures that restrict water-consuming uses, such as mineral development and livestock grazing, pinyon-juniper removal and vegetation management would have a net benefit on the quantities of water stored in the landscape.

All of the action alternatives would result in greater restrictions on resource uses compared with continuation of existing management under Alternative A, including such measures as reductions in acres available for livestock grazing, management of ROW exclusion areas, and closure to mineral leasing and development. All of the action alternatives would thereby potentially result in overall improvements in water quality across the decision area. Under Alternative C, AMLs for wild horses would be reduced by 25 percent, which would also reduce the demand on water resources from wild horses. Alternative C would also close certain areas to OHV travel, which, if done in areas where such use is contributing to water quality issues, would curtail the impacts. While the effects could be spread beyond the closure areas to the watershed, this magnitude of the effects is unlikely given the size and dispersed nature of the closures throughout the decision area.

Because water-consuming activities would be restricted, the action alternatives are all also likely to result in increased storage of water in the landscape. Restrictions from the action alternatives would improve the likelihood of more waters meeting fully supporting beneficial uses and increase or maintain the level of stream miles meeting state and federal water quality standards and designated beneficial uses. The action alternatives are likely to protect, if not improve and restore, water sources for GRSG, and are also likely to decrease the presence of mosquito breeding habitat.

The Proposed Plans would reduce potential impacts on PHMA and GHMA over current management by implementing additional acres as ROW avoidance and exclusion (see **Table 2.3**). This would concentrate impacts on water resources from ROW permitting and construction to limited areas in comparison to current management. The application of additional RDFs for GRSG objectives would reduce the impact of the ROWs that are permitted in these areas, over current management. The Proposed Plans would also have greater restrictions on mineral development by closing areas of PHMA and GHMA to fluid mineral leasing, nonenergy development, coal leasing, salable, and locatable mineral, and managing some open areas with NSO and CSU restrictions (**Table 2.3**), which would prevent impacts on water

resources from these uses. Finally, the Proposed Plans would manage areas as limited or closed to travel and transportation over current management which would reduce the threat of erosion or runoff into water resources from this use.

Vegetation treatments and prescribed burns can reduce vegetation cover in the short term, which typically increases overland flow and sediment loading of waterways. Watershed health would be affected by reducing water infiltration rates, increase overland flow and sediment loading, which could affect turbidity, temperature, and nutrient loading in water systems. Vegetation management under the Proposed Plans would aim to maintain a minimum of 70 percent of lands capable of producing sagebrush with a 10 to 30 percent canopy cover. Treatment of vegetation to enhance vegetation communities would inadvertently enhance and maintain water resources, by reducing runoff and preventing excessive erosion by stabilizing soils.

The Proposed Plans would apply a 3 percent disturbance cap (5 percent on National Forest System lands in Wyoming) to all anthropogenic disturbances PHMA at both the BSU and project levels, and a limit would be placed on the density of energy and mining facilities, which would reduce impacts caused by such disturbances as described above. Anthropogenic disturbances in PHMA and GHMA would be also mitigated to ensure a net conservation gain to GRSG, thereby preserving the potential for these areas to provide GRSG habitat. In addition, numerous conservation measures would be implemented in PHMA and GHMA such as RDFs and lek buffers (**Appendix F**) to reduce impacts from human activities in PHMA and GHMA.

#### **4.8 VEGETATION (INCLUDING NOXIOUS WEEDS, RIPARIAN AREAS, AND WETLANDS)**

GRSG rely on sagebrush ecosystems for all aspects of their life cycle. Typically, a range of sagebrush community composition within the landscape (including variations in sub-species composition, co-dominant vegetation, shrub cover, herbaceous cover, and stand age), along with the use of riparian and wet meadow areas, is needed to meet seasonal requirements for food, cover, nesting, and wintering habitats. The landscape required for GRSG may be up to 40 square miles (Connelly et al. 2004). Thus, the ecology, management, and conservation of large, intact sagebrush ecosystems goes hand-in-hand with managing for the dynamics and behaviors of the populations themselves (Connelly et al. 2004; Crawford et al. 2004). Intact sagebrush does not imply uniform coverage of sagebrush across the ecosystem, but a mosaic of shrub, grassland, and riparian cover across the landscape that allows for migration of GRSG between seasonal habitats (Connelly et al. 2011).

Historically, sagebrush-dominated vegetation was one of the most widespread habitat types in the US, but its expanse has been fragmented, lost, or altered by invasive plant species and anthropogenic disturbance (NTT 2011, p. 4). Protection of GRSG habitat would involve restrictions and limitations on activities that contribute to the spread of invasive plant species, fire, and other surface disturbance, and management of vegetation to promote healthy sagebrush and understory vegetation to support GRSG.

Riparian and wetland areas provide important seasonal habitat, water, and forage for GRSG; these areas are discussed in this section under the topics of livestock grazing and vegetation management. Noxious weeds are discussed under GRSG management, vegetation management, and fire.

#### **4.8.1 Methods and Assumptions**

##### ***Indicators***

Indicators of impacts on vegetation are as follows:

##### *Upland Vegetation*

- Acres and condition of vegetation communities
- Effects of fragmentation

##### *Riparian and Wetland*

- Acres and condition of riparian and wetland vegetation

##### *Noxious Weeds and Invasive Species*

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

##### ***Assumptions***

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- All plant communities would be managed toward achieving a diverse species composition, cover, and age classes across the landscape, except in localized situations where plantings are used for stabilization after wildfire to reduce annual grass invasion, or from past rangeland-improvement practices.
- The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors, including location in the watershed; the type, time, and degree of disturbance; existing vegetation; precipitation; and mitigating actions applied to the disturbance.
- Noxious and invasive weeds would continue to be introduced and spread because of ongoing vehicle traffic in and out of the planning area, recreational activities, wildland fire, wildlife and livestock grazing and movements, and surface-disturbing activities.
- Activities that would disturb soils could cause erosion, loss of topsoil, and soil compaction, which could affect the ability of vegetation to regenerate. Further, surface-disturbing activities could increase dust, which could cover existing vegetation and impair plant photosynthesis and respiration. Resulting impacts could include lowered plant vigor and growth rate, altered or disrupted pollination, and increased susceptibility to disease.
- 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.
- Climatic fluctuation would continue to influence the health and productivity of plant communities on an annual basis.

#### **4.8.2 Alternative A**

In general, Alternative A relies on management guidance that does not reflect the most up-to-date science regarding GRSG, as well as older LUPs that often lack a landscape-level approach to land planning.

##### ***Greater Sage-Grouse Management***

There is no consistently applied GRSG management across all LUPs, though many incorporate objectives for maintaining, improving, or restoring vegetation communities, particularly sagebrush and riparian and wetland habitats. As a result, there is general direction to preserve and improve vegetation communities; however, discrete anthropogenic disturbances, such as road construction, mineral development, and ROW development, would continue. This could result in a number of impacts on vegetation, including vegetation removal, fragmentation of vegetation communities, loss of habitat for pollinators, and conversion of areas to an earlier seral stage, which could change vegetation community succession and reduce the extent of native plant communities. The remaining vegetation could have reduced vigor or productivity due to mechanical damage, soil compaction, and dust. Soil compaction would inhibit natural revegetation in areas without active reclamation efforts and would reduce plant vigor, making plants more susceptible to disease, drought, or insect attack.

##### ***Vegetation Management and Fire (including invasive plants and juniper encroachment)***

In addition to landscapes with large, intact patches of sagebrush, GRSG require high-quality habitat conditions including a diversity of herbaceous species, vegetative and reproductive health of native grasses, and an abundance of sagebrush, making management for high condition in seasonally important habitats important (Manier et al. 2013, p. 181-182). Given the limited distribution of suitable sagebrush habitats and the cost of habitat restoration, management plans that protect intact sagebrush and restore impacted areas strategically to enhance existing habitats (for example, connectivity of intact sagebrush) have the best chance of increasing the amount and quality of sagebrush cover (Manier et al. 2013, p. 183). Sagebrush-promoting vegetation treatments would enhance native vegetation and overall ecosystem productivity, while reducing the distribution of invasive species and some woody species.

Invasive plants can alter plant community structure and composition, productivity, nutrient cycling, and hydrology, and may competitively exclude native plant populations. In particular, invasive plants can reduce and eliminate vegetation that GRSG use for food and cover, resulting in habitat loss and fragmentation, and may increase the risk of wildfire. The spread of invasive plants such as cheatgrass (*Bromus tectorum*) has increased the frequency and intensity of fires (Balch et al. 2012). An assortment of nonnative annuals and perennials and native conifers are currently invading sagebrush ecosystems.

Expansion of conifer woodlands, especially juniper (*Juniperus* spp.) present a threat to GRSG because they do not provide suitable habitat, and mature trees displace shrubs, grasses, and forbs through direct competition for resources; juniper expansion is also associated with increased bare ground and increased erosion potential (Manier et al. 2013, pp. 152-154).

Current treatments and active vegetation management typically focus on vegetation composition and structure for fuels management, habitat management, and/or productivity manipulation for improving the habitat and forage conditions for ungulates and other grazers, using surface soil

stabilization to increase productivity, or by removing invasive plants. Locally and regionally, the distribution of these treatments can affect the distribution of sagebrush habitats (Manier et al. 2013, pp. 179-185). Vegetation treatments would have short-term effects on vegetation from vegetation removal and disturbance, but would result in long-term improvements in vegetation condition.

While wildfires likely played an important role historically in creating a mosaic of herbaceous-dominated areas (recently disturbed) and mature sagebrush (less-frequently disturbed), current land-use patterns have restricted the system's ability to support natural wildfire regimes. Slow rates of regrowth and vegetation recovery after disturbances (driven by low water availability and other constraints), coupled with high rates of disturbance and conversion to introduced plant cover, are largely responsible for the accumulating displacement and degradation of the sagebrush ecosystem (Manier et al. 2013, pp. 133-144). Thus, preservation of sagebrush against wildfire and limiting use of prescribed burning is important to preserving GRSG habitat.

Fire is particularly damaging to sagebrush ecosystems. 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 5 years of a burn, but a return to a full pre-burn community cover can take 15 to 30 years (Manier et al. 2013, pp. 133-134). Fire suppression may be used to maintain habitat for GRSG (NTT 2011, pp. 25-26). When management decreases fire size by controlling natural ignitions, the indirect impact is that vegetation ages across the landscape, and early successional vegetation communities, are diminished. Fire suppression may preserve the condition of some vegetation communities, as well as habitat connectivity. This is particularly important in areas where fire frequency has increased because of weed invasion, or where landscapes are highly fragmented. Fire suppression can also lead to increased fuel loads, which can lead to more damaging or larger-scale fires in the long term. Fire also increases opportunities for invasive species, such as cheatgrass, to expand (Brooks et al. 2004), so fire suppression can indirectly limit this expansion.

Controlled burning may be prescribed to treat fuel buildup and can assist in the recovery of sagebrush habitat in some vegetation types. Emergency Stabilization and Rehabilitation (for BLM-administered lands) and Burned Area Emergency Rehabilitation (for National Forest System lands) would reduce the potential effects of invasive species by providing the best opportunities for vegetation to reestablish following wildland fires and compete with the natural strengths invasive species have compared to native species. Re-seeding with native plants and long-term monitoring to ensure the production of GRSG cover and forage plants assists with vegetation recovery (NTT 2011, pp. 25-26). Under Alternative A, projects would be designed to minimize the size of wildfire and prevent the further loss of sagebrush. However, past restoration and rehabilitation efforts have not specifically targeted GRSG habitat objectives. A recent study suggests that past restoration and rehabilitation efforts did not increase the probability of burned areas meeting most GRSG habitat objectives (Arkle et al. 2014).

#### ***Livestock Grazing and Wild Horses and Burros***

Livestock grazing is the most widespread land use across the sagebrush biome (Connelly et al. 2004, p. 7-29). 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 Ch. 7; NTT 2011, p. 14; Jones 2000, p. 159). Livestock grazing has been described as a “diffuse” form of biotic disturbance that exerts repeated pressure over many years on a system; unlike point sources of disturbance (e.g., fires), livestock grazing exerts repeated pressure across the landscape. Thus, effects of grazing are not likely to be detected as disruptions, but as differences in the processes and functioning of the sagebrush, riparian and wetland systems. Grazing effects are not distributed evenly because historic practices, management plans and agreements, and animal behavior all lead to differential use of the range (Manier et al. 2013, pp. 157-168). In addition, some grass species that evolved with grazing pressure from large herbivorous mammals may be less affected by livestock grazing compared to species without herbivore-adapted traits (Mack and Thompson 1982, p. 768). Livestock often use riparian and wetland areas for water and shade, which could reduce riparian community condition and hydrologic functionality. Properly managed grazing could also reduce litter and fine fuel loading, which could reduce fire size and severity. Wild horse and burro impacts are similar to those from livestock grazing, as wild horses and burros also forage on and trample vegetation. However, wild horse and burro use is not a permitted use and is thus not managed in the same way as livestock grazing.

Water developments, roads, and structural range improvements associated with livestock grazing would remove vegetation over the long term and could be a source of weed introduction to rangelands. Livestock may congregate around water developments, causing soil compaction and trampling nearby vegetation, including shoreline and riparian areas, making reestablishment of native vegetation difficult in the area surrounding water developments. Water developments may also cause dewatering of riparian areas, leading to generally degraded conditions or loss of riparian habitats.

At unsustainable levels, grazing can lead to loss of vegetative cover, reduced water infiltration rates, decreased plant litter, increased bare ground, reduced nutrient cycling, decreased water quality, and increased soil erosion (Manier et al. 2013, pp. 157-159; Jones 2000, p. 159). Grazing may also confer competitive advantage on junipers through the removal of native grasses and forbs, facilitation of tree regeneration by increased shrub cover, and enhanced seed dispersal (Baker 2011, p. 200). Land health evaluations are used to assess rangeland condition and help to identify where changing in grazing management would be beneficial.

Livestock grazing would continue to occur under Alternative A, with 329,521 AUMs permitted on BLM-administered lands and 265,373 AUMs permitted on National Forest System lands. Rangelands would continue to be managed to conform to the BLM Utah Public Land Health Standards or similar guidelines, so that vegetation communities would continue to be maintained and improved to some extent across the decision area. Changes and adjustments would be considered on a case-by-case basis and would incorporate grazing standards and guides to evaluate the ability to meet desired conditions. Riparian and wetland areas would be managed to maintain or attain proper functioning condition or Forest Plan standards and guidelines.

#### ***Travel and Transportation***

Road construction divides and fragments vegetation and causes erosion and nutrient leaching. OHV travel compacts soils and allows the spread of human disturbance, including wildfire and invasive plant species (USFWS 2010, pp. 13929-13931; Manier et al. 2013, pp. 71-90). Invasive

plant species can out-compete sagebrush and other vegetation essential for GRSG survival. Invasive plant species also increase wildfire frequencies, further contributing to habitat loss (Balch et al. 2012).

The more areas that are seasonally or permanently closed to OHV travel, the fewer impacts on vegetation from surface disturbance, such as vehicle and human trampling of vegetation, soil compaction, and spread of dust and weeds, would be expected.

Impacts from OHV use would continue under Alternative A on 797,000 acres that would be open to cross-country use. Route and trail modifications would be considered on a case-by-case basis.

***Infrastructure Development (including all ROWs and utility corridors)***

Permitted activities, such as construction of utility ROWs, involve vegetation removal, which reduces the condition of native vegetation communities and individual native plant species, alters age class distribution, reduces connectivity, and encourages the spread of invasive species. Construction activities could compact soils, which would inhibit natural revegetation in areas without active reclamation efforts and would reduce plant vigor, which would make plants more susceptible to disease, drought, or insect attack. In most cases, reclaimed areas would be ripped and seeded during interim or final reclamation (NTT 2011, pp. 12-13).

The impacts from different types of ROWs would impact vegetation in different ways. Aboveground linear and underground ROWs, such as transmission lines or pipelines, would temporarily remove vegetation during construction, but areas would be reclaimed or restored after construction. Vegetation would be permanently removed for construction of surface linear ROWs, such as roads. Furthermore, because aboveground and surface linear ROWs may extend for many miles, vegetation communities could be fragmented and the potential for weeds to be introduced or to spread may increase. Aboveground site-type ROWs and wind energy projects would remove vegetation during the life of the project, often lasting several decades, but areas would be restored after the ROW is decommissioned. ROW corridors on 177,700 acres would concentrate disturbances in one area, which would cause greater impacts in this one area but would reduce the likelihood for disturbance in other areas.

ROW exclusion areas would prohibit all development of ROWs in those areas, which would directly protect vegetation from disturbance and removal. In ROW avoidance areas, the permits would be considered on a case-by-case basis. This flexibility may be advantageous where federal and private land ownership is mixed, and exclusion areas may result in more widespread development on private lands. Under Alternative A, 102,500 acres would be managed as ROW exclusion areas, including for wind energy development.

Land exchanges or acquisitions to reduce the fragmentation of GRSG habitat could improve the BLM and Forest Service's ability to implement management actions that would result in increased vegetation diversity, ecological health, and attainment of BLM Utah Public Land Health Standards. In addition, retention of federal lands would prevent sagebrush removal associated with land conversion to agricultural or urban uses. Under Alternative A, 24,400 acres of land would be available for disposal and would be required to meet certain disposal criteria.

### **Mineral Development (including geothermal)**

Energy development requires construction of roads, well pads, wells, and other infrastructure, and associated noise, traffic, and lights that alter, degrade, and/or entirely displace native ecosystems (Manier et al. 2013, pp. 90-104). Surface disturbance associated with mineral development often removes vegetation, reduces the condition of native vegetation communities and the connectivity of habitat, and encourages the spread of invasive species (NTT 2011, pp. 19-20). Vegetation removal results in conversion of areas to an earlier seral stage, which could change vegetation community succession and reduce desired plant communities. The remaining vegetation could have reduced vigor or productivity due to mechanical damage, soil compaction, and dust. Impacts would not occur in areas closed to mineral leasing or development.

Under Alternative A, 138,500 acres would be closed to nonenergy mineral leasing, 73,500 acres closed to mineral material development, and 335,300 acres closed to fluid mineral leasing. In addition, 22,900 acres would be found unsuitable for surface mining of coal, and 498,100 acres would be recommended for withdrawal from locatable mineral entry. Stipulations may be applied in certain areas to reduce impacts from mineral leasing or development, but these stipulations are not applied consistently across the planning area. As a result, impacts from mineral development on vegetation as described above would continue to occur in areas open to leasing and development.

### **Other Actions**

Recreational use of GRSG habitat can be benign, but casual use at excessive levels may cause degradation of sagebrush vegetation from activities such as camping, bicycling, OHV use, and hunting. Potential impacts from casual recreation use include trampling, soil compaction, erosion, invasive plants spread, and fugitive dust generation (Knick et al. 2011). Recreational use can also increase the potential for wildfire caused by invasive plant spread or human error (Knick et al. 2011). Most impacts occur in easily accessible areas and in areas open to cross-country travel, particularly motorized use. Restrictions on recreational use of GRSG habitat would limit damage to the vegetation communities that comprise this habitat, by directly reducing disturbance to vegetation from trampling, motorized vehicles, dust, and spread of invasive species. Such restrictions could involve seasonal area closures or limitations on the number of users or types of uses permitted, particularly OHV use (NTT 2011, p. 12). In general, impacts from recreation would be similar among all alternatives, as dispersed casual recreation would continue throughout the planning area.

No existing BLM ACECs or Forest Service Zoological Areas include GRSG habitat as a relevant and important value, and no additional ACECs or Zoological Areas would be designated under Alternative A. Existing ACECs could protect vegetation through use restrictions, and these impacts are analyzed under each existing LUPs within the planning area. As a result, there would be no additional effects from ACEC or Zoological Area management on vegetation under this alternative.

### **4.8.3 Alternative B**

Under Alternative B, lands in the decision area would be managed to conserve, enhance, and restore sagebrush ecosystems. Direct protection of sagebrush habitat to support GRSG would limit or modify uses in this habitat type, improving the acreage and condition of desired

vegetation communities. Use restrictions would reduce damage to native vegetation communities and individual native plant species in areas that are important for regional vegetation diversity and quality. Likewise, use restrictions would minimize loss of connectivity and would be more likely to retain existing age class distribution within these specific areas. Use restrictions could also minimize the spread of invasive species by limiting human activities that cause soil disturbance or seed introductions.

#### ***Greater Sage-Grouse Management***

Under Alternative B, identified PHMA and GHMA would encompass 2,781,700 acres and 532,100 acres of vegetation, respectively. A 3 percent anthropogenic disturbance cap would be applied to activities in PHMA and would implement numerous conservation measures to reduce impacts from human activities in PHMA, which would reduce the likelihood for sagebrush vegetation removal, degradation, or fragmentation, and improve the acreage and condition of sagebrush vegetation.

#### ***Vegetation Management and Fire (including invasive plants and juniper encroachment)***

Under Alternative B, management actions for habitat restoration and rehabilitation post-fire would aim to improve GRS habitat and prioritize restoration efforts to benefit GRS habitats. The use of native seeds would be required, with some exceptions, as a component and would design post-rehabilitation efforts to ensure the long-term persistence of the restoration efforts. In addition, climate changes would be considered when determining restoration species. Together, these management actions would alter vegetative communities by promoting increases in sagebrush height and herbaceous cover and vegetation productivity. Treatments designed to prevent encroachment of trees and nonnative species would alter the condition of native vegetation communities by changing the density, composition, and frequency of species within plant communities. Habitat connectivity for GRS could increase through vegetation manipulation designed to restore vegetation, particularly sagebrush overstory cover.

Vegetation manipulations in riparian areas, such as weed treatments, native plantings, and erosion control in the channel, would improve the acreage and condition of the riparian vegetation community, individual riparian species, and hydrologic functionality to attain proper functioning condition or Forest Plan standards and guidelines.

Fuels treatments under Alternative B would be designed to protect sagebrush ecosystems by maintaining sagebrush cover, applying seasonal restrictions and protections for winter range, and requiring use of native seeds as a component of restoration. Post-fuels treatments, Emergency Stabilization and Rehabilitation, and Burned Area Emergency Response management would be designed to ensure long-term persistence of seeded areas and native plant restoration areas. These management actions would help to retain the extent of sagebrush vegetation and prevent degradation or destruction of sagebrush caused by wildland fires. Suppression in PHMA would be prioritized, which would retain the existing conditions and trends of vegetation in these areas. Nature and type of impacts from fuels treatments, Emergency Stabilization and Rehabilitation/Burned Area Emergency Response, and suppression would be similar to those described under Alternative A. However, treatments targeting GRS habitat objectives would increase the likelihood that restoration and rehabilitation efforts would result in improved diversity of sagebrush and native vegetation.

#### ***Livestock Grazing and Wild Horses and Burros***

Under Alternative B, permitted AUMs would not change from Alternative A. However, a number of management actions would be implemented in PHMA to incorporate GRSG habitat objectives and management considerations into livestock grazing management. These include, but are not limited to, completion of land health assessments or similar grazing evaluations, consideration of grazing methods and systems to reduce impacts on GRSG habitat, improved management of riparian areas and wet meadows, and evaluation of existing introduced perennial grass seedings, water developments, and structural range improvements. Such measures would help maintain or improve acreage and vegetation condition of rangeland and riparian and wetland areas, and could reduce the likelihood of nonnative invasive species introduction or spread. Together, these efforts would reduce, but would not eliminate, impacts from grazing on vegetation.

Impacts from wild horse and burro management would be similar to those described for Alternative A but would incorporate GRSG habitat objectives and considerations into wild horse and burro management. Such considerations could reduce grazing impacts and improve condition of vegetation described under Alternative A in these areas.

#### ***Travel and Transportation***

Impacts from OHV use closures would be the same as those described under Alternative A. However, under Alternative B, 95 percent fewer acres would be open to cross-country use, and additional management actions would be implemented to reduce new route construction and restore roads, primitive roads, and trails not designated in travel management plans. These actions would reduce the likelihood of impacts caused by roads as described under Alternative A and would increase the acreage and connectivity of sagebrush vegetation.

#### ***Infrastructure Development (including all ROWs and utility corridors)***

Identifying 2,784,200 acres (over 25 times more acres than under Alternative A) of ROW exclusion areas (including 2,781,700 acres of wind ROW exclusion) and undesignating 47,500 acres of ROW corridors would reduce impacts on vegetation as described under Alternative A. In addition, ROWs that are no longer in use would be restored, which would increase the extent and connectivity of sagebrush habitats, and reduce the spread of weeds to these areas, over the long term. Lands would be retained in federal ownership, with limited exceptions, which would reduce fragmentation as described under Alternative A.

#### ***Mineral Development (including geothermal)***

Under Alternative B, 3,341,300 acres would be closed to nonenergy mineral leasing (nearly 25 times more than under Alternative A) and fluid mineral leasing (nearly 10 times more than under Alternative A), and BMPs would be required on existing leases. In addition, PHMA would be found unsuitable for surface coal mining and would be recommended for withdrawal from locatable mineral entry. In addition, all PHMA would be found unsuitable for surface coal mining and 3,650,900 acres (7 times more than Alternative A) would be recommended for withdrawal from locatable mineral entry. In PHMA, applicable BMPs would be mandatory as COAs. In addition, 3,340,000 acres would be closed to mineral material development (45 times more than under Alternative A). Furthermore, mineral material pits no longer in use would be restored and fluid mineral development in PHMA would require numerous conservation measures.

Over the long term, closures and NSO stipulations would protect existing vegetation from removal, degradation, fragmentation, and nonnative invasive species introduction or spread in unleased areas. Conservation measures would help to reduce such impacts in leased areas, and restoration activities would improve the condition and increase the extent of vegetation, and depending on the location, could remove nonnative invasive species and reduce fragmentation. Exploration activities could disturb vegetation or spread weeds, but would be unlikely to remove substantial amounts of vegetation.

#### **Other Actions**

In general, impacts from recreation would be similar among all alternatives, as dispersed casual recreation would continue throughout the planning area. Impacts from ACEC and Zoological Area management under Alternative B would be the same as those described for Alternative A.

#### **4.8.4 Alternative C**

Under Alternative C, lands would be managed to conserve, enhance, and restore sagebrush ecosystems. Management and associated impacts would be largely similar to those described for Alternative B, though with more-stringent guidance and restrictive management.

#### **Greater Sage-Grouse Management**

Under Alternative C, management actions would be applied to all mapped occupied GRSG habitats, encompassing 3,313,800 acres of vegetation. Unique to Alternative C, an area would be considered successfully restored only if GRSG used the area. Impacts from implementing the 3 percent disturbance cap would be similar to those described for Alternative B, but all surface disturbances (including anthropogenic disturbance and burned areas) would count towards the disturbance cap under Alternative C. This would further reduce the acreage of vegetation that would be removed or fragmented within all occupied habitat over the long term.

#### **Vegetation Management and Fire (including invasive plants and juniper encroachment)**

Management under Alternative C would be similar to that described under Alternative B, but with an increased focus on restoration of areas with invasive species and crested wheatgrass seedings. In addition, management would apply to a larger area than Alternative B, all mapped occupied habitat. As a result, there would be greater improvements to vegetation condition and an increase in sagebrush acreage under Alternative C.

Impacts from wildland fire management under Alternative C would be similar to those described for Alternative B. Alternative C would require exclusions of grazing after a fire has occurred until woody and herbaceous plants achieve GRSG habitat objectives. This could lead to grazing exclusions for a decade or longer depending on site and vegetation conditions, compared to a standard of 2 years under Alternative A. This would reduce grazing pressure on and trampling of Emergency Stabilization and Rehabilitation seedings in the first several years post-fire thus improving the likelihood of native vegetation restoration.

#### **Livestock Grazing and Wild Horses and Burros**

##### *Alternative C1*

Under Alternative C1, all mapped occupied habitat would be made unavailable for livestock grazing, resulting in a reduction of up to 329,521 permitted AUMs on BLM-administered lands

and 265,373 AUMs on National Forest System lands. Removal of livestock grazing would assure that effects on vegetation from improper grazing use levels, as described under Alternative A, no longer occurred within mapped occupied GRSG habitats. As a result, Alternative C1 would reduce impacts on vegetation from improper livestock grazing, including disturbance or trampling of nesting birds (Rasmussen and Griner 1938), competition for resources, and spread of weeds, as well as increased soil compaction, erosion, and decreased water quality (Reisner et al. 2013; Braun 1998) more than Alternative A, and would allow for native understory perennial recovery and would increase herbaceous vegetation cover (Strand and Launchbaugh 2013). Because livestock grazing would not be allowed in mapped occupied GRSG habitat, there could be a buildup of fine fuel or an increase in noxious weed growth in sagebrush vegetation communities. This could increase the risk of destructive wildfires that would destroy and fragment sagebrush vegetation. Livestock would not be a tool available for implementing fuels management treatments or invasive species control in sagebrush habitat areas. A reduction in available tools decreases the potential for successful implementation of treatments used to protect or restore sagebrush habitats. Impacts from wild horse and burro management would be the same as those described for Alternative B.

#### *Alternative C2*

Under Alternative C2, permitted AUMs would be reduced, resulting in 197,713 AUMs available for permitting on BLM-administered lands and 159,224 AUMs on National Forest System lands. By reducing AUMs, land managers would reduce the likelihood for the grazing-related impacts described under Alternative A, including trampling and removal of vegetation in mapped occupied habitat. Other management actions would be similar to those described for Alternative B, though Alternative C2 includes additional restrictions on grazing, such as not allowing grazing during the growing season, authorizing no new water developments for diversion from springs or seeps, and avoiding all new structural range developments and location of supplements in occupied habitat. These management actions would preserve and restore rangeland and riparian acreage more than the other alternatives.

Impacts from wild horse and burro management would be similar to those described for Alternative B; however, wild horse AMLs would be reduced by 25 percent, thereby reducing the likelihood for impacts from wild horses by reducing grazing pressure more than Alternative B.

#### ***Travel and Transportation***

Impacts from travel and transportation management under Alternative C would be similar to those described for Alternative B, though there would be fewer impacts on vegetation under Alternative C because no acres would be open to cross-country use, new road construction would be prohibited within 4 miles of occupied leks, and mitigation of impacts from route construction would be required. In addition, approximately 555,700 acres of mapped occupied habitat would be closed to OHV travel. This includes 32,200 acres that are currently closed as well as 523,500 acres of new closed areas. Closed areas, shown on **Map 2.56**, would reduce the risk of trampling or removal of vegetation, although the majority of the closed areas are absent mapped routes.

***Infrastructure Development (including all ROWs and utility corridors)***

Management for infrastructure development under Alternative C would be similar to that described for Alternative B. However, ROW exclusion areas, including for wind energy development, would be designated in all mapped occupied habitats, covering 3,313,800 acres (over 30 times more than under Alternative A). In addition, all designated ROW corridors would be undesignated, and mapped occupied habitat would not be available for land tenure adjustments. Impacts from land tenure decisions would be similar to those described under Alternative B, although Alternative C would not allow for exceptions to disposal criteria, which would reduce management flexibility and could reduce vegetation connectivity by pushing projects outside of all mapped occupied habitat on federal lands. Impacts from ROW exclusion areas and retention of federal lands would be as described under Alternative A.

***Mineral Development (including geothermal)***

Under Alternative C, 4,008,580 acres would be closed to nonenergy mineral leasing (nearly 30 times more than under Alternative A), and 3,821,580 acres would be closed to fluid mineral leasing (11 times more than under Alternative A) and 4,008,580 acres to mineral material and locatable mineral development (7 times more than Alternative A). In addition, 4,008,580 acres would be closed to mineral material development (50 times more than under Alternative A). Other management actions would be similar to those described for Alternative B, but because they would apply to a larger area, all mapped occupied habitat, impacts would be largely reduced, thereby preserving more vegetation acreage.

***Other Actions***

In general, impacts from recreation would be similar among all alternatives because dispersed casual recreation would continue throughout the planning area. Under Alternative C, the BLM would designate 13 ACECs covering 1,834,200 acres, and the Forest Service would establish 399,600 acres of new Zoological Areas. Within these areas, the BLM and Forest Service would aim to reduce anthropogenic disturbances, retain intact sagebrush vegetation, and remove existing infrastructure. As a result, the extent and condition of vegetation in these areas would be maintained, and the likelihood for the spread of invasive plant species caused by surface-disturbing activities would be reduced. The likelihood for other impacts caused by surface-disturbing activities, such as removal of or damage to vegetation, soil compaction, and soil erosion, would be similarly reduced.

**4.8.5 Alternative D**

Under Alternative D, lands would be managed to conserve, enhance, and restore sagebrush ecosystems, and management would be applied within identified PHMA and GHMA. Management and impacts would be similar to Alternative B, though Alternative D would provide the BLM and Forest Service with the ability to make adjustments to sagebrush habitat objectives in the sub-regional when there is local scientific literature that supports variation. In general, Alternative D would provide more guidance and criteria for how to implement the management actions.

***Greater Sage-Grouse Management***

Under Alternative D, 2,760,300 acres would be identified as PHMA and 553,500 acres would be identified as GHMA, slightly modified from the PHMA and GHMA boundaries under Alternative

B. A 5 percent disturbance cap on discrete anthropogenic disturbances would be applied in PHMA, which would reduce impacts caused by such disturbances as described under Alternative A. In addition, Alternative D provides criteria for determining when an area has been restored or reclaimed, thereby providing a set standard to which managers would be able to compare the existing conditions. These metrics may improve the likelihood for restoration or reclamation success and increase the extent, connectivity, and condition of vegetation communities in PHMA.

Management under Alternative D would recognize that there are areas within the mapped occupied habitat that lack the principle habitat components necessary for GRSG. Under certain conditions, actions may be allowed in mapped occupied habitat areas that are not ecologically capable for supporting GRSG. Development within nonhabitat areas could result in removal and damage to vegetation. However, impacts would not be on sagebrush or vegetation that supports GRSG.

***Vegetation Management and Fire (including invasive plants and juniper encroachment)***

Management under Alternative D would be similar to that described for Alternative B, though with additional measures to prioritize vegetation rehabilitation, incorporate design features that would improve the success of rehabilitation projects, and allow for commercial seed or plant collection. Alternative D would also consider use of post-fire grazing exclusion areas in PHMA; however, it would not require GRSG use of habitat for an area to be considered “rehabilitated” and for grazing to resume. Together, these management actions would improve the likelihood for sagebrush rehabilitation and sustainable use of native plant products, while maintaining vegetation condition over the long term.

Wildland fire management under Alternative D would be similar to that described for Alternative B, though management would not only aim to protect, but also to maintain and expand, sagebrush ecosystems. In addition, the BLM and Forest Service would prioritize wildfire suppression pre-planning. Together, these actions would help to retain and increase sagebrush community and improve condition. Furthermore, the likelihood of catastrophic wildfire and subsequent impacts on vegetation from wildland fire described under Alternative A would also be reduced.

***Livestock Grazing and Wild Horses and Burros***

Under Alternative D, the BLM and Forest Service would maintain the same number of AUMs as under Alternative A, though the number of AUMs on a permit may be adjusted during site-specific evaluations. On BLM-administered lands, if acres are not meeting BLM Utah Public Land Health Standards, livestock grazing systems would be adjusted to ensure progress is made towards meeting the standards. Many of the management actions would be similar to those described under Alternative B, although Alternative D would include refinements to improve management flexibility and implementation. These actions would help to maintain or restore sagebrush habitat and riparian and wetland vegetation in certain areas and to reduce the impacts from livestock grazing on vegetation as described under Alternative A. Impacts from wild horse and burro management would be similar to those described under Alternative B.

***Travel and Transportation***

Under Alternative D, the BLM and Forest Service would reduce the acreage open to cross-country use by 90 percent compared with Alternative A. Other impacts from travel and transportation management under Alternative D would be similar to those described under Alternative B, though with increased flexibility incorporated to provide for high-quality and sustainable travel routes and administrative access. As such, there may be increased impacts on acreage of vegetation in areas where new routes are created. Impacts in these areas would be as described under Alternative A.

***Infrastructure Development (including all ROWs and utility corridors)***

Under Alternative D, ROW avoidance and exclusion areas would differ between the types of ROW development. The greatest restrictions would be applied to aboveground linear ROWs, as 1,504,000 acres of mapped GRSG habitat and population areas would be managed as ROW exclusion. Slightly fewer restrictions would be applied for aboveground site-type ROWs, for which there would be 301,200 acres of mapped GRSG habitat and population areas managed as ROW exclusion. The fewest restrictions would be applied to underground and surface linear ROWs, where ROW exclusion areas would cover 102,500 acres of mapped GRSG habitat and population areas. Approximately 2,864,300 acres of mapped GRSG habitat and population areas would be managed as ROW exclusion for wind energy development. Together, these management actions would reduce the impacts on vegetation, as described under Alternative A, from each type of ROW development.

The BLM would undesignate 39,700 acres of existing ROW corridors and designate an additional 31,700 acres of new ROW corridors, making the acreage impact from ROW corridors similar to, but slightly less than, Alternative A. Impacts would occur in different areas, however, and the emphasis on avoiding GRSG habitat would increase the likelihood that sagebrush vegetation would also be avoided.

Impacts from land tenure management would be similar to those described under Alternative B, although impacts could occur on 5,540 acres of vegetation that would be available for disposal. Impacts from disposal would be as described under Alternative A.

***Mineral Development (including geothermal)***

Impacts under Alternative D would be similar to Alternative B, but restrictions would focus on surface mining, with fewer restrictions on underground mining. This would reduce the acreage of surface disturbance, which would reduce the amount of vegetation removed and would reduce the likelihood for invasive species introduction or spread. Restrictions include closure to nonenergy mineral leasing with development by surface mining, closure to all leasing on 3,302,900 acres (nearly 24 times more than under Alternative A) and closure to mineral materials development on 352,800 acres (nearly 5 times more than under Alternative A). Acres recommended for withdrawal from locatable mineral entry would be the same as Alternative A (498,700 acres). The same acreage of GRSG habitat and population areas would be closed to fluid mineral leasing as under Alternative A, but 2,451,900 acres would have an NSO stipulation applied (over 2 times more than under Alternative A), thereby reducing acreage of surface-disturbing impacts from fluid mineral development in these areas.

### **Other Actions**

In general, impacts from recreation would be similar among all alternatives, as dispersed casual recreation would continue throughout the planning area. Under Alternative D, the BLM and Forest Service would not designate any additional ACECs or Zoological Areas, respectively, and thus no additional impacts on vegetation from ACEC management would occur.

#### **4.8.6 Alternative E**

Under Alternative E, lands would be managed to protect, maintain, improve, and enhance sagebrush ecosystems and would identify mapped GRSG habitat in SGMAs/core areas within which management would be applied. Management and impacts would be similar to Alternative D, though Alternative E would apply less-stringent use restrictions and would manage the least amount of mapped GRSG habitat in SGMAs/core areas when compared to the other alternatives.

#### **Greater Sage-Grouse Management**

GRSG management under Alternative E would be similar to that described for Alternative D, but would provide less protection to vegetation by designating fewer acres as GRSG habitat in SGMAs/core areas (2,711,200 acres), and the BLM and Forest Service would not manage for habitat outside GRSG habitat in SGMAs/core areas. In addition, under Alternative E, the 5 percent disturbance cap on surface disturbance would not include existing disturbances, only new disturbances, which could result in significantly higher acreage of disturbed areas in GRSG habitat in SGMAs/core areas. As a result, protective measures and restrictions on uses and surface-disturbing activities would be applied to a smaller acreage, and thus there could be greater impacts on vegetation acreage and condition from such uses, as described under Alternative A.

#### **Vegetation Management and Fire (including invasive plants and juniper encroachment)**

Vegetation and fire management under Alternative E would emphasize removal of encroaching conifers, cheatgrass, and other invasive species, active restoration and reclamation, improved fire response, and limitations on sagebrush treatment projects, thereby maintaining and expanding sagebrush vegetation as compared to Alternative A.

Fire suppression would be prioritized in mapped GRSG habitat in SGMAs/core areas only. Under Alternative E, the 5 percent disturbance cap would apply only to new disturbances, not existing disturbances. Under Alternative E2, vegetation treatments in GRSG habitat would be evaluated and may or may not count in the 5 percent disturbance cap. Due to the increased allowance for disturbance under Alternative E, there is the potential for greater impacts on vegetation acreage or less-successful vegetation protection or vegetation condition enhancement. However, burned areas would be counted in the 5 percent disturbance cap calculation for Alternative E, therefore in areas with fire there is decreased potential for disturbance.

#### **Livestock Grazing and Wild Horses and Burros**

Under Alternative E, the same number of AUMs would be maintained as under Alternative A. However, Alternative E incorporates consideration of GRSG needs and management for seasonal habitats, which would reduce the likelihood for impacts on associated vegetation, including riparian vegetation, from livestock. Water developments would be allowed, and

impacts on vegetation could occur as described under Alternative A. Impacts from wild horse and burro management would be the same as described under Alternative A.

#### ***Travel and Transportation***

Under Alternative E, fewer acres would be open to cross-country travel, 351,700 acres (over 50 percent fewer acres than Alternative A). This would reduce vegetation impacts caused by OHV use as described under Alternative A. Few additional management measures are presented under Alternative E for travel and transportation management; thus, additional impacts cannot be inferred.

#### ***Infrastructure Development (including all ROWs and utility corridors)***

Under Alternative E, agencies would manage the same acreage as ROW exclusion as Alternative A, but would focus on managing areas as ROW avoidance with stipulations to reduce impacts from ROW development. Under Alternative E, 2,757,200 acres would be managed as ROW avoidance, including for wind energy development (over 23 times more acres than under Alternative A). Alternative E does not provide guidance for managing ROW corridors or land tenure decisions; thus, impacts cannot be inferred.

#### ***Mineral Development (including geothermal)***

Under Alternative E, the same acreage of nonenergy leasable minerals and mineral materials would be open as under Alternative A. In addition, the same amount of acres would be recommended for withdrawal from locatable mineral entry. Additional stipulations would be implemented that would reduce impacts on vegetation in GRSG habitat in SGMAs/core areas by reducing surface-disturbing activities.

Impacts from coal leasing and locatable minerals management would be similar to those described for Alternative D, though additional stipulations to reduce the extent of surface-disturbing activities would be applied. As a result, this would reduce the impacts on vegetation acreage and condition from mineral development described under Alternative A.

CSU stipulations would be applied to fluid mineral leases on 2,642,700 acres (2 times as many acres as under Alternative A) to reduce impacts in sensitive areas. The same number of acres would be closed to leasing as under Alternative A. However, under Alternative E, additional conservation measures would not be applied to leased federal fluid mineral estate. This could cause impacts where existing conservation measures are not as stringent as the most up-to-date GRSG guidance.

#### ***Other Actions***

In general, impacts from recreation would be similar among all alternatives, as dispersed casual recreation would continue throughout the planning area. Under Alternative E, the BLM and Forest Service would not designate any additional ACECs or Zoological Areas, respectively, and thus no additional impacts on vegetation from ACEC management would occur.

#### **4.8.7 Proposed Plans**

Under the Proposed Plans, lands would be managed to conserve, enhance, and restore sagebrush ecosystems, and management would be applied within identified SFA, PHMA, and GHMA, as well as in certain areas outside of PHMA and GHMA. Management and impacts

would be similar to Alternative D, though Alternative D would provide additional protections to vegetation and the Proposed Plans do not have a lek-centered approach for lands and realty or minerals management.

#### **Greater Sage-Grouse Management**

Under the Proposed Plans, mapped GRSG habitat would be identified as SFA, PHMA, and GHMA. Management of SFA would provide additional protections from locatable minerals activities, fluid minerals development, and livestock grazing compared to PHMA. This area constitutes approximately five percent of total mapped occupied habitat. In PHMA, management actions would aim to achieve certain vegetation objectives to improve GRSG habitat. A 3 percent disturbance cap (5 percent on National Forest System lands in Wyoming) on discrete anthropogenic disturbances would be applied in PHMA at both the BSU and project levels, and a limit would be placed on the density of energy and mining facilities which would reduce impacts caused by such disturbances as described under Alternative A.

Anthropogenic disturbances in PHMA and GHMA would be also mitigated to ensure a net conservation gain to GRSG, thereby preserving the potential for these areas to provide GRSG habitat. In addition, numerous conservation measures would be implemented in PHMA and GHMA such as RDFs and lek buffers (**Appendix F**) to reduce impacts from human activities in PHMA and GHMA. This would reduce the likelihood for vegetation removal, degradation, or fragmentation and reduce the likelihood for weed introduction or spread.

Over a 10-year period, conifer treatments designed to increase the amount and functionality of seasonal habitats within PHMA would alter the condition of native vegetation communities by changing the density, composition, and frequency of species within plant communities. Habitat connectivity for GRSG could be increased over the planning timeframe through vegetation manipulation designed to restore vegetation, particularly sagebrush overstory cover.

#### **Vegetation Management and Fire (including invasive plants and juniper encroachment)**

Impacts from vegetation management under the Proposed Plans would be similar to those described for Alternative D. The Proposed Plans would further reduce impacts on sagebrush and riparian/wetland habitats by including additional measures for conifer removal, including acres to be removed, improved management of wet meadows, and implementation of RDFs.

Impacts from wildland fire management would also be similar to those described for Alternative D. The Proposed Plans would further reduce impacts on vegetation by including additional fuels management actions, such as removing encroaching conifer stands, prioritizing the use of native seeds, and avoiding sagebrush reduction treatments in certain areas. Together, these actions would help to retain and increase sagebrush community vegetation extent and improve condition. Furthermore, the likelihood of catastrophic wildfire and subsequent impacts on vegetation from wildland fire described under Alternative A would also be reduced.

#### **Livestock Grazing and Wild Horses and Burros**

Impacts from livestock grazing management under the Proposed Plans would be similar to those described for Alternative D. The Proposed Plans would further reduce impacts on riparian and wet meadow vegetation by prioritizing the review of grazing permits/leases in SFA and PHMA in areas not meeting Land Health Standards, with focus on those containing riparian and wet

meadow vegetation. This action would expedite improvements to riparian and wetland condition in areas most important to GRSG. Impacts from wild horse and burro management would be similar to those described under Alternative B. The Forest Service will incorporate grazing guidelines (outlined in **Sections 2.6.3** and **2.6.4**) into term grazing permits that will likely improve vegetation structure in GRSG seasonal habitat on grazing allotments.

#### ***Travel and Transportation***

Impacts from travel and transportation management under the Proposed Plans would be similar to those described for Alternative D. The Proposed Plans would have greater potential to increase the extent of sagebrush vegetation by considering the use of transplanted sagebrush when reseeding roads, primitive roads, and trails.

#### ***Infrastructure Development (including all ROWs and utility corridors)***

Identifying PHMA as exclusion for wind energy development on lands managed according to the BLM and Forest Service-Utah Proposed Plans and avoidance on National Forest System lands in the Wyoming portion of the planning area and avoidance for other types of ROWs and undesignating ROW corridors would reduce impacts on vegetation as described under Alternative A. All GRSG habitat would be retained in federal ownership, with limited exceptions, which would reduce fragmentation as described under Alternative A.

#### ***Mineral Development (including geothermal)***

Impacts under the Proposed Plans would be similar to Alternative B, but expansion of existing operations for nonenergy leasable and salable minerals could be considered in certain instances, causing impacts on vegetation as described for Alternative A. Restrictions under the Proposed Plans include closure of all PHMA to nonenergy mineral leasing and to mineral materials development on lands managed according to the BLM and Forest Service-Utah Proposed Plans and avoidance on National Forest System lands in the Wyoming portion of the planning area. SFA would be recommended for withdrawal from the Mining Law of 1872, as amended. Further, coal management would emphasize underground mining, which would reduce impacts on vegetation. The same acreage of GRSG habitat and population areas would be closed to fluid mineral leasing as under Alternative A, but protections for vegetation would be increased in SFA, which would be subject to an NSO stipulation without waivers, exceptions or modifications. Vegetation would also be highly protected in PHMA; in total, an NSO stipulation would be applied on 3,258,300 acres (7 times more than under Alternative A), thereby reducing acreage of surface-disturbing impacts from fluid mineral development in these areas. These measures, combined with the RDFs, buffers, and mitigation, would help to reduce impacts on vegetation from mineral development compared to Alternative A.

#### ***Other Actions***

In general, impacts from recreation would be similar among all alternatives, as dispersed casual recreation would continue throughout the planning area. Under the Proposed Plans, no additional ACECs or Zoological Areas would be designated, and thus no additional impacts on vegetation from ACEC management would occur.

## 4.9 OTHER SPECIAL STATUS SPECIES

### 4.9.1 Methods and Assumptions

Although data on known locations and habitats within the planning area are available, the data are not complete or comprehensive concerning all special status species known to occur or potential habitat that might exist. Known and potential special status species and habitat locations were considered in the analysis; however, the potential for species to occur outside of these areas was also considered, and, as a result, some impacts are discussed in more general terms.

Impacts on special status species would primarily result from unmitigated surface disturbance such as wildfires, wildfire-suppression activities, erosion, and trampling. Direct and indirect impacts on special status species result from any surface-disturbing activity or alteration to occupied habitats. All federal actions would comply with ESA consultation requirements, and all implementation actions would be subject to further special status species review before site-specific projects are authorized or implemented. Federal regulations and BLM and Forest Service policy protecting threatened, endangered, and sensitive species were considered methods for reducing the potential impacts from permitted activities. If adverse impacts are identified, compensatory mitigation measures, including avoidance, would be implemented to minimize or eliminate the impacts.

#### **Indicators**

Indicators of impacts on other special status species are as follows:

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

#### **Assumptions**

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- The analysis presented is largely qualitative due to the lack of data or uncertainty in existing data on certain special status species' occurrences, such as many of the BLM sensitive plant species. Furthermore, because many special status species may potentially use habitats that are currently unoccupied and populations fluctuate, any quantitative analysis of occupied habitat would change over time as knowledge of species locations increases. Where appropriate, acreages from **Table 2.3** are included to show a comparison between alternatives.
- Impacts on special status species would be more significant than impacts on common species because population viability may be already uncertain for special status species, and certain species, such as special status plants, tend to be poor competitors.
- Short-term effects are defined as those that would occur over a timeframe of 5 years or less, and long-term effects would occur over longer than 5 years.

- USFWS would be consulted on any action that could potentially affect any listed plant or animal species or their habitat.

Implementing the management actions for GRSG would have mostly negligible or beneficial impacts on other special status species and, therefore, impacts from each alternative are not discussed separately in detail. The key impacts from resource uses, as well as management actions for GRSG, on other special status species are described below.

#### **4.9.2 Alternatives Analysis**

Special status fish, wildlife, and plant species are likely to inhabit the population areas within the decision area, as described in **Table 3.33** and **Table 3.34**. Special status fish and wildlife habitats on BLM-administered and National Forest System lands within the decision area would be affected under all alternatives, and the condition of habitats is directly linked to vegetation conditions, water quality and quantity, and progression towards land health standards (**Section 4.8**, Vegetation (Including Noxious Weeds, Riparian Areas, and Wetlands) and **Section 4.7**, Water Resources, respectively). Habitat loss or modification due to human activity is a threat to ecosystems and has effects on species adapted to specific ecological niches. The BLM and Forest Service land management practices are intended to sustain and promote species that are legally protected and to prevent plant and animal species that are not yet legally protected from needing such protection (see the Other Special Status Species section of **Chapter 3** for agency management guidance).

#### **General Management Decisions**

Management actions for GRSG are based on minimizing disturbance to limit impacts on GRSG habitat to improve GRSG population growth. Disturbance thresholds would apply under the action alternatives throughout population areas so the potential for impacts would be present for all special status species identified in **Chapter 3** (Other Special Status Species). Impacts from disturbance on special status plant species habitat could result in loss of vigor or reduced reproductive success, changes in habitat structure, competition, loss of pollinators or pollinator habitat, soil compaction, erosion or sedimentation, alteration of hydrologic conditions, and changes in fire regime. Special status animal species could be impacted from increased habitat loss and degradation. Reducing disturbance to protect GRSG would also reduce the impacts from disturbance on special status plants and wildlife.

Under Alternative A, no specific allocations to protect GRSG is applied in mapped occupied habitat and surface-disturbing activities would continue within GRSG occupied habitat in accordance with allocations prescribed in existing LUPs. Alternative A provides the least amount of protection to GRSG habitat. Protections for GRSG under Alternative A are inconsistently applied across the decision area and overall would provide the least amount of protection for other special status species that occupy GRSG habitat (see the Other Special Status Species section of **Chapter 3**). Because there is no consistent management for GRSG across the decision area, there are no consistent direct impacts from implementing management for GRSG under Alternative A. Protection for special status plants and wildlife would continue to be managed according to the BLM and Forest Service policies and management in existing LUPs, where applicable.

Imposing disturbance caps, applying fluid mineral lease restrictions, identifying PHMA and GHMA, and changing livestock grazing practices could result in habitat protection for certain special status species that occur within GRSG habitat. Alternatives B and C and the Proposed Plans would provide the greatest quantity of habitat protection from human disturbance activities by imposing a 3 percent disturbance cap, compared to the 5 percent disturbance limit proposed under Alternatives D and E. The disturbance caps would generally protect special status species habitat by minimizing the amount of disturbance in special status species habitat that overlaps mapped occupied GRSG habitat. In addition, under Alternative C treatments that remove sagebrush would be limited by the disturbance cap. Because Utah prairie dog and black-footed ferret would benefit from sagebrush removal, limiting such treatments under Alternative C could impact Utah prairie dog and black-footed ferret (see additional discussion below). Limiting disturbance in GRSG habitat could also push disturbance to outside of mapped occupied GRSG habitat on federal lands.

The Proposed Plans also include more restrictive management in SFA as well as lek buffers and requirements for mitigation of anthropogenic disturbances; together these actions would further protect habitats. Compared to all of the other alternatives, actions proposed under Alternative C would provide the greatest quantity of protected PHMA because all mapped occupied habitat would be identified as PHMA under Alternative C. Therefore, Alternative C would provide for the most restrictions on development in PHMA and the greatest level of protection from development. In addition, under Alternative C, disturbance would be collocated where possible; concentrating smaller areas of impacts into larger, less-diffuse clusters would increase the quality of protected habitat by reducing the potential for habitat fragmentation.

Utah prairie dog complex data (**Table 4.15**) indicate that Alternative C would provide the most habitat protection for the prairie dog within occupied habitat because Alternative C would manage the most acres as PHMA and would have the highest level of restrictions on surface-disturbing activities. The 3 percent disturbance cap proposed under Alternative C would reduce impacts from surface disturbance; however, it would also limit vegetation treatments that could improve Utah prairie dog and black-footed ferret habitat as well as the habitat of other special status species that rely on areas with less sagebrush listed in the Other Special Status Species section of **Chapter 3**. The 5 percent disturbance cap proposed under Alternatives D and E would allow for more surface disturbance but it would also allow more habitat treatments (where appropriate) that could increase the quality for those species that need less of a canopy cover or less shrubs (like Utah prairie dog and black footed-ferret) while also improving GRSG habitat. Impacts from GRSG management under Alternative E would be similar to those described under Alternative D. However, Alternative E would provide fewer acres of protection to occupied GRSG habitat and the 5 percent disturbance cap would only apply to new disturbances. Because of these two differences, there is the potential for more impacts on other sensitive species both that use GRSG habitat and those that are only within the population areas if Alternative E is chosen. The Proposed Plans would not include habitat treatments as disturbances under the 3 percent disturbance cap (5 percent on National Forest System lands in Wyoming), thereby providing flexibility to improve Utah prairie dog and black-footed ferret habitat by allowing sagebrush treatments when necessary.

**Table 4.15**  
**Acres of Utah Prairie Dog Habitat in GRSG Occupied Habitat by Alternative**

Category	Alternative A		Alternative B		Alternative C		Alternative D		Alternative E		Proposed Plans	
	Mapped Occupied Habitat	PHMA	GHMA	PHMA (all mapped occupied habitat)	PHMA	GHMA	GRSG Habitat in SGMA/ Core Areas	GRSG Habitat outside SGMA/ Noncore Areas	PHMA	GHMA		
Bald Hills	77,100	75,000	2,100	77,100	75,000	2,100	77,100	0	77,600	0		
Hamlin Valley	11,500	11,500	0	11,500	11,500	0	11,500	0	11,500	0		
Panguitch	105,800	105,800	0	105,800	94,700	11,200	105,400	0	105,100	0		
Parker Mountain	356,100	356,100	0	356,100	356,100	0	352,500	0	336,300	0		
<i>Total</i>	<i>550,500</i>	<i>548,400</i>	<i>2,100</i>	<i>550,500</i>	<i>537,300</i>	<i>13,300</i>	<i>546,500</i>	<i>0</i>	<i>530,500</i>	<i>0</i>		

Source: BLM 2012d, 2015

#### **Infrastructure Development (including all ROWs and utility corridors)**

The development of infrastructure includes a range of permitted activities such as utility ROWs, roads, and pipelines. Surface disturbing activities associated with the construction and maintenance of ROWs can result in impacts on all special status species described in the Other Special Status Species section of **Chapter 3** through mortality, injury, displacement, and noise or human disturbance caused by increased vehicle traffic and use of heavy machinery during construction. Mortality and injury to special status bird species could occur from collision or electrocution with transmission lines and other ROW structures (EPG 2011). Indirect impacts may include introduction of invasive vegetation that results in alteration of fire return intervals; increase in predators or predation pressure; decreased survival or reproduction of the species; and decreased habitat available for special status species. Invasive species could also outcompete some of the native special status plant species. Additional impacts on habitat could include loss of vegetation and native plant communities as described in **Section 4.8.2**, Alternative A. These activities would remove or fragment habitats due to road construction and use within ROWs, which could also affect all special status species identified in the Other Special Status Species section of **Chapter 3**. Special status wildlife could avoid developed areas over the long term, or may adapt and recolonize sites after construction.

Under Alternative A, 3,219,000 acres would continue to be open to ROW development resulting in the greatest amount of BLM-administered and National Forest System lands in occupied habitat available for infrastructure development. The potential for impacts (like those listed above) from ROW and infrastructure development would continue for all special status species listed in the Other Special Status Species section of **Chapter 3**.

Management actions that restrict surface-disturbing activities from infrastructure development would reduce impacts described above such as habitat degradation or loss, fragmentation, and human disturbance. The magnitude of these impacts on special status species would depend on the location and nature of the restrictions, as well as the acres covered by the restrictions. ROW avoidance and exclusion areas that could reduce or avoid habitat impacts and would

reduce the total acreage of habitat disturbance and fragmentation. ROW development in areas where there are existing ROWs could also reduce impacts, as resident special status wildlife may have adapted to the existing ROWs (Avian Power Line Interaction Committee 2005). In addition, in areas of occupied GRSG habitat with mixed ownerships, land exchanges or acquisitions would provide more contiguous federal management of GRSG habitat and could increase the continuity of habitat for sagebrush obligate special status species. This could improve the ability of the agencies to implement management actions that would result in improved habitats, undisturbed special status fish and wildlife populations, and attainment of BLM Utah Public Land Health Standards. However, lands identified for disposal could cause fragmentation and habitat loss if the disposed land is converted to other uses, such as agriculture, residential, or industrial development.

Management under Alternative B would limit the development of infrastructure by excluding new ROWs in PHMA (2,784,200 acres) and avoiding new ROWs in GHMA (529,600 acres). See **Section 4.3.3**, Alternative B, for additional habitat protections provided under Alternative B. The exclusion of PHMA under Alternative B would substantially reduce potential impacts from surface-disturbing activities on those special status species that are within the decision area where there is PHMA whether they use sagebrush habitat or not (see the Other Special Status Species section of **Chapter 3**), compared with Alternative A. ROWs no longer in use would be restored to natural habitat and could improve habitat connectivity for special status species that occur in those areas. Land acquisitions to gain or improve GRSG habitat under Alternative B could reduce habitat fragmentation and improve habitat connectivity for all special status species in PHMA. However, the management actions proposed under Alternative B could push infrastructure development outside of PHMA.

Under Alternative C, all mapped occupied habitat would be PHMA and would be ROW exclusion areas (3,313,800 acres). Alternative C would provide the greatest amount of habitat protection for special status species within PHMA from ROW development. No land tenure adjustments would be available, preventing the BLM and Forest Service from acquiring blocks of land in an attempt to concentrate GRSG habitat and, in turn, most likely benefitting other special status species, especially those that occupy or rely on sagebrush. This could result in an increase in habitat fragmentation by creating islands of occupied habitat with a mosaic of ownerships with multiple land uses, which would impact special status species such as the Utah prairie dog and black-footed ferret, which benefit from open and contiguous habitat. Additionally, the complete closure of new ROWs in all GRSG habitat could push additional infrastructure development outside of PHMA.

Alternative D would provide management flexibility in developing infrastructure within GRSG habitat and provide more protection of habitat near leks compared to the action alternatives. Under Alternative D, 522,600 acres of PHMA would be open to new aboveground linear ROWs. A 4-mile exclusion buffer from occupied leks for aboveground linear ROWs in PHMA and a 1-mile avoidance buffer from occupied leks in GHMA would provide additional protection from infrastructure development and operations for all special status species that are in the population areas and within the exclusion areas but outside of the occupied habitat. Land tenure adjustments proposed under Alternative D would be the same as Alternative B, which would aim to reduce GRSG habitat fragmentation in PHMA. This would indirectly benefit species that

overlap GRSG habitat and could push impacts outside of PHMA. See **Section 4.3.5**, Alternative D, for more information regarding proposed management actions that would protect GRSG habitat.

Under Alternative E1, management for new infrastructure would allow for 632,200 acres open in GRSG habitat for new ROWs and would be the least restrictive action alternative. Proposed stipulations under Alternative E1 would restrict infrastructure development within occupied leks, provide a 1-mile disturbance buffer from occupied leks, establish noise thresholds during the breeding season, and implement time of day as well as seasonal stipulations when leks are active. Despite these stipulations, infrastructure development within mapped GRSG habitat in SGMAs would be permitted if project proponents demonstrate that avoidance of impacts in GRSG habitat in SGMAs is not possible. This could result in additional loss of GRSG habitat in SGMAs particularly in areas with high mineral potential such as the Uintah Population Area. Special status species that inhabit GRSG habitat in SGMAs would likely encounter a decrease habitat quantity and quality under Alternative E1. This alternative would provide the flexibility for allowing infrastructure development within GRSG habitat in SGMAs.

The Proposed Plans would provide management flexibility in developing infrastructure similar to Alternative D, but would focus on GRSG habitats. Under the Proposed Plans, over 2.7 million acres of PHMA would be ROW avoidance for new linear and site type ROWs, permits, and leases; high voltage transmission lines ROWs (100 kV or greater); major pipelines; and communication sites. Additional protection would be provided by managing PHMA and GHMA as ROW exclusions areas for solar energy development and PHMA as ROW exclusion areas for wind energy development. Under the Proposed Plans, PHMA and GHMA would be identified for retention with some exceptions for situations that would not result in impacts on GRSG or would have a net conservation gain. Impacts would be similar to the other action alternatives. Such management would protect special status species that overlap GRSG habitat, but could push impacts outside of GRSG habitat.

Under the Proposed Plans, a portion of a designated utility corridor is being realigned to avoid impacts to two primary leks in PHMA in the Panguitch Population Area. The existing designated utility corridor, under Alternative A, is aligned to intersect two primary leks but this portion of the corridor does not have any power lines in it. Under the Proposed Plans, the vacant portion of corridor is being realigned to where there currently are existing power lines and closer to Highway 89. Because of this realignment, if a new transmission line (100 kV or greater) cannot avoid PHMA, which is the principle management approach, the next option would be to locate it in a designated corridor. By placing a potential new line next to an existing power line, there would be less new disturbance and impacts would be concentrated where there is already some disturbance. The location of the existing power lines goes over some existing Utah prairie dog colonies. However, management decisions in the existing Kanab RMP that pertain to Utah prairie dogs (and are not being amended in this process) state that no surface disturbance or surface occupancy can occur within 0.5 miles of active Utah prairie dog habitats, and that renewed or amended ROWs on public lands that have the potential to disturb active and inactive Utah prairie dog colonies should be rerouted. Though a designated utility corridor does not guarantee a power line will be built in the area, it increases the likelihood, relative to other areas outside the designated corridor. In addition to complying with the GRSG lands actions

directing avoidance of this area, any potential power line would have to also comply with the Utah prairie dog management actions in the Kanab RMP, including in the realigned corridor. Further, the Kanab RMP does not restrict power lines to designated corridors; neither do the Proposed Plans. As such, any new potential power lines, while more likely to be located within the realigned corridor, would still need to comply with other GRSG and Utah prairie dog management actions.

***Mineral Development (including geothermal)***

Permitted surface-disturbing activities because of mineral exploration and development could result in impacts on any special status species identified in the Other Special Status Species section of **Chapter 3**. During mineral development, increased human disturbance activities could result in temporary habitat avoidance or direct impacts on special status species causing mortality or injury. Other direct impacts include the removal or degradation of habitat vegetation and the spread of noxious weeds. Continuous operations associated with oil and gas development or mining can result in long-term impacts on special status species and their habitat. Displacement of species could increase competition for resources in adjacent habitats. Over the long term, these activities could remove and fragment habitats due to road development and use, facility construction and placement, creation of well pads and pipelines, and construction. Special status species may avoid developed areas over the long term, or may adapt and recolonize sites after construction and reclamation.

Both short term, loud noise (such as from vehicles or construction) and long-term, low-level noise (such as from industrial activities such as oil and gas development) have been documented to cause physiological effects on multiple special status wildlife species. These effects include increased heart rate, altered metabolism, and changes in hormones, foraging, anti-predator behavior, reduced reproductive success, density, and community structure (Radle 2007; Barber et al. 2009a). In addition, noise can impact special status wildlife species through the disruption of communication and environmental cues (US Department of Transportation, Federal Highway Administration 2011). Determining the effect of noise is complicated because different species and individuals have varying responses, and certain species rely more heavily on acoustical cues than others (Radle 2007; Barber et al. 2009b). Impacts would be both short- and long-term, depending on the type and source of noise, and the depending on the species.

Restricting surface-disturbing activities through management actions would reduce impacts on special status species plants and animals and their habitat. Such management actions include stipulations to protect GRSG habitat, closure of areas to mineral leasing and development, areas recommended for withdrawal from mineral entry, restrictions within ACECs, and route closure or restrictions. For example, impacts on special status species within GRSG habitat would be reduced if lands are withdrawn from mineral entry, by reducing the total acreage of potential habitat disturbance and fragmentation from that activity. Areas closed to mineral leasing and development or managed under NSO stipulations would reduce surface disturbance and associated impacts from mineral development in certain areas.

Management proposed under Alternative A would continue to have 22,900 acres unsuitable for coal surface mining in occupied GRSG habitat; 138,500 acres would be closed to fluid mineral leasing and nonenergy mineral leasing. Although leasing stipulations would apply to areas open

to mineral leasing, management actions under Alternative A would provide the most acres of GRSG habitat available for mineral leasing and provide the least amount of habitat protection for all special status species. Alternatives B and C would close 3,341,300 acres and 3,821,580 acres respectively of fluid mineral leasing and could push development outside of the closed areas, impacting other lands. The remaining isolated areas outside of GRSG habitat may be the only pieces of land open to fluid mineral leasing that could be developed to a high degree. The NSO stipulations within Alternatives D and E and the Proposed Plans could also push development onto lands adjacent to the areas managed with NSO stipulations (see **Table 2.3** for a comparison of the number of acres open to leasing and subject to NSO stipulations for each fluid mineral alternative). Subsequently, these management actions could increase fluid mineral development on non-BLM administered or non-National Forest System lands. Management under Alternative E would provide the most fluid mineral leasing acreage with CSU and TL stipulations. However, Alternative E would allow the most fluid mineral leasing acres to be open (with stipulations) of all the action alternatives and would likely result in the greatest number of impacts on special status species in mapped occupied GRSG habitat in SGMAs/core areas.

#### ***Livestock Grazing and Wild Horses and Burros***

Other special status species identified in the Other Special Status Species section of **Chapter 3** that use rangelands can benefit from the proper management of livestock. These benefits include providing sustainable, diverse, and vigorous mixtures of native vegetation for forage and habitat. In addition, proper management of grazing livestock can control noxious weeds and reduce fuel accumulations, protect intact sagebrush habitat, and increase habitat extent and continuity (NRCS 2011). Elmore and Messmer (2006) proposed that proper livestock grazing management can be applied to improve Utah prairie dog habitat in the long term by reducing canopy cover and increasing grass and forb composition. If managed improperly, overuse of forage by livestock could occur, leading to increased competition with wildlife for forage, and potentially reduced cover and nesting habitat for other species. Livestock could also spread weeds, which would degrade habitats. Special status wildlife could be displaced from their habitats, which could increase competition for resources in adjacent habitats. Impacts would vary depending on the extent of removal, type of vegetation impacted, and length of the grazing period. In general, the more acres that are available for livestock grazing under a given alternative, the greater the risk for impacts. Livestock may degrade riparian areas, which could impact riparian-dependent aquatic and fish species identified in the Other Special Status Species section of **Chapter 3**.

Wild horse and burro impacts are similar to those from livestock grazing, as wild horses and burros forage on and trample vegetation used by special status species. However, wild horse and burro use is not a permitted use, and is thus not managed in the same way as livestock grazing.

Under Alternative A, 329,521 AUMs of BLM-administered lands and 265,373 AUMs of National Forest System lands in GRSG habitat would continue to be available for livestock grazing. The BLM Utah's Standards for Rangeland Health would continue to provide management direction for rangelands. In addition, special status species under Alternative A would continue to be managed to conform to Standard 3 of the Rangeland Health Standards. Changes in livestock grazing practices to protect GRSG habitat would increase the availability of forage and habitat

for special status wildlife that rely on those resources as described in the Other Special Status Species section of **Chapter 3**.

Management proposed under Alternative B would permit the same number of AUMs as those under Alternative A; however, Alternative B would include GRSG habitat objectives within PHMA in BLM and Forest Service grazing allotments and management actions. Compared with Alternative A, other special status species habitat within PHMA under Alternative B would likely increase in quality from the proposed range improvements aimed at reducing impacts on GRSG habitat.

Under Alternative C1, the potential indirect benefits to some special status species from proper rangeland management, water treatments, and improvements to riparian and wetland habitats as described above would be reduced under Alternative C1. Utah prairie dog and black-footed ferret would also be impacted by the loss of the beneficial hoof action on their habitat.

Livestock grazing management actions proposed under Alternative C2 would reduce available AUMs to 197,713 on BLM-administered lands and 159,224 on National Forest System lands compared with Alternative A. In addition, AMLs for wild horses would be reduced by 25 percent, which would reduce the competition for forage between wild horses and special status species. Many of the remaining management actions proposed under Alternative C2 would be similar to those described under Alternative B with a few exceptions. Under Alternative C2, no grazing would be allowed during the growing season within GRSG habitat and other seasonal grazing restrictions would be implemented to meet GRSG habitat requirements. Additionally, the availability of AUMs under Alternative C2 could provide beneficial impacts on other special status species from proper livestock grazing practices.

Impacts from the proposed management under Alternatives D and E and the Proposed Plans would be similar to those described under Alternative B with a few exceptions. The Proposed Plans would also prioritize PHMA for review of livestock grazing permits/leases, which could expedite habitat improvements and/or rehabilitation in these areas.

#### ***Vegetation Management and Fire (including invasive plants and juniper encroachment)***

A diversity of special status species use a wide variety of habitats throughout Utah. Many factors threaten the viability of special status species habitat as described in the Other Special Status Species section of **Chapter 3**. Current vegetation management is directed at fire and fuels management, habitat management, and habitat treatment to improve the quality of resources for special status wildlife and livestock, see **Section 4.8** for more details regarding vegetation management. Some existing LUPs prioritize vegetation management and habitat restoration efforts towards benefiting multiple resources, which include special status species. In addition, existing LUPs generally allow for prescribed fire and non-fire fuels treatments but they do not include specific fire management decisions aimed specifically at sagebrush habitat. However, under Alternative A, project designs would have to consider measures to reduce wildfire size and prevent the loss of sagebrush.

Vegetation management proposed under Alternatives B and C would prioritize restoration and treatment efforts to maintain, protect, and/or expand GRSG habitat. Additionally, fire management under Alternatives B and C would implement fuels treatments with an emphasis on

protecting sagebrush ecosystems. Management under Alternative C would emphasize restoring habitat affected by invasive weeds to recover and expand occupied sagebrush habitat. In addition, under Alternative C, areas affected by fire would be excluded from grazing to allow vegetation treatments to improve sagebrush ecosystems. Vegetation and fire management proposed under Alternatives B and C would strive to increase the quantity and quality of habitat of GRSG habitat, which would benefit most special status species that overlap GRSG habitat. Actions taken in these alternatives could reduce the habitat quality and directly cause injury or mortality to the special status species that do not rely on GRSG habitat as actions are taken to reduce fuels or increase sagebrush landscapes. Alternative C would eliminate habitat treatments that are critical to the improvement of habitat for other special status species that depend on portions of sagebrush that are different than the needs of GRSG including understory plant composition or removal.

Management under Alternative D and the Proposed Plans would be similar to that described for Alternative B but would include a comprehensive strategy for wildland fire management, including the FIAT. Further, Alternative D and the Proposed Plans would take into consideration the habitat requirements of other special status species, such as the Utah prairie dog or black-footed ferret, that in some cases have needs that might conflict with GRSG during certain life stages. Where the management of GRSG habitat conflicts with federally listed species habitat, under Alternative D and the Proposed Plans the federal agencies would need to develop vegetation treatments that could improve the habitat for GRSG and other threatened or endangered species at the same time or at least not to the detriment to the overall habitat or population of the other one. As such, Alternative D and the Proposed Plans would provide the most comprehensive habitat wildland fire, restoration and vegetation management of all the proposed actions for increasing special status species habitat and GRSG habitat. Vegetation treatments under Alternative D and the Proposed Plans would aim to achieve certain vegetation objectives, and include the removal of pinyon-juniper habitat and other plant species that have encroached on suitable sagebrush habitat. In addition, increased emphasis on vegetation treatments (e.g., conifer removal) and fire suppression in GRSG could result in direct and indirect impacts to Utah prairie dogs where they overlap with PHMA areas. Though measures would be taken to avoid and minimize impacts to Utah prairie dogs, the implementation of these actions could increase human presence through or near existing colonies that could change prairie dog behavior. In the short term, vegetation treatment and vegetation removal near riparian areas within GRSG habitat could result in increased sediment, however this is anticipated to be negligible because the riparian stipulations would remain the same and protect special status fish species. The BLM Utah Riparian Policy requires a 100-meter buffer for surface-disturbing activities, which is the smallest protective buffer around riparian areas in the current RMPs. If there was the need for any potential vegetation treatments within or adjacent to riparian areas for riparian health or a fuels treatment, additional site-specific evaluations to consider impacts on special status species would be required at that time. None of those actions is being proposed as part of this action.

Although efforts to increase the quality of habitat for those special status species that use GRSG habitat, those plant and animal species identified in the Other Special Status Species section of **Chapter 3** that occur in pinyon-juniper habitat would have reduced available habitat over the long term as encroaching conifers would be treated to encourage sagebrush growth. Under

Alternative E, vegetation treatments would focus on the removal of invasive plant species and encroaching pinyon-junipers to expand and improve sagebrush habitat. Additionally, management under Alternative E would recommend that within mapped GRSG habitat in SGMAs/core areas, GRSG stipulations would take precedence over stipulations to protect other species if allowable by law. Therefore, management actions proposed under Alternative E would favor special status species that rely on GRSG habitat over other such species as the experimental black-footed ferret population described in the Other Special Status Species section of **Chapter 3**.

#### ***Travel and Transportation***

Habitat loss and fragmentation from the development and use of roadways as well as direct injury or mortality from vehicle strikes threaten all special status species animals described in the Other Special Status Species section of **Chapter 3**. The closure of roads to motor vehicles either permanently or seasonally would reduce the risk of impacts on special status species described above. Recreational OHV travel impacts would still occur in areas limited to designated routes due to noise disturbance, human presence, potential for weed spread and subsequent habitat degradation, and potential for injury or mortality to special status wildlife from vehicle collisions.

Under Alternative A, 797,000 acres would continue to be open to cross-country travel with no new restrictions to GRSG habitat management. Management proposed under Alternative B would limit travel to existing roads in PHMA on BLM-administered lands. Vehicle traffic would continue to be limited to existing roads on National Forest System lands. In addition, management actions under Alternative B in PHMA would evaluate permanent or seasonal road closures and limit new route construction to reduce impacts on GRSG habitat. Reducing the development of new roads or restricting vehicle use on existing roads as proposed under Alternative B would reduce the potential for impacting all special status species described in the Other Special Status Species section of **Chapter 3**. Specific management direction to reduce impacts from travel in GRSG habitat would also reduce the potential for impacting special status species that overlap GRSG habitat. Under Alternative C, no acres would be open to cross-country travel, which would reduce potential impacts from travel to special status species more than Alternative B. In addition, under Alternative C within PHMA, no new roads would be constructed within 4 miles of active leks. In addition, approximately 555,700 of mapped occupied habitat would be closed to OHV travel. This includes 32,200 acres that are currently closed as well as 523,500 acres of new closed areas. Closed areas, which are shown on **Map 2.56**, would reduce the risk of trampling or removal of vegetation, although the majority of the closed areas are absent mapped routes. Management under Alternative C would reduce impacts from OHV travel on special status species that overlap GRSG habitat on BLM-administered and National Forest System lands but the proposed actions could push cross-country travel on to adjacent nonfederal lands or increase traffic on routes outside of sagebrush habitat. Travel and transportation management proposed under Alternative D would close cross-country travel similar to Alternative C and impacts on special status species from other proposed management actions in Alternative D would be similar to Alternative B. Under Alternative E, routes not designated in a travel management plan in PHMA areas within GRSG winter and nesting habitat would be managed as limited to existing routes. In these areas within PHMA, existing route designations would be revised based on the potential for impacting GRSG habitat. Also,

Alternative E would provide the most acres open to cross-country travel of all the action alternatives; with impacts on special status species similar to those described under Alternative A but over a smaller area. Special status species in occupied GRSG habitat would have an increased risk of impacts on habitat (loss, degradation, and fragmentation) or direct injury and mortality (vehicle strikes) under Alternative E compared to the other action alternatives. However, under Alternative E, special status species outside of BLM-administered and National Forest System lands listed in the Other Special Status Species section of **Chapter 3** would have a reduced risk of impacts from travel management actions compared to the other action alternatives. Travel and transportation management under the Proposed Plans would limit OHV use similar to Alternative E, though all PHMA and GHMA (over 3.3 million acres) would be managed as limited to existing or designated routes. Impacts on special status species from other proposed management actions in the Proposed Plans would be similar to Alternative D.

#### **Other Actions**

Substantial analysis and planning would need to be implemented in order to determine the locations and types of recreation activities that would occur, such as camping, bicycling, and hunting. However, these uses are not subject to site-specific environmental review and monitoring requirements, and impacts on habitats or species would not be apparent until after damage has occurred. Overuse from recreational activities can directly impact special status species described in the Other Special Status Species section of **Chapter 3** through habitat loss or degradation and direct injury or mortality to special status plants, fish, and wildlife species. Examples of impacts on special status fish and wildlife from recreational use include habitat loss, fragmentation, or degradation; animal mortality or injury; waterway sedimentation; increased turbidity; decreased water quality; disturbance to species during sensitive or critical periods in their life cycle such as spawning, nesting, or denning; short-term displacement; and long-term habitat avoidance by species that are sensitive to noise or human presence, such as raptors. Some species may adapt to disturbances over time and could recolonize disturbed habitats.

On-site management of recreational activities could prevent or reduce impacts on other special status species. Under Alternative A, recreational use would continue throughout the planning area. As described in **Section 4.8**, no new ACECs or Forest Service Zoological Areas would be added to provide additional habitat protection under Alternative A. Recreation management actions proposed under Alternative B would restrict the BLM and Forest Service from issuing recreation permits within PHMA unless the proposed activity would have neutral or beneficial effects on GRSG. Management proposed under Alternative C would place similar restrictions on issuing permits within PHMA as Alternative B but also includes seasonal restrictions for some recreational activities within 4 miles of active leks. Impacts on special status species that overlap GRSG habitat would be reduced by limiting permitted recreational use in PHMA across Alternatives B, C, and D, and the Proposed Plans. Construction of new recreation facilities would also be limited in PHMA under the Proposed Plans. Such management, however, could push non-permitted recreational use outside of PHMA. Additionally, management proposed under Alternative C would create 15 new ACECs and Forest Service Zoological Areas that would be managed as sagebrush reserves to conserve GRSG habitat. Habitat for special status species that use GRSG habitat would increase in size and quality under Alternative C however, impacts from recreational use on special status species not associated with sagebrush would continue. In addition to management impacts described above for Alternative D and the

Proposed Plans, existing recreation permits would be evaluated and modified to avoid impacts on GRSG or restore habitat following permitted recreational activities. No new ACECs or Forest Service Zoological Areas would be included under Alternatives D and E or the Proposed Plans. Alternative E however, would include recreational use stipulations to limit surface disturbance activities within 1 mile of occupied leks and other sensitive GRSG habitat. These measures proposed under Alternative E would also protect habitat for special status species that use GRSG habitat but would not increase habitat protection for those special status species outside of GRSG habitat. The proposed stipulations for recreational use within GRSG habitat could also push non-permitted recreational activities on to adjacent habitats outside of GRSG habitat.

## **4.10 FISH AND WILDLIFE**

### **4.10.1 Methods and Assumptions**

Similar to **Section 4.9**, Other Special Status Species, available species information including locations and habitat descriptions are included in the following analysis. Additionally, the potential for species to occur outside of these areas were considered and discussed in general terms. Below are general descriptions of impacts that could result in the decline of wildlife habitat. Impacts from the proposed management actions are not expected to impact fish and aquatic species any different than those impacts disclosed for special status fish species (which are very limited if any) within the Other Special Status Species section above, therefore there will not be a discussion of those impacts in the Fish and Wildlife impact analysis.

Impacts on wildlife species and their habitats would result from disturbance and/or loss of plant communities, food supplies, cover, breeding sites, and other habitat components necessary for population maintenance. Impacts on wildlife would result from disturbance and/or loss of seasonally important habitat (e.g., critical for overwintering or successful breeding) to a point that would cause the species' population to decline. In addition, wildlife species could be impacted by interference with a species movement pattern that decreases the ability of a species to breed or overwinter successfully to a degree that would lead to substantial population declines.

#### ***Indicators***

Indicators of impacts on wildlife are as follows:

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

#### ***Assumptions***

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- Short-term effects would occur over a timeframe of 5 years or less, and long-term effects would occur over longer than 5 years.

- If monitoring reveals that mitigation is unsuccessful in reducing or eliminating impacts, immediate measures to prevent further impacts would be implemented as appropriate to the species affected.
- Impacts on big game populations that reduce the herd number of any herd unit that currently exceeds population objective levels would not be considered significant if the impacts would not reduce the population below the objective levels.

Implementing the management actions for GRSG would have mostly negligible or beneficial impacts on wildlife species; therefore, impacts from each alternative are not discussed in detail. The key impacts from resource uses, as well as management actions for GRSG, that would reduce these impacts on wildlife species are described below.

#### **4.10.2 Alternatives Analysis**

Wildlife habitat conditions within the decision area are directly linked to vegetation conditions, water quality and quantity, and progression towards land health standards, as described in **Section 4.7** and **Section 4.8**. Impacts from the action alternatives on wildlife species would be similar to those described in **Section 4.9**. Impacts that are specific to wildlife species are described below.

##### ***General Management Decisions***

The establishment of disturbance thresholds to limit impacts on GRSG habitat is fundamental to developing management actions to increase the success of GRSG populations. Wildlife species throughout the population areas would be impacted by the disturbance limits imposed by the BLM and Forest Service to improve the management of GRSG. As described in the Fish and Wildlife section of **Chapter 3** over 600 species of vertebrate wildlife species inhabit Utah; however, the analysis of impacts on wildlife species will focus on migratory birds and big game as federal and state management agencies maintain explicit population trend data for these species for regulatory and wildlife management objectives. Surface disturbance could directly degrade or remove wildlife habitat or result in mortality or injury to wildlife species. In general, actions to reduce disturbance on GRSG habitat would also result in reduced disturbance and improve habitat for wildlife species that occupy GRSG habitat.

Alternative A provides the least amount of protection for wildlife that occupy GRSG habitat as surface-disturbing activities would continue under the management of existing LUPs without surface disturbance caps.

Management actions proposed under Alternatives B and C would provide the greatest quantity and quality of habitat protection by applying a 3 percent disturbance cap on anthropogenic disturbance in GRSG habitat. Wildlife species that occur in shrub steppe habitat for part of their life cycle could receive more habitat protection under Alternatives B and C compared with Alternative A. Refer to the Fish and Wildlife section of **Chapter 3** for more details regarding wildlife species that occupy GRSG habitat and that would benefit greatest by this protection.

Compared to the other action alternatives, Alternative C would provide the most restrictions on development within PHMA and, therefore, the greatest level of protection from impacts on migratory birds and wildlife species because of human activities. Distributions of big game

habitat, including crucial winter and fawning/calving habitat that occur within PHMA, would receive the most protection under Alternative C (**Table 4.16**). These sensitive habitats limit Utah big game herds and, by providing more protection for these crucial ranges, population trends could increase. However, the 3 percent disturbance cap on anthropogenic disturbances would limit the ability to do vegetation treatments that may be needed to increase the quality of crucial wildlife habitat within occupied GRSG habitat.

Alternatives D and E would provide fewer acres of protected habitat compared with Alternative C because of the differences in areas managed as PHMA/mapped GRSG habitat in SGMAs/core areas and via the proposed disturbance cap. The 5 percent disturbance cap proposed under Alternatives D and E would allow for some additional protection from disturbance above that seen in Alternative A, although not to the same degree as in Alternative C. Management under these alternatives, however, would provide more flexibility to implement habitat treatments that could increase the quality of crucial or important wildlife habitat while also improving GRSG habitat.

Impacts from GRSG management under Alternative E on migratory birds and wildlife would be similar to those described under Alternative D. However, Alternative E would provide fewer acres of protection to contiguous blocks of vegetation and the 5 percent disturbance cap would only apply to new disturbances. As a result, the level of protection of habitat from disturbance would be reduced.

Under the Proposed Plans, lands would be managed to conserve, enhance, and restore sagebrush ecosystems. Management actions would be applied within identified SFA, PHMA, and GHMA, as well as in certain areas outside of PHMA and GHMA, including vegetation objectives to achieve improvements in GRSG habitat. Under the Proposed Plans, a 3 percent disturbance cap (5 percent on National Forest System lands in Wyoming) on discrete anthropogenic disturbances would be applied in PHMA at both the BSU and project levels; however, habitat treatment areas would not be included under the cap. Additionally, a limit would be placed on the density of energy and mining facilities, which would reduce impacts on wildlife habitat caused by such disturbances as described under Alternative A.

Under the Proposed Plans, anthropogenic disturbances in PHMA and GHMA would also be mitigated to ensure a net conservation gain to GRSG, which would also maintain habitat for other wildlife species that use GRSG habitat. Conservation measures would be imposed to complement mitigation and further reduce anthropogenic disturbance in PHMA and GHMA, including RDFs and lek buffers (**Appendix F**).

The Proposed Plans would impose additional management measures within GRSG habitat that would also benefit wildlife that overlap with GRSG habitat due to reductions in disturbance and habitat loss. However, impacts on wildlife that do not use sagebrush habitats will likely continue as described in Alternative A. Nevertheless, the Proposed Plans will provide the greatest benefit for wildlife with respect to disturbance relative to the action alternatives.

**Table 4.16**  
**Acres of Elk, Mule Deer, Pronghorn (antelope), Moose, Bison, and**  
**Bighorn Sheep Habitat in GRSG Management Areas by Alternative**

Habitat Type	Alternative A	Alternative B		Alternative C	Alternative D		Alternative E		Proposed Plans	
	Mapped Occupied Habitat	PHMA	GHMA	PHMA (all mapped occupied habitat)	PHMA	GHMA	GRSG Habitat in SGMA/ Core Areas	GRSG Habitat outside SGMA/ Noncore Areas	PHMA	GHMA
<b>Elk</b>										
Crucial (Winter)	1,338,000	802,700	534,400	1,338,400	835,400	502,900	760,100	581,400	801,600	540,100
Crucial (All)	2,827,800	2,098,900	738,700	2,843,700	2,166,300	672,600	2,033,300	836,300	2,166,600	733,700
Calving	782,200	1,700	16,300	782,200	112,300	422,500	1,700	18,000	0	0
<b>Mule Deer</b>										
Crucial (winter)	2,325,300	1,840,400	490,600	2,331,000	1,911,700	433,600	1,816,700	502,300	1,844,700	445,900
Crucial (All)	4,324,300	3,440,200	902,200	4,342,400	3,465,700	944,600	3,372,800	991,600	3,475,700	889,600
Fawning	1,647,600	1,321,700	372,500	1,641,000	1,234,200	360,900	1,295,600	371,700	1,322,300	329,900
<b>Pronghorn (antelope)</b>										
Crucial (Winter)	220,800	165,700	0	165,700	165,700	0	165,400	0	165,200	0
Crucial (All)	1,118,200	1,316,600	346,900	1,709,800	1,345,000	364,700	1,385,900	319,000	1,348,000	331,560
Fawning	394,300	171,200	223,000	394,264	171,200	223,000	170,000	223,600	170,200	223,400
<b>Moose</b>										
Crucial (Winter)	782,600	697,800	84,800	794,500	698,500	84,100	703,800	88,900	717,800	86,200
Crucial (All)	1,522,000	1,146,600	172,100	1,655,800	1,350,500	171,500	1,350,000	179,500	1,390,800	168,100
Calving	94,500	73,200	21,300	94,500	73,200	21,300	71,500	22,600	14,900	18,500
<b>Bison</b>										
Habitat	425,500	0	425,300	425,500	0	425,300	0	425,300	0	425,300
<b>Bighorn Sheep</b>										
Crucial (year-long)	228,400	63,400	234,600	228,400	430	192,000	21,600	206,800	95,700	204,200

Source: BLM 2012d, 2015

**Infrastructure Development (including all ROWs and utility corridors)**

Surface disturbing activities associated with the construction and maintenance of ROWs can result in a variety of impacts on wildlife species similar to the impacts described in **Section 4.9**.

Impacts including habitat degradation or loss, fragmentation, and human disturbance would be reduced by applying management actions that restrict surface-disturbing activities. The magnitude of these impacts on birds and wildlife species would depend on the location and nature of the restrictions, as well as the acres covered by the restrictions.

Under Alternative A, the potential for impacts from ROW and infrastructure development would continue for all migratory birds and wildlife species listed in the Fish and Wildlife section of **Chapter 3**.

Alternative B would limit the development of infrastructure by excluding new ROWs in PHMA (2,784,200 acres) and avoiding new ROWs in GHMA (529,600 acres). This action would greatly reduce the potential for impacts from surface-disturbing activities on species that inhabit sagebrush ecosystems compared with Alternative A. Under Alternatives B, C, D, and E2, ROWs no longer in use would be restored to natural habitat and could improve habitat connectivity for wildlife that occur in GRSG habitat. Land acquisitions to gain or improve GRSG habitat under Alternative B could reduce habitat fragmentation and improve habitat connectivity for all wildlife species in PHMA but would be focused on those that share habitat with GRSG. However, the management actions proposed under Alternative B could push infrastructure development to outside of GRSG habitat, which would thus concentrate impacts on those areas that are outside of federal ownership.

Alternative C would designate all occupied GRSG habitat as PHMA and would be ROW exclusion areas (3,313,800 acres). Although Alternative C would provide the greatest amount of habitat protection for birds and wildlife within PHMA from ROW development. The complete closure of new ROWs in GRSG habitat could push infrastructure development onto adjacent nonfederal land.

Under Alternative D, proposed management actions would provide flexibility in infrastructure development within GRSG habitat and would provide more protection of habitat near leks compared to the other action alternatives. Wildlife species habitat within 4 miles of an occupied lek would receive extra protection by designating linear ROWs as exclusion areas. Furthermore, lands beyond the 4-mile buffer from occupied leks would be designated as avoidance areas, which could further protect wildlife habitat in those areas. Big game and bird species known to occupy or forage in suitable lek habitat would have increased habitat protection under Alternative D. Land tenure adjustments and related impacts would be the same as described under Alternative B. See **Section 4.3.3**, Alternative B, for a detailed discussion of proposed management actions that would protect GRSG habitat.

Alternative E would be the least restrictive action alternative in terms of infrastructure development. Proposed stipulations under Alternative E would limit disturbance on GRSG and lek habitat. However, infrastructure development within mapped GRSG habitat in SGMAs/core areas would be permitted if project proponents demonstrate that avoidance of impacts on mapped GRSG habitat in SGMAs/core areas is not possible. This could result in additional loss

of important wildlife habitat in mapped GRSG habitat in SGMAs/core areas, particularly in areas with high mineral potential such as the Uintah Population Area where crucial winter and fawning/calving habitat occurs for many big game species including elk and mule deer.

The Proposed Plans would provide management flexibility in developing infrastructure similar to Alternative D, but would focus on GRSG habitats. Under the Proposed Plans, approximately 2,724,300 acres of PHMA would be ROW avoidance for new linear and site type ROWs, permits, and leases; high voltage transmission lines ROWs (100 kV or greater); major pipelines; and communication sites. Additional protection would be provided by managing PHMA and GHMA as ROW exclusions areas for solar energy development and PHMA as ROW exclusion areas for wind energy development. RDFs would be applied to further reduce impacts. Ensuring a net conservation gain to GRSG under the regional mitigation strategy may require projects to avoid, minimize, or compensate for their potential impacts on GRSG, which could reduce the loss or disturbance of habitat from specific projects. Offsite mitigation may not always benefit species impacted at the disturbed site. Therefore, there could be a local impact on certain species.

Under the Proposed Plans, PHMA and GHMA would be identified for retention with some exceptions for situations that would not result in impacts on GRSG or would have a net conservation gain. Retaining all GRSG habitat in public ownership would mean these lands were subject to the management actions above; such management would protect sagebrush obligate migratory birds and wildlife, but could push impacts into adjacent, non-sagebrush habitats.

#### ***Mineral Development (including geothermal)***

In general, surface-disturbing activities because of mineral exploration and development result in short-term and long-term impacts on migratory birds and wildlife species as described in **Section 4.9**. Specifically, wildlife research indicates that big game species are known to avoid areas with active oil and gas wells and supporting service roads. Wilbert et al (2008) provided observations of wildlife responses to indicators including distance to nearest roads and well pads. Their findings indicate that elk habitat effectiveness is eliminated in nonforested habitats when road densities exceed 1 mile/square mile. Mule deer in shrub habitat avoid roads within 328 feet and the minimum distance from active oil and gas development that mule deer are likely to occur in range between 1.6 and 2.3 miles from well pads. Restricting surface-disturbing activities from mineral development through management actions would therefore reduce impacts on wildlife species and their habitat, generally for species within GRSG habitat.

Under Alternative A, 22,900 acres are unsuitable for coal surface mining in occupied GRSG habitat; and 138,500 acres are closed to fluid and nonenergy mineral leasing. Leasing stipulations apply to areas open to mineral leasing; however, management actions under Alternative A would provide the most acres of GRSG habitat available for mineral leasing and provide the least amount of habitat protection for all migratory birds and big game species.

In contrast, Alternatives B and C would close 3,341,300 acres and 3,821,580 acres respectively of fluid mineral leasing. This may reduce impacts from fluid mineral development and habitat fragmentation on wildlife within GRSG habitat on federal lands. The closure of PHMA to fluid mineral leasing would substantially increase the protection of crucial winter habitat for elk and mule deer in the Uintah Population Area from management actions proposed under Alternative

C. In addition, imposing a 3 percent disturbance cap would limit discrete disturbances in PHMA from roads as well as oil and gas well development reducing wildlife avoidance described by Wilbert et al (2008) above. However, this action could also push development to outside of PHMA. Any reduction in habitat fragmentation within the planning area would increase the connectivity for those wildlife species that prefer open continuous rangeland habitat.

Alternatives D and E, would open more lands to fluid mineral leasing than the other action alternatives but these lands would be subject to NSO and CSU/TL stipulations. Where there is an NSO, surface occupancy would be precluded in that area and impacts would be similar to the area being closed. Impacts on wildlife would be similar to Alternatives B and C in those areas. However, the stipulations in Alternatives D and E could also push development to outside of areas managed for GRSG as described above. In those cases, the effect would be the same as under Alternatives B and C where the NSO occurs. The CSU and TL stipulations would still allow for some development in GRSG habitat, though. Areas subject to NSO restrictions would be greater under Alternative D than under Alternative E.

Impacts under the Proposed Plans would be similar to Alternative B, but expansion of existing operations for nonenergy leasable and salable minerals could be considered in certain instances, causing impacts on habitat for migratory birds and wildlife as described for Alternative A. Restrictions under the Proposed Plans include closure of 3,370,000 acres (24 times more land than under Alternative A) to nonenergy mineral leasing and closure to mineral materials development on 3,340,200 acres (45 times more land than under Alternative A). Coal management would emphasize underground mining, which would reduce impacts on vegetation that serves as habitat for migratory birds and wildlife.

The same acreage of GRSG habitat and population areas would be closed to fluid mineral leasing as under Alternative A so impacts would be the same as Alternative A in those areas. Managing PHMA as NSO for fluid minerals would result in a similar effect as described for Alternative B because disturbance would be pushed outside of PHMA. While GHMA would be available for fluid minerals leasing and other types of minerals and energy development, such activities would be subject to conservation measures (i.e., net conservation gain, lek buffers, and RDFs). This would generally have a local beneficial impact on wildlife in those areas. SFA would also be recommended for withdrawal from the Mining Law of 1872, as amended, which would preclude development in SFA if withdrawn.

#### ***Livestock Grazing and Wild Horses and Burros***

Wildlife species that use rangeland habitat can benefit from the proper management of livestock as discussed in **Section 4.9**. Conversely, improper management and overuse of rangeland can impact wildlife species by the degradation or loss of habitat and increasing competition for forage. Lack of suitable habitat could push wildlife species off these areas. The types of impacts from wild horses and burros on fish and wildlife are the same as described in **Section 4.9**.

Under Alternative A, the BLM Utah's Standards for Rangeland Health and standards and guidelines in Forest Service LRMPs and allotment-specific decision documents would continue to provide management direction for rangelands. Approximately 329,521 AUMs on BLM-administered lands and 265,373 AUMs on National Forest System lands in GRSG habitat would continue to be available for livestock grazing. Changes in livestock grazing practices to protect

GRSG habitat would increase the availability of forage and habitat for wildlife that rely on those resources. Competition between wildlife grazers (including elk, pronghorn, and bison) and livestock would be reduced because of the action alternatives. Some big game populations that occur within the areas made unavailable for livestock grazing could trend upwards due to the increased availability of forage.

Alternative B would permit the same number of AUMs as those under Alternative A; however, Alternative B would include GRSG habitat objectives within PHMA in BLM and Forest Service grazing allotments and management actions. Big game and migratory bird habitat within PHMA would likely increase in quality from the proposed range improvements compared with Alternative A.

By making over 3.3 million acres unavailable for livestock grazing under Alternative C1, there would be a reduction in competition between grazing wildlife and livestock which would increase the availability of forage plants for wildlife grazers including elk, pronghorn. However, the elimination of grazing within the population areas would end the maintenance of water improvements in areas previously used by livestock. The reduced availability of water under Alternative C1 would also locally impact browsers (mule deer). Livestock grazing management proposed under Alternative C2 would reduce available AUMs to 197,713 on BLM-administered lands and 159,224 on National Forest System lands compared with Alternative A. In addition, AMLs for wild horses would be reduced by 25 percent, which would reduce the competition for forage between wild horses and wildlife species. Many of the remaining management actions proposed under Alternative C2 would be similar to those described under Alternative B with a few exceptions. Under Alternative C2, no grazing would be allowed during the growing season within GRSG habitat and other seasonal grazing restrictions would be implemented to meet GRSG habitat requirements. Management actions under Alternative C2 would reduce the number of permitted AUMs on federal lands and reduce competition between big game and livestock for forage and slightly increase protection from grazing on wildlife habitat.

Under Alternative D, site-specific reviews during grazing permit renewals could allow for adjustments to the number of AUMs on federal lands. In addition, Alternative D would direct the agencies to collaborate with private landowners in PHMA to reduce habitat fragmentation and provide landscape level habitat improvements. Wildlife habitat connectivity within PHMA would increase as a result of the management proposed under Alternative D. Actions proposed under Alternative E would allow for continued grazing in mapped GRSG habitat in SGMAs/core areas but would adjust grazing practices to reduce impacts on GRSG through the use of BMPs. Livestock grazing management within mapped GRSG habitat in SGMAs/core areas would continue to degrade habitat and increase competition for forage with wildlife under Alternative E.

Impacts on wildlife from livestock grazing management under the Proposed Plans would be similar to those described for Alternative D. The Proposed Plans would further reduce impacts on riparian and wet meadow vegetation by prioritizing the review of grazing permits/leases in SFA in areas not meeting Land Health Standards, with a focus on those containing riparian and wet meadow vegetation. This action would provide beneficial impacts on wildlife, for which

riparian and wet meadow habitats provide important habitat. Impacts from wild horse and burro management would be similar to those described under Alternative B.

***Vegetation Management and Fire (including invasive plants and juniper encroachment)***

Habitat conservation and management of vegetation of sagebrush ecosystems not only benefit GRSG but also can increase habitat quality and quantity for a variety of migratory birds and big game. Bird species including the Brewer's sparrow, sage sparrow, and sage thrasher depend on functional sagebrush habitat as described in the Fish and Wildlife section of **Chapter 3**. Big game including elk, mule deer, and pronghorn would also benefit from increased habitat protection because of management actions aimed at improving and expanding GRSG habitat.

Current vegetation management is directed at fire and fuels management, habitat management, and habitat treatment to improve the quality of resources for wildlife, see **Section 4.8** for more details regarding impacts from vegetation management. Some LUPs prioritize vegetation management and habitat restoration efforts towards benefiting multiple resources including wildlife species. In addition, LUPs generally allow for prescribed fire and non-fire fuels treatments but they do not include specific fire management decisions aimed specifically at sagebrush habitat. However, under Alternative A, project designs would have to consider measures to reduce wildfire size and prevent the loss of sagebrush. This would increase protection of habitat for wildlife species, although the degree of protection would vary under different LUPs.

Under the habitat restoration and vegetation management proposed in the action alternatives, efforts to maintain, protect, and expand GRSG habitat would prioritize the implementation of restoration and treatment activities. Additionally, fire management under Alternatives B and C would implement fuels treatments with an emphasis on protecting sagebrush ecosystems. Management under Alternative C would emphasize restoring habitat affected by invasive weeds to recover and expand occupied sagebrush habitat. In addition, under Alternative C, areas affected by fire would be excluded from grazing to allow vegetation treatments to improve sagebrush ecosystems. Impacts from fire and prescribed fire treatments under Alternative C would be included in the 3 percent disturbance cap. The vegetation and fire management proposed under Alternatives B and C could increase the quantity and quality of habitat for wildlife species that use GRSG habitat. However, Alternative C could eliminate habitat treatments that are critical to the improvement of habitat for wildlife species that depend on portions or seral stage of sagebrush communities that are different from the needs of GRSG. Treatments could include the removal of understory plant communities or selectively enhancing different seral stages to improve sagebrush ecosystems that would effectively remove or modify the preferred habitat for other wildlife species.

Alternative D provides the most comprehensive habitat restoration and vegetation management of all the proposed actions for increasing habitat for wildlife species that use GRSG habitat. Vegetation treatments under Alternative D would include the removal of pinyon-juniper habitat and other plant species that have encroached on suitable sagebrush habitat. However, wildlife species including the black-throated gray warbler, ferruginous hawk, pinyon jay, and other migratory birds listed in the Fish and Wildlife section of **Chapter 3** that occupy pinyon-juniper habitat, would be impacted by treatments. It is expected that impacts on pinyon-juniper obligate

species from conifer removal activities would be minimal as these treatments would focus on the edge of encroaching conifers and would not occur in the nesting or breeding seasons. Additionally, proposed treatments to improve early brood-rearing habitat aimed at improving understory (grasses and forbs) would also increase forage for big game grazing species, including pronghorn that rely on those habitats for forage. For further details regarding vegetation management in the decision area, refer to **Section 4.8**.

Under Alternative E, vegetation treatments would focus on the removal of invasive plant species and encroaching pinyon-junipers in order to expand and improve sagebrush habitat. These treatments would have similar impacts on wildlife as described under Alternative D. Impacts from fire and fire treatment would also be subject to the 5 percent disturbance cap. Additionally, management under Alternative E would recommend that within mapped GRSG habitat in SGMAs/core areas, GRSG stipulations would take precedence over stipulations to protect other species if allowable by law. Therefore, management actions proposed under Alternative E would favor providing increased habitat protection for sagebrush obligate wildlife species over enhancing or protecting habitat for wildlife species that do not overlap with GRSG habitat.

Management under the Proposed Plans would be similar to that described for Alternative D but would include a comprehensive strategy for wildland fire management, including the FIAT. Vegetation treatments under the Proposed Plans would aim to achieve certain vegetation objectives, and include the removal of pinyon-juniper habitat and other plant species that have encroached on suitable sagebrush habitat. These vegetation treatments would not be counted towards the 3 percent disturbance cap (5 percent on National Forest System lands in Wyoming) under the Proposed Plans.

Impacts on migratory birds and wildlife species from vegetation management under the Proposed Plans would be similar to those described for Alternative D. However, the Proposed Plans would further reduce impacts on sagebrush and riparian/wetland habitats by including additional measures for conifer removal, including acres to be removed, improved management of wet meadows, and implementation of RDFs. Reduced impacts on these habitats would have a beneficial impact on migratory birds and wildlife that use them.

Impacts from wildland fire management under the Proposed Plans would also be similar to those described for Alternative D. The Proposed Plans would further reduce impacts on habitat for migratory birds and wildlife by including additional fuels management actions, such as removing encroaching conifer stands, prioritizing the use of native seeds, and avoiding sagebrush reduction treatments in certain areas. Though removal of conifers in particular may have negative impacts on some migratory birds in the short term, these actions would help to retain and increase vegetation extent and improve vegetation condition in the long term and therefore provide beneficial impacts on most species of migratory birds and other wildlife. Furthermore, the likelihood of catastrophic wildfire and subsequent impacts on habitat from wildland fire described under Alternative A would also be reduced.

#### ***Travel and Transportation***

Habitat loss and fragmentation from the development and use of roadways as well as direct injury or mortality from vehicle strikes threaten all wildlife species described in the Fish and

Wildlife section of **Chapter 3**. Recreational OHV travel impacts would still occur in areas limited to designated routes due to noise disturbance, human presence, potential for weed spread and subsequent habitat degradation, and potential for injury or mortality to wildlife from vehicle collisions.

The permanent or seasonal closure of roads to motor vehicles would reduce the risk of impacts on migratory birds and big game species.

Under Alternative A, 797,000 acres would continue to be open to cross-country travel on BLM-administered lands. As such, the risk of impacting wildlife species within the decision area would not change from current conditions.

Alternative B would limit travel to existing roads in PHMA on BLM-administered lands. Vehicle traffic would continue to be limited to existing roads on National Forest System lands under all alternatives. Routes within PHMA would be evaluated for permanent or seasonal closures and new route construction would be limited to reduce impacts on GRSG habitat under Alternative B. Reducing the development of new roads or restricting vehicle use on existing roads as proposed under Alternative B would reduce the potential for impacting all wildlife species. Specific management direction to reduce impacts from travel in GRSG habitat would also reduce the potential for impacting wildlife species that also occupy that habitat. Areas open to cross-country OHV use are the same as those in Alternative A so impacts would be the same as under Alternative A.

Under Alternative C, no acres would be open to cross-country travel on BLM-administered lands, which would reduce potential impacts from travel on big game and migratory bird species more than Alternative B. Furthermore, 555,700 acres of GRSG habitat would be closed to OHV travel, including 32,200 acres that are currently closed. Closures overlap GRSG brood-rearing habitat, winter habitat, and/or are within 4 miles of an active lek. Brood-rearing habitat for GRSG consists of tall herbaceous understory vegetation for cover and access to riparian areas for forage. Preferred winter habitat for GRSG includes dense sagebrush canopy and forbs. Elk and bison are known to overlap with GRSG brood-rearing habitat in the decision area and would therefore receive increased habitat protection from human travel activities compared to the other action alternatives. In addition, under Alternative C within PHMA, no new roads would be constructed within 4 miles of active leks. Management under Alternative C would reduce impacts from OHV travel on sagebrush-obligate bird species on BLM-administered and National Forest System lands. However, the proposed actions could push cross-country travel outside of sagebrush habitat or outside of PHMA.

Travel and transportation management proposed under Alternative D would limit OHV travel to existing or designated routes similarly to Alternative B. Impacts on wildlife species from other proposed management actions in Alternative D would be similar to Alternative B.

Under Alternative E, routes not designated in a travel management plan in mapped GRSG habitat in SGMAs/core areas within GRSG winter and nesting habitat would be limited to existing routes. Big game species known to occupy GRSG winter and nesting habitat described in the Fish and Wildlife section of **Chapter 3** would receive increased habitat protection under Alternative E. In these areas, existing route designations would be revised based on the potential

for impacting GRSG habitat. Also, Alternative E would provide the most acres open to cross-country travel on BLM-administered lands of all the action alternatives; with impacts on wildlife species similar to those described under Alternative A but over a smaller area. Sagebrush-obligate migratory birds would have an increased risk of impacts on habitat (loss, degradation, and fragmentation) or direct injury and mortality (vehicle strikes) under Alternative E compared to the other action alternatives. However, because areas would be available for cross-country OHV travel under Alternative E, the level of such use that would be pushed to outside of SGMAs would be less than under the other action alternatives.

Travel and transportation management under the Proposed Plans would limit OHV use similar to Alternative E, though all PHMA and GHMA would be managed as limited to existing or designated routes. Impacts on wildlife from travel and transportation management under the Proposed Plans would be similar to those described for Alternative D. The Proposed Plans would have greater potential to increase the extent of sagebrush vegetation and habitat for associated migratory bird and wildlife species under travel and transportation management actions by considering the use of transplanted sagebrush when reseeding roads, primitive roads, and trails. In addition, there would be potential beneficial impacts on habitat from applying lek buffers and the 3 percent disturbance cap (5 percent on National Forest System lands in Wyoming). These measures could reduce the likelihood of loss or disturbance of habitat for migratory birds and wildlife from travel and transportation management as described under Alternative A. However, impacts on migratory birds and wildlife that do not use sagebrush habitats will likely continue as described in Alternative A. Nevertheless, the Proposed Plans will provide the greatest benefit for wildlife relative to the action alternatives because of the flexibility in management.

#### **Other Actions**

All wildlife species can be directly impacted from the overuse of habitat by a multitude of recreational activities. Examples of impacts on wildlife from recreational use include habitat loss, fragmentation, or degradation; animal mortality or injury; disturbance to species during sensitive or critical periods in their life cycle; short-term displacement; and long-term habitat avoidance by species that are sensitive to noise or human presence. Some species may adapt to disturbances over time and could recolonize disturbed habitats.

Recreation management actions proposed under Alternative B would restrict the BLM and Forest Service from issuing recreation permits within PHMA unless the proposed activity would have neutral or beneficial effects on GRSG. Management proposed under Alternative C would place similar restrictions on issuing permits within PHMA as Alternative B but also includes seasonal restrictions for recreational activities within 4 miles of active leks. Impacts on sagebrush obligate bird species as well as big game that use these habitats would be reduced by limiting permitted recreational use in PHMA across Alternatives B, C, and D. This management action however could push non-permitted recreational use outside of PHMA.

Under Alternative A, recreational use would continue throughout the planning area; no new ACECs or Forest Service Zoological Areas would be added to provide additional habitat protection under Alternative A. Management proposed under Alternative C would create 15 new ACECs and Forest Service Zoological Areas that would be managed as sagebrush reserves

to conserve GRSG habitat. Sagebrush obligate bird species and other wildlife habitat would increase in size and quality under Alternative C however, impacts from recreational use on species not associated with sagebrush would continue. In addition to management impacts described above for Alternative D, existing recreation permits would be evaluated and modified to avoid impacts on GRSG or restore habitat following permitted recreational activities. No new ACECs or Forest Service Zoological Areas would be included under Alternatives B, D, or E, or the Proposed Plans.

Alternative E would include recreational use stipulations to limit surface disturbance activities within 1 mile of occupied leks and other sensitive GRSG habitat. These measures would increase habitat protection for sagebrush-obligate bird species and big game but would not increase habitat protection for wildlife outside of GRSG habitat. The proposed stipulations for recreational use within GRSG habitat could also push non-permitted recreational activities to outside of GRSG habitat.

In general, impacts from recreation would be similar among all alternatives and the Proposed Plans, as dispersed casual recreation would continue throughout the planning area. Construction of new recreation facilities would also be limited in PHMA under the Proposed Plans.

## 4.11 WILD HORSES AND BURROS

### 4.11.1 Methods and Assumptions

#### *Indicators*

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

- Changes to AML for HMAs in mapped GRSG habitat
- Changes to ability to manage or HMAs due to changes in forage availability and sufficient volume, quality, and distribution (location) of water sources
- Ability to perform necessary management activities in HMAs such as fertility treatments and horse gathers

#### *Assumptions*

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- Horses are dependent on the herbaceous component of a shrub/grass plant community. Encroachment of shrubs or pinyon-juniper onto established rangelands are adverse, and 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.
- Fences and other disturbances can restrict wild horse movement and access.

- While wild horses and burros may be found on lands outside HMAs, areas outside HMAs are not managed for wild horses and burros.

The Forest Service does not manage any wild horses or burros in mapped occupied GRSG habitat in the planning area; therefore, no impacts on wild horse or burro management would occur on National Forest System lands.

#### 4.11.2 Alternatives Analysis

Implementing management for the protection of GRSG generally involves reducing or otherwise restricting land uses and activities that could potentially reduce forage availability or disturb wild horse populations. For example, mineral extraction, recreation, and construction activities within ROW grants may all reduce forage availability, result in disturbance of horses, or prohibit the ability of horses to move freely across HMAs. Protecting areas from these activities for the purpose of protecting GRSG would also protect forage for wild horse and burros and limit disturbance.

Impacts could occur to wild horse and burros and the ability to support AMLs when management options for HMAs are restricted. Prioritizing gather operations in PHMA could ensure that AML is maintained along with the necessary forage for the wild horses in higher-level priority HMAs; however, it may increase the number of gathers needed to maintain AML, which could potentially increase the disturbance to the populations as well as possible disruption of herd dynamics. Prioritization could also put HMAs outside of GRSG habitat at risk for overpopulation; however, under this LUPA, provisions 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.

Across all alternatives, a total of 181,600 acres of HMAs would fall within mapped occupied GRSG habitat, all of which are in PHMA/mapped GRSG habitat in SGMAs/core areas. A breakdown of acres by HMA is included in **Table 4.17**.

**Table 4.17**  
**Comparison of Wild Horse- and Burro-Affecting**  
**Management Actions by Alternative**

Alternatives A-E and the Proposed Plans: Acres of HMAs within mapped GRSG habitat on BLM-administered lands	
HMA	Occupied Habitat
Chokecherry	19,000
Opaque Mountain	98,300
Range Creek	38,000
Sulphur	25,300
Tilly Creek	1,000
<b>Total</b>	<b>181,600</b>

Source: BLM 2015

Note: All HMAs fall within areas classified as PHMA/mapped GRSG habitat in SGMAs/core areas in Alternatives B-E and the Proposed Plans

None of the alternatives, with the exception of Alternative C2, would change the acres or AML numbers within designated HMAs as part of the planning level decision. Impacts from management for wild horses and burros under all alternatives (other than Alternative C2) would be limited to any future implementation level changes that occurred as a result of AML adjustment based on habitat conditions and GRSG habitat objectives, as described in further detail below.

Under Alternative C2, in contrast, AMLs would be directly reduced by 25 percent for HMAs within PHMA as part of the planning level decision. This would result in a reduction of AMLs for the following HMAs that are located entirely or partially within mapped occupied GRSG habitat:

- Chokecherry (reduction to 23 heads)
- Onaqui Mountain (reduction to 158 heads)
- Range Creek (reduction to 94 heads)
- Sulphur (reduction to 188 heads)
- Tilly Creek (reduction to 38 heads)

Impacts would be concentrated under Alternative C2 in three population areas: Hamlin Valley (Chokecherry, Sulphur, and Tilly Creek HMAs), Sheepricks (Onaqui Mountain HMA), and Carbon (Range Creek HMA). Because of AML reduction under Alternative C2, costs of wild horse and burro management would increase, due to a need for additional horse gathers for removal and/or fertility treatment.

Under Alternative A, all adjustments to HMAs, HMA plans, and priorities of gathers would continue during implementation level planning and would be based on monitoring data. As a result, impacts on wild horses under Alternative A would depend on the site-specific conditions as reported in monitoring data.

In contrast, management actions in Alternative B, C, and D, and the Proposed Plans would require examination of herd management plans, AMLs, range improvements, or other implementation level NEPA and management activities for wild horse and burros in light of GRSG habitat objectives and potential impacts on GRSG habitat. These actions would apply to PHMA as identified in **Table 4.17** in Alternatives B, C, and D, and the Proposed Plans. This could potentially result in indirect, long-term changes to wild horse and burro management should objectives for GRSG habitat not align with management objectives for wild horse management. In many cases, however, management actions to improve GRSG habitat would also improve wild horse rangeland conditions in the long term. For example, conifer removal and noxious weed control as identified in the VDDT approach or the prioritization for treatment/restoration projects as identified in the FIAT assessment approach would improve forage conditions for wild horse and burros.

Placing a cap on anthropogenic disturbance within PHMA under Alternative B and the Proposed Plans would prohibit and restrict development in HMAs, which would limit forage degradation and reduce harassment of wild horses and burros.

Indirect impacts on wild horses and burros may occur under Alternative C1 due to the removal of permitted livestock grazing from mapped occupied habitat. Due to removal of livestock, there is potential for additional forage to be available for wild horse and burro use. Under Alternative C1 there is also potential for impacts on available water sources for horses and burros, in instances where wild horses and burros are using livestock water sources, lack of maintenance or removal of these improvements could reduce available water for horses and impact ability to manage for AML.

Restrictions on management in HMAs under all action alternatives would include limitations on water developments in PHMA/mapped GRSG habitat in SGMAs/core areas and, under Alternative C, a closure to OHV travel in some areas. As a result, developments that are often used by wild horses would be limited, costs for water developments could be increased, and flexibility of management could be reduced. Ability to manage for AMLs could be impacted, particularly in drought conditions. While some routes could remain open for administrative use in the closed areas, it is possible that the closure could have some impact on the ability to perform gathers when necessary.

Other resource uses would be limited in PHMA/mapped GRSG habitat in SGMAs/core areas for all action alternatives, reducing disturbance to horses in GRSG habitat, with the greatest reduction in disturbance compared with Alternative A, occurring under Alternative C based on the acres classified as PHMA (see **Table 4.17**).

Reducing or otherwise restricting land uses in PHMA through the following specific allocation decisions in the Proposed Plans: ROW avoidance and wind exclusion; NSO for fluid minerals with waivers, modifications, and exceptions; OHV travel limited to existing (or designated) routes; and exclusion from new mineral material and nonenergy leasable mineral development would provide better forage availability for the wild horses and burros in the HMAs identified in **Table 4.17** more than under Alternative A and reduce disturbance to wild horse populations. Restricting land uses in PHMA could push development to areas outside of PHMA. Implementing the GRSG mitigation strategy, monitoring framework, and hard trigger adaptive management responses under the Proposed Plans would ensure that this increased level of protection of forage and water resources and reduction of wild horse and burro harassment would be maintained.

Additional limitation would occur in GHMA in Alternative D, particularly when within 1 mile of a lek, resulting in additional reduction in disturbance in these areas. Implementing the lek buffer distances as identified in **Appendix F** under the proposed Plans, would provide added protection on wild horse forage and fewer disturbances to wild horses and burros in these buffered areas.

In addition, restoration management and post fuels management actions may require short or long-term changes to wild horse and burro management under Alternatives B, C1, C2, and D, and the Proposed Plans. This could result in site-specific restrictions on grazing and reduction in available forage, and may require an adjustment in AMLs in the long term. As described from surface-disturbing activities, above, the level of restrictions would have the greatest change from Alternative A under Alternative C based on the acres classified as PHMA.

Under Alternative E, management for wild horse and burros would generally follow that in Alternative A; therefore, impacts from wild horse and burro management would be as described for Alternative A.

Under Alternative E, management actions for other resource uses and related reduction in disturbance would be focused on mapped GRS habitat in SGMAs/core areas. In addition, under this alternative, many management actions would include site-specific and seasonal variations based on the type of GRS habitat (e.g., breeding, winter, and distance to leks). As a result, the level to which other surface-disturbing activities would be reduced in each HMA would depend on the GRS habitat category for each HMA.

## 4.12 CULTURAL RESOURCES

### 4.12.1 Methods and Assumptions

#### *Indicators*

The use of indicators in NEPA analysis should provide information on determining the extent or degree to which cultural resources may be damaged, their physical integrity is lost, or the setting of the resource is damaged (36 CFR 800), and whether future opportunities for scientific research, preservation, or public appreciation are foreclosed or otherwise adversely affected by a proposed action. In other words, would the action have a significant adverse impact on the resource (43 CFR 1508.27)? When assessing whether the action would have significant impact, the following level-of-effect indicators are considered:

- **Magnitude:** The amount of physical alteration or destruction that can be expected. The resultant loss of cultural resource value is measured either in amount or degree of disturbance.
- **Severity:** The irreversibility of an impact. Adverse impacts that result in an irreversible and irretrievable loss of archaeological value are of the highest severity.
- **Duration:** The length of time an adverse impact persists. Impacts may have short-term or temporary effects, or conversely, more persistent, long-term effects on cultural resources.
- **Range:** The spatial distribution, whether widespread or site-specific, of an adverse impact.
- **Frequency:** The number of times an impact can be expected. For example, an adverse impact of variable magnitude and severity may occur only once. An impact such as that resulting from cultivation may be of recurring or ongoing nature.

#### *Assumptions*

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- Impacts on cultural resources are assessed by applying the criteria of adverse effect, as defined in 36 CFR Part 800.5a: “An adverse effect is found when an action may alter the characteristics of a historic property that qualify it for inclusion in the National Register of Historic Places in a manner that would diminish the integrity of

the property's location, design, setting, workmanship, feeling, or association. Adverse effects may include reasonably foreseeable effects caused by the action that may occur later in time, be farther removed in distance, or be cumulative."

- The BLM and Forest Service would follow 36 CFR 800, Section 106, and the BLM-Utah's statewide programmatic agreement when addressing federal undertakings; therefore, adverse effects on cultural resources would be appropriately avoided or mitigated.
- The information on cultural resources in the planning area is based on the results of industry, BLM, and Forest Service inventory projects and depicts the relative potential for cultural resource sites within the planning area. However, as these data are geographically biased toward past project-oriented undertakings and cannot accurately predict where and how many resources may exist in unsurveyed areas, this analysis does not attempt to quantify affected resources.
- Cultural resource protection and mitigation measures apply to all proposed federal or federally assisted undertakings and would be applied at project design and implementation phases.
- Cultural resource inventories, either federal undertakings or related programs, would continue into the foreseeable future and would result in the continued identification of cultural resources. The cultural resource data acquired through these inventories and evaluations would increase overall knowledge and understanding of the distribution of cultural resources in the region.
- Impacts on known cultural resource sites from authorized uses would be mitigated after appropriate Section 106 and/or consultation identified in BLM-Utah's statewide programmatic agreement. Mitigation strategies can include, but are not limited to, project cancellation, redesign, avoidance, or data recovery.
- Degradation of known and undiscovered cultural resources from natural processes (e.g., erosion) would continue regardless of avoidance of human caused impacts.
- Potential impacts on cultural resources and their settings from subsequent undertakings (implementation of the planning decisions or site-specific project proposals) require separate compliance with NEPA and Section 106, and result in the continued identification, evaluation, and mitigation of cultural resources to the National Register of Historic Places. Per the BLM Utah's statewide programmatic agreement and standard BLM and Forest Service operating procedures, effects on cultural resources eligible for listing in the National Register of Historic Places and potentially eligible cultural resources would first be avoided or mitigated. If previously undiscovered resources are identified during an undertaking, work would be suspended while the resource is evaluated and mitigated to avoid any further impact.

#### **4.12.2 Alternatives Analysis**

Under Alternative A, the activities that involve surface-disturbing activities, such as vegetation management and habitat restoration treatments, ROW development and construction, fire/fuels treatments, and minerals development (including fluid, locatable, and salable minerals), would

have potential direct and indirect impacts on cultural resources, including damaging, destroying, and/or displacing artifacts and features, and construction of modern features out of character with a historic setting. Many cultural resources that occur on or just below the ground are susceptible to surface disturbance and erosion damage, including modifying spatial relationships of artifacts and destroying features and stratified deposits. The information loss is relevant to the site function, dates of occupation, subsistence, and past environments; all of these are important to understanding past culture. Depending on the extent and type of activity, the amount of physical disturbance could be from slight artifact shifts out of context in a small portion of the site to wholesale destruction of the entire site. Should a portion of a site be affected, it is possible that most of the information available from a site could be retrieved and contributed to the prehistoric record of the region, thereby reducing the severity of the impacts. However, adverse impacts that result in an irreversible and irretrievable loss of cultural resource value are of the highest severity.

Indirect impacts on cultural resources include changing the character of a property's use or physical features within a property's setting that contribute to its historic significance (e.g., isolating the property from its setting) and introducing visual, atmospheric, or audible elements that diminish the integrity of the property's historic features. Additionally, actions that result in increased human presence (e.g., more people visiting a recreation area or new access into a previously inaccessible area) could increase the risk of illicit collecting of surface artifacts, resulting in a loss of scientific information.

The potential for undiscovered buried cultural resources and human remains exists for any surface-disturbing activity despite previous archaeological surveys and investigations. Surface-disturbing activities impact undiscovered cultural resources and human remains by exposing buried material. While this may result in inadvertent artifact destruction or loss of scientific context, it may also lead to the discovery of cultural materials that would otherwise have been undiscovered and lead to an increased body of knowledge of the cultural history of the area. Indirect impacts result from the increased human presence, leading to possible illicit collecting of newly exposed materials.

On a project-by-project basis, the spatial distribution (or range) of disturbances would be largely focused on the specific site or location of a development or action. However, over time and as more actions occur throughout the planning area, the extent would be throughout the planning area.

Under the action alternatives and the Proposed Plans, actions that provide protections for GRSG or its habitat by limiting access into areas or excluding surface-disturbing activities, such as NSO and restrictions on surface and vehicle use that would protect cultural resources from effects due to surface disturbance, erosion, effects on setting and access leading to vandalism, inadvertent damage, and unauthorized collection of cultural resources. However, these protective measures could inhibit Native American cultural uses in some areas, and restrictions on surface and vehicle use that would protect cultural resources from effects due to surface disturbance, erosion, effects on setting and access leading to vandalism, inadvertent damage, and unauthorized collection of cultural resources.

The action alternatives and the Proposed Plans provide varying degrees of exclusion and closure allocations, but under all alternatives there is a marked increase in excluded/closed areas, resulting in more protections to cultural resources than areas that avoid or are open to ROWs, and/or closures, do not allow for leasing or development, which eliminates the risk of surface disturbance from associated project construction, and the direct and indirect impacts as described above under Alternative A would not occur. In ROW avoidance areas, the likelihood for the impacts would be reduced, as these areas provide for additional restrictions and stipulations to protect sensitive resources, as compared to open areas.

Vegetation management measures addressing land health and plant diversity, restoring natural processes, promoting desired plant communities, reducing effects on rangeland during drought, and eliminating weeds would largely be compatible with cultural resource management and preservation. Many of the measures would reduce the potential for cultural site erosion, maintain and improve soil health, maintain or restore the historic setting, and protect plant resources that could be important to Native American communities. However, mechanical, biological, and chemical treatments could affect cultural resources and could restrict access to resources for cultural purposes during treatment. Ground-disturbing mechanical vegetation treatments could modify the spatial relationships of artifacts and site features and break artifacts. Chemical treatments could alter the chemistry of soils and artifact residues and affect the reliability of dating surface features and affect artifact residue analysis. Use of fire as a treatment could affect flammable cultural resource artifacts and features, cause rock spalling and staining (either as a surface for rock art or as part of a feature or structure), and distort the temporal and functional analysis of artifacts. On the other hand, increased soil stability resulting from improving vegetation cover on a site can reduce the rate of erosion of resources on the surface.

Fire management would involve ground-disturbing activities that could also directly affect cultural resources by altering the spatial relationships within archaeological sites. In addition, fire-retardant chemicals and heat could affect the accuracy of paleo-botanical or radiocarbon data obtained from cultural resources. Removing vegetation increases the visibility of cultural resources and exposes previously undiscovered resources.

Sites exposed by fire or prepared for fire avoidance in prescribed burns are more susceptible to unauthorized collection, vandalism, and subsequent erosion. The risk of adverse effects on cultural resources is greatest from unplanned wildland fire because the locations of cultural resources are less likely to be known and avoided. Effects from prescribed fire are similar to those of wildland fire, but prescribed fire is subject to project-level analysis and the Section 106 process, which can prevent or reduce impacts through avoidance and other mitigation measures.

## 4.13 VISUAL RESOURCES

### 4.13.1 Methods and Assumptions

#### *Indicators*

Indicators of impacts on visual resources are as follows:

- Changes in the visual quality of the landscape

**Assumptions**

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- Management actions that reduce surface disturbance and other human modifications would maintain or improve visual resources.
- Vegetation cover is a component of visual quality, any changes to which could directly affect visual resources.
- Large-scale vegetation treatments to improve sagebrush habitat temporarily alters visual resources, but as desired vegetation regimes become reestablished, longer-term changes to visual resources would be less apparent.
- Collocating compatible activities and structures, such as fences, guy wires, or roads, reduces the visual impact of artificial elements in the natural landscape.
- Motorized vehicular travel and resulting ground and vegetation disturbances can degrade sagebrush habitat (and associated visual resources).

**4.13.2 Alternatives Analysis**

Implementing management for GRSG protection generally involves reducing or otherwise restricting land uses and activities that remove vegetation and allow development activities that would add visual contrast and decrease visual quality. Mineral extraction and construction activities within ROWs, such as infrastructure and energy development, present the greatest potential for impact on visual resources. Restricting these activities in mapped GRSG habitat would maintain or enhance visual resources.

Vegetation management actions that would enhance sagebrush vegetation cover instead of existing pinyon-juniper or other non-sagebrush vegetation regime could impact the visual qualities of particular areas. A taller, denser vegetation structure can provide screening and mitigate visual contrast otherwise produced by surface-disturbing activities. Management that favors a transition to sagebrush cover could result in increased visual contrast in certain areas (e.g., where vegetation mitigates contrast from man-made surface features such as roads, communication towers, or fences). Conversely, removal of tall conifer species could also open landscapes to view from key observation points that otherwise would have been obstructed.

Large-scale vegetation treatments such as fuels reduction and prescribed fire would impact visual resources, particularly in the short term, but with lesser impacts as desired vegetation regimes become reestablished. A more dispersed vegetation pattern could also result in long-term impacts on visual quality, particularly where vegetation is an essential component to the quality of existing visual resources (e.g., in areas where roadways are present). At the same time, a more diverse vegetation composition consisting of sagebrush, grasses, and forbs would also contribute to an area's visual quality.

Under the action alternatives, the BLM would, at a minimum, limit OHV travel to existing roads and trails. The Forest Service limits OHV travel to designated routes and will continue to do so under all alternatives. The limitation of OHV travel to existing routes would limit the creation of new linear ground disturbances and subsequent impacts on visual resources. Closure of existing

routes would not immediately impact visual resources, but could result in a long-term impact following a reseeding and restoration program.

All of the action alternatives would result in greater restrictions on surface-disturbing activities as compared with the continuation of existing management under Alternative A, including such measures as managing ROW exclusion areas and closing areas to mineral leasing and development. **Table 2.3** provides a quantitative overview of how BLM and Forest Service management actions across alternatives would affect visual resources.

Under Alternative A, the BLM and Forest Service would continue to manage visual resources as identified in the existing LUPs. Under Alternative A, new ROWs would be excluded on 102,500 acres of mapped occupied GRSG habitat, and the BLM would retain 177,700 acres of designated utility corridors. As a result, new utility corridor development, particularly electrical transmission lines, could result in short- and long-term direct and indirect impacts on visual quality through the placement of large vertical transmission line structures and associated ground disturbance. Fluid mineral development and surface mining would also impact visual quality through surface modifications and mining equipment.

Under Alternative B, new human modifications within GRSG habitat would result in little to no impact on visual resources. In particular, new ROWs would be excluded on 2,784,200 acres of mapped occupied GRSG habitat and avoided on 529,600 acres of mapped occupied GRSG habitat. Additionally, 3,341,300 acres of mapped occupied habitat would be closed to fluid mineral development, and 3,328,760 acres would be managed as unsuitable for surface mining.

Management under Alternative C would result in the fewest opportunities for new ROW and mineral development and therefore the fewest alterations to visual resources when compared with the other alternatives. Under Alternative C, all designated utility corridors in PHMA would be undesignated, and all areas within PHMA (3,313,800 acres) would be managed as ROW exclusion. A total of 87 percent (3,821,580 acres) of PHMA would be closed to fluid minerals, and 4,008,580 acres (including 694,780 acres of mineral split estate) would be managed as unsuitable for surface mining. Prohibitions on new human modifications in PHMA under Alternative C would maintain visual resources. In addition, the closure of some areas to OHV travel could result in a level of natural rehabilitation in these areas to their historical state, particularly if routes are not frequently used for nonmotorized forms of travel.

Because Alternative D would result in greater restrictions on new human modifications to the landscape as compared with Alternative A, Alternative D would reduce the potential for new impacts on visual resources. For example, aboveground linear infrastructure would be excluded on 1,422,300 acres and avoided on 1,368,900 acres of mapped occupied habitat. Refer to **Table 2.3** for a comparison of management of ROW development by type. No areas in mapped occupied habitat would be open to fluid mineral leasing with standard stipulations; however, 3,383,080 acres would be available for fluid mineral leasing with either CSU/TL stipulations (1,829,980 acres) or NSO stipulations (1,853,100 acres).

Impacts on visual resources under Alternative E would be similar to Alternative A, but would include additional management actions to avoid or minimize new human modifications (e.g., ROW and mineral development) if possible within SGMAs. Because Alternative E would result

in only slightly greater restrictions on new human modifications to the landscape as compared with Alternative A, there would be the potential for impacts on visual resources under Alternative E. Notably, Alternative E would manage 27,600 acres as ROW exclusion and 2,654,000 acres as ROW avoidance. Impacts on visual resources from mineral development would be similar to Alternative A, except that NSO and CSU/TL stipulations for fluid mineral leasing would apply to 688,100 acres and 2,642,700 acres of mapped occupied habitat, respectively. Under Alternative E, more acres would be treated to restore GRSG habitat than under the action alternatives. This could impact the characteristic landscape in the short term in areas where treatments are not prevalent but would have a minimal impact in areas that have been treated in the past and still show signs of such treatment. Over the long term, impacts would be minimal once the treatment objectives have been achieved.

Compared to Alternative A, the Proposed Plans would minimize future surface-disturbing activities (e.g., ROW and mineral development) if possible within PHMA and, to a lesser extent, within GHMA. Specific restrictions would vary based on the type of development. Refer to **Table 2.3** for a comparison of management of ROW development by type. In particular, new ROWs would be excluded on 28,100 acres and avoided on 2,764,800 acres of PHMA and GHMA, with an additional 165,500 acres of avoidance adjacent to PHMA. Most areas in mapped occupied habitat would be open to fluid mineral leasing subject to NSO stipulations, thereby minimizing visual impacts from aboveground fluid mineral production equipment. The Proposed Plans would also include sagebrush habitat objectives to restore and maintain desirable landscapes to support GRSG populations. Impacts on visual resources would be similar to those described under Alternative E. Because the Proposed Plans would result in greater restrictions on new human modifications to the landscape while enhancing the existing landscape, the Proposed Plans would reduce impacts on visual resources as compared with Alternative A.

## 4.14 WILDLAND FIRE MANAGEMENT

### 4.14.1 Methods and Assumptions

#### *Indicators*

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

- Alteration of vegetative cover or composition that 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
- Changes in the response to wildland fire or appropriate treatments to reduce impacts of wildland fire

#### *Assumptions*

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- Fire is an important functional, natural disturbance in many of the ecological systems in the planning area.

- A direct relationship exists between fuel characteristics and potential fire intensity and severity.
- Necessity for fuels treatments would likely continue over the life of the LUPA.
- There will be increased demand on suppression resources for managing wildland fires in order to protect values at risk.

#### **4.14.2 Alternative A**

Under Alternative A, few management actions would be applied specifically 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.

##### ***Greater Sage-Grouse Management***

Surface disturbance caused by development contributes to the modification of the composition and structure of vegetation communities (including increases in noxious weed proliferation) near developed areas, which contributes to fueling high-intensity fires and can shift FRCC away from historic conditions. This could cause an increase in program costs because of the increased fire potential. As such, management actions that minimize disturbance for GRSG from development would reduce the risk of fire potential.

Under Alternative A, special provisions for GRSG protection are limited. No PHMA or GHMA is designated, and there are few direct limitations on resource uses specifically for GRSG protection. There is limited potential for site-specific restrictions on development because of measures to protect, maintain, and enhance special status species habitat. In addition, many LUPs contain management actions to prohibit surface-disturbing or other disruptive activities within GRSG breeding and nesting habitat and, in some cases, winter habitat, within a certain distance and between certain dates. Where development restrictions are in place (specifically for GRSG or for special status species management), the level of risk for human-caused fire ignition are decreased. The level of impacts would depend on site-specific restrictions in place under current LUPs but is likely to be lower than all other alternatives.

##### ***Vegetation Management and Fire (including invasive plants and juniper encroachment)***

Vegetation and weed treatments that decrease standing vegetation and associated fuel loads could reduce the size, extent, and occurrence of wildfire and could 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 likely promote healthy plant communities and an associated lower risk of high-intensity wildfire (USGS 2006b). Used appropriately, prescribed fire would be compatible with noxious and invasive weed control; however, the presence of noxious weeds and the potential of weed spread after a prescribed fire would need to be monitored on a site-specific basis. Conversely, management actions that retain shrub and cover could result in increased fuel loading and increase the likelihood and 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 towards historic conditions and promoting the most efficient use of fire

management resources. Current fire regime and condition class are shown for habitat type in **Table 4.18** and **Table 4.19**.

Treatment methods may include the use of fuelbreaks. A fuelbreak is a strategically located wide block, or strip, on which a cover of dense, heavy, or flammable vegetation has been changed to one of lower fuel volume or reduced flammability and is maintained as necessary as an aid to fire control. Fuelbreaks are not designed to stop fires but to allow suppression forces a higher probability of successfully attacking a wildland fire (Agee et al. 2000).

A reduction in fuel treatments would result in an incremental increase in hazardous fuels that leads to an increase in the potential for high-intensity wildfire that is uncharacteristic of the historical FRCC. Allowing a range of fuel-treatment options provides management flexibility to reduce large fire costs and achieve fire and fuels goals and objectives. Conversely, prioritizing fire suppression can limit management options and increase costs for fire management programs.

Under Alternative A, although fuels treatments would be designed to minimize the size of wildfire and prevent further loss of sagebrush, few specific management actions would be in place on fuels-management and fire-control methods in GRSG habitat. Alternative A would generally allow for the use of prescribed burns for vegetative manipulations where needed. Fire suppression would be prioritized to protect human life, human safety, and high-value resources. Impacts on FRCC and fire size, extent, and occurrence would vary throughout the planning areas based on site-specific habitat objectives and treatments applied.

While existing LUPs do not generally require prioritization of suppression in GRSG habitat, other existing policies (e.g., BLM IM 2013-128) have included such prioritizations and have for several years. This prioritization requires suppression resources to be focused on protecting GRSG habitat from wildfire.

#### ***Livestock Grazing and Wild Horses and Burros***

Range management can impact the ability to manage fire as a natural process through changes in fine fuels availability (e.g., grasses). There are several ways that livestock grazing practices can affect the extent and severity of fires in sagebrush dominated ecosystems, including long-term effects that occur on decadal time scales to alter plant community composition and those observed as yearly changes in fuel loads. Livestock grazing can change the relative proportions of shrubs, perennial grasses, and annual grasses over decades, altering the fuel composition. On an annual basis, grazing can reduce the amount of herbaceous fine fuels, including cheatgrass, forbs, and small twigs of woody plants. The effects of grazing on both perennial and annual grasses depend on precipitation, soil characteristics, season of grazing, grazing intensity, and type of herbivore, and are variable and site-specific (Strand and Launchbaugh 2013). Some studies indicate that grazing may suppress competition from native plants and cause soil disturbance that can favor annual invasive grasses including cheatgrass, particularly in intense (high stocking rate) or severe (high use levels) grazing (Reisner et al. 2013, Bradford and Lauenroth 2006, Chambers et al. 2007, Loeser et al. 2007). In some situations, however, targeted livestock grazing can suppress annual grasses, including cheatgrass (Mosley and Roselle 2006). Moderate grazing may reduce fire spread and intensity by removing understory vegetation, reducing the amount of fuel,

**Table 4.18**  
**Acres of GRSG Habitat Classification by Fire Regime Group**

Fire Regime	Alternative A	Alternative B		Alternative C	Alternative D		Alternative E		Proposed Plans	
	Mapped Occupied Habitat	PHMA	GHMA	PHMA (all mapped occupied habitat)	PHMA	GHMA	GRSG Habitat in SGMAs/ Core Areas	GRSG Habitat outside SGMAs/ Noncore Areas	PHMA	GHMA
Group I	353,700	230,300	123,600	353,936	222,300	131,600	223,000	128,400	236,400	114,460
Group II	60	0	60	60	0	60	0	60	0	60
Group III	1,674,700	1,280,118	397,200	1,677,300	1,305,00	372,300	1,282,800	422,300	1,340,600	352,600
Group IV	4,089,300	3,087,900	1,019,200	4,107,000	2,977,515	1,129,500	3,018,000	1,133,300	3,043,900	1,048,100
Group V	991,100	743,394	248,200	991,600	738,500	253,000	815,500	230,500	795,100	231,800

Source: BLM 2015

**Table 4.19**  
**Acres of Current Fire Regime Condition Class by GRSG Habitat Classification**

Condition Class	Alternative A	Alternative B		Alternative C	Alternative D		Alternative E		Proposed Plans	
	Mapped Occupied Habitat	PHMA	GHMA	PHMA (all mapped occupied habitat)	PHMA	GHMA	GRSG Habitat in SGMAs/ Core Areas	GRSG Habitat outside SGMAs/ Noncore Areas	PHMA	GHMA
Class I	1,863,300	804,100	262,600	1,066,700	811,700	255,000	781,500	303,800	806,100	269,200
Class II	4,973,200	2,414,400	822,600	3,237,000	2,369,600	867,400	2,364,700	888,700	2,410,700	803,900
Class III	3,937,300	1,950,700	637,700	2,588,400	1,892,600	695,800	2,011,500	660,900	2,029,400	615,200

Source: BLM 2015

and accelerating the decay of litter through trampling (Davies et al. 2010). The effects of grazing could result in fires that burn at lower intensity, increased patchiness, decreased rate of spread, and increase subsequent survival of plants after fire, but the effects depend on the fire weather conditions and the structural composition of the plant community (Bunting et al. 1987). As fire weather conditions become extreme, the potential role of grazing on fire behavior is limited (Strand and Launchbaugh 2013).

Under Alternative A, there would be 329,521 permitted AUMs on BLM-administered lands and 265,373 AUMs permitted on National Forest System lands. Livestock grazing could result in site-specific reduction in fuels and the associated risk of wildland fire as described above, but level of impacts would be determined by weather conditions, grazing management and site-specific vegetative conditions.

#### ***Travel and Transportation***

Transportation and travel management can impact fire frequency by increasing the potential for human-caused ignitions. The risk of ignition is increased where travel is less restrictive, particularly where motorized vehicles travel cross-country. All forms of travel facilitate the spread of invasive weeds (Commission for Environmental Cooperation 2012), particularly cheatgrass, which can shift fire regimes by decreasing fire intervals and increasing fire intensity. Conversely, if management restricts access, wildfire risk could be decreased. In some cases, transportation management could impact fire suppression efforts; when routes are closed and rehabilitated, they become unavailable for response to wildfires, limiting access opportunities.

Under Alternative A, potential for human-caused ignition would be highest in the 797,000 acres of BLM-administered lands open to cross-country use, with reduced risk in the 437,400 acres of BLM-administered lands limited to existing routes and 1,217,700 acres limited to designated routes. OHV use on National Forest System lands within the planning area is limited to roads, trails, and areas that have been designated through a transportation planning process and, therefore, risk of human-caused ignition from travel management would be the same across all alternatives on National Forest System lands.

#### ***Infrastructure Development (including all ROWs and utility corridors)***

Lands and realty actions could result in development and an associate increase in risk of human-caused ignition. 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. As such, issuance of ROWs would increase fire management program costs because of the increased potential for fire in the ROW. However, critical-infrastructure ROW corridors would receive maintenance throughout their life to keep vegetation at a level that would moderate fire behavior and allow for some protection from an unplanned wildland fire. Limiting ROW grants may reduce roads and in turn reduce potential fire suppression control lines.

Under Alternative A, 3,219,000 acres would be open to ROW development, and 27,600 acres would be managed as ROW exclusion areas. As discussed above, risk of human-caused ignition from ROW development would be lowest in ROW exclusion areas and highest in areas open to new ROW development.

**Mineral Development (including geothermal)**

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 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 emergencies associated with energy development. The road infrastructure supporting energy and minerals development would provide increased accessibility to remote areas for fire suppression and would provide fuelbreaks in the event of wildland fire, thus supporting ability to respond to wildland fire.

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

Under Alternative A, management actions would generally be the least restrictive on mineral and energy development, with the most acres in GRSG habitat open to leases without restrictions (see **Table 2.3** for acres by alternative), and therefore has the highest risk of human-caused ignition from mineral development.

**Other Actions**

Level and type of permitted recreation can impact fire risk. Increased recreational use could increase the probability of unintentional fire starts from human-caused ignitions and the need for fire suppression. Recreation management could reduce this risk by providing targeted activities and outcomes.

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. Under Alternative A, no ACECs include GRSG as a relevant and important value; however, limitations on fire suppression and management activities could occur in ACECs for other resource protection.

**4.14.3 Alternative B**

Alternative B would focus on fire suppression in PHMA and would impose limitations on fuels treatments in PHMA, resulting in higher levels of protection but reduced management options in this area.

**Greater Sage-Grouse Management**

Managing PHMA so that discrete anthropogenic disturbances cover less than 3 percent of the total mapped GRSG habitat regardless of ownership would decrease the chance of human-caused ignition in PHMA. In addition, managing or restoring PHMA so that at least 70 percent of the land cover provides adequate sagebrush habitat to meet GRSG needs would promote a shift

towards historic FRCC in sagebrush ecosystems. Should development in other parts of the decision area increase as a result of restrictions in PHMA, there is potential for a greater chance of human-caused ignition and a shift away from historic FRCC in these areas.

***Vegetation Management and Fire (including invasive plants and juniper encroachment)***

Restoration of native plants and creation of landscape patterns that most benefit GRSG, as well as reestablishment of sagebrush cover in PHMA, would result in a trend towards historic FRCC in the long term and a reduction in the size and extent of fire in PHMA.

Frequency and intensity of wildland fires, as measured by FRCC for PHMA, would trend towards natural conditions under Alternative B in the long term because post-fire, post-fuel, and restoration management would be designed to ensure long-term persistence of seeded or pre-burn native plants. Over time, the focus on long-term persistence of the preferred vegetation would result in fire regime conditions that more closely reflect desired historic conditions and therefore capable of withstanding wildland fire events without losing key ecosystem components. This would be of particular importance for the 1,950,700 acres in PHMA currently in Condition Class III and areas current classified as high-severity fire risk in PHMA (Fire Regime Classes II and IV; see **Table 4.18**).

Prioritizing wildfire suppression immediately after life and property would likely require more suppression resources (crews, engines, air support, etc.) and a resulting increase in suppression costs compared with Alternative A. Prioritizing suppression would also result in an increased risk to firefighter safety. However, the increased focus on constructing and maintaining fuelbreaks under Alternative B could increase the likelihood of suppressing wildfires making them easier to control. Combined with the increased focus on suppression, Alternative B would reduce acres burned compared with Alternative A.

Fuels management projects in PHMA would be designed to reduce wildfire threats in the greatest area, thereby decreasing risk of high-intensity fire in PHMA in the long term (currently 3,087,900 acres in PHMA are classified as Fire Regime Class IV, high-severity fire; see **Table 4.18**). Restrictions on the location of fuelbreaks and the season and location of other fuels treatments, however, would reduce management options and could increase fuel management costs. Exceptions would allow for treatments when determined necessary; therefore, the impacts on ability to manage wildfire would be limited.

Using targeted livestock in certain cases to reduce fine fuels would reduce the likelihood and severity of wildland fire in site-specific areas where this treatment was used, but level of impacts would depend on site-specific conditions.

If livestock grazing, travel management, and other activities affect the success of restoration projects, management could be changed to encourage a higher success rate. This would help stabilize shifts in FRCC and reduce the likelihood and severity of wildland fire by implementing more successful restoration projects across the planning area.

***Livestock Grazing and Wild Horses and Burros***

Potential restrictions on livestock grazing, including making allotments unavailable for livestock use in PHMA, could result in increase in fine fuels and resultant increased size or extent of

wildland fires should they occur. However, the risk of wildfire would be evaluated when considering making the area unavailable for livestock grazing was considered, thereby limiting the risk. Limiting the types of range improvements allowed in PHMA would decrease opportunities for human-caused ignitions during construction or maintenance.

#### ***Travel and Transportation***

Limiting OHV travel in PHMA to existing roads and trails until travel management planning is complete, as well as limiting road upgrades or new roads in this area, would reduce the risk of human-caused ignition in PHMA on BLM-administered lands.

#### ***Infrastructure Development (including all ROWs and utility corridors)***

Excluding new ROW authorization and related development in PHMA would reduce opportunities for human-caused ignitions. Reclamation of development in ROWs that are currently not in use in PHMA would result in short-term site-specific increases in the chance of human-caused ignition but would increase fuel build-up over time unless maintained. Collocation of development when possible in GHMA would also reduce the risk of ignition in this area. The rest of the decision area would continue to experience current levels of risk for human-caused ignitions and the resultant shift in FRCC away from desired historic conditions.

#### ***Mineral Development (including geothermal)***

Alternative B would impose restrictions on mineral development in PHMA, including closure to nonenergy mineral leases, finding PHMA unsuitable to surface coal development, recommended for mineral withdrawal, and closure to mineral material sales and new fluid mineral leases. These restrictions and closures would reduce opportunities for human-caused ignitions. The rest of the decision area would continue to experience current levels of risk for human-caused ignitions and the resultant shift in FRCC away from desired historic conditions. Similarly, limitations on development in areas previously leased would limit the risk of human-caused ignition in PHMA. Exploration, especially when using overland travel, could temporarily increase the potential for human-caused ignitions.

#### ***Other Actions***

Limiting special recreational uses in PHMA to those that are neutral or beneficial to GRSG could result in use restrictions that may reduce the risk of human-caused ignitions.

Impacts from ACEC management would be the same as discussed under Alternative A due the designation of no new ACECs.

#### **4.14.4 Alternative C**

Alternative C would generally have the broadest restrictions on resource uses and highest level of protection for GRSG habitat of all the alternatives, extending to all mapped occupied habitat, resulting in a high level of priority for fire suppression in GRSG habitat but a limitation on fuels-management activities.

#### ***Greater Sage-Grouse Management***

Impacts would be similar in nature to those described in Alternative B. Expansion of measures to increase and protect sagebrush from human-related disturbance in all mapped occupied habitat would further reduce opportunities for human-caused ignitions in GRSG habitat.

**Vegetation Management and Fire (including invasive plants and juniper encroachment)**

Impacts from vegetation management would be similar to those described in Alternative B, with expansion of restoration priorities and associated shift in FRCC to all occupied GRSG habitat of particular importance for the 2,588,400 acres in mapped occupied habitat currently classified as Fire Regime Class III (see **Table 4.19**).

Impacts from fire management would be similar to those described under Alternative B. Prioritizing wildfire suppression immediately after life and property would still require more suppression resources (crews, engines, air support, etc.) and a resulting increase in suppression costs compared with Alternative A. Prioritizing suppression could also result in an increased risk to firefighter safety. However, unlike Alternative B, Alternative C places restrictions on vegetation and fuels treatments that remove sagebrush, as well as expanding prioritizations and restrictions to all occupied GRSG habitat. There are also restrictions on fuelbreaks. Should treatments in fuelbreaks be limited to mowing of grass, such treatments could be less effective than permitting other mechanical methods. The decreased effectiveness of the fuelbreaks could result in more acres of wildland fires. The result is that burned acres are anticipated to increase compared with Alternative A. The increase in burned acres combined with the increase in suppression resources would result in increased suppression costs under Alternative C compared with Alternative A.

Exclusion of livestock grazing from burned areas until woody and herbaceous plants achieve GRSG habitat objectives, and closure of burned areas that cannot be fenced from grazing until recovered, would result in a short-term increase in fine fuels in areas excluding grazing, which could increase fire risk. Due to the lack of authorized grazing (under Alternative C1) and reduction in permitted grazing (under Alternative C2), however, these management actions are not likely to add to fire size, extent, or occurrence, as discussed under Alternative C, *Livestock Grazing and Wild Horses*, above. Enclosures to study recovery could also lead to more efficient fire rehabilitation methods and associated improvements in wildland fire program resource allocations.

**Livestock Grazing and Wild Horses and Burros**

Under Alternative C1, no livestock grazing would be permitted within mapped occupied GRSG habitat. As a result, fine fuels are likely to increase throughout occupied habitat, and fire size, intensity, and occurrence could subsequently increase. However, the degree of impacts would be dependent on site-specific vegetation condition and climate, with hotter, dryer weather reducing the impact of grazing reduction on fire behavior as described in Alternative A.

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

Under Alternative C2, impacts would be similar to those described in Alternative C1, but fire risk would be reduced in scale due to the existence of some level of permitted livestock grazing and wild horse use under Alternative C2. As the specific areas that would contain permitted grazing within mapped occupied GRSG habitat would be determined at permit renewal, site-specific impacts would vary and cannot be determined. The 25 percent reduction in AMLs for wild horses would occur in the HMAs that overlap occupied GRSG habitat in three population

areas: Hamlin Valley (Chokecherry, Sulphur, and Tilly Creek HMAs), Sheeprocks (Onaqui Mountain HMA), and Carbon (Range Creek HMA).

Prohibition of all structural range improvements in occupied habitat in both Alternatives C1 and C2 would limit the risk of human-caused ignition during construction.

#### ***Travel and Transportation***

Impacts of travel management would be similar to but less than those described in Alternative B. The risk of human-caused ignition in Alternative C would be further decreased due to the closure of all mapped occupied habitat to cross-county OHV travel. In addition, the BLM would designate approximately 523,500 acres of GRSG habitat as closed to OHV use. These areas are currently designated as open or limited. Prohibiting use of OHVs in these areas could prevent OHVs from igniting fine fuels.

#### ***Infrastructure Development (including all ROWs and utility corridors)***

Impacts would be similar in nature to those described in Alternative B. Under Alternative C, ROW exclusion areas would be extended to include all mapped occupied habitat, further reducing opportunities for human-caused ignitions in GRSG habitat.

#### ***Mineral Development (including geothermal)***

Impacts would be similar in nature to those described in Alternative B. Fire risk would be further decreased under Alternative C due to the expansion of mineral development restrictions in all mapped occupied habitat (see **Table 2.3** for acres).

#### ***Other Actions***

Limiting special recreational uses in occupied habitat could result in use restrictions that could reduce the risk of human-caused ignitions, as described in Alternative B. In addition, limitations on camping and other recreational uses with 4 miles of occupied leks would further limit risk of human-caused ignition in these areas.

Restrictions associated with the management of 15 areas as ACECs could limit fire suppression tactics and fuels treatment methods, which could result in less efficient or less effective fire suppression and increases in fire suppression expenditures. ACEC designations could also result in fewer human-caused ignitions due to restrictive management.

#### **4.14.5 Alternative D**

Alternative D management actions and related impacts would be similar to those described in 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.

#### ***Greater Sage-Grouse Management***

Impacts would be similar to those described under Alternative B. The emphasis on maintenance and restoration of sagebrush to provide habitat for lekking, nesting, brood-rearing, winter, and transition areas could provide site-specific variation in FRCC changes and level of fire risk.

Management of GHMA for a range of 28 to 49 percent sagebrush cover across the landscape would trend FRCC in this habitat towards historic conditions.

Efforts to collaborate with local GRSG conservation efforts would improve habitat in the long term with related return of FRCC towards historic conditions.

As in Alternative B, anthropogenic disturbance would be capped and the risk of human-caused ignitions in this area would be reduced. Under Alternative D, maximum allowed level of disturbance would be 5 percent within a biologically based disturbance calculation area in PHMA. The 5 percent disturbance calculation does not include burned areas not yet recovered, which is a potentially significant acreage and could result in a total disturbance well over 5 percent. In addition, limitation on disturbance in specific habitat areas during specific time frames would reduce the chance of human-caused ignition in these areas, particularly when seasonal stipulations apply during fire season.

***Vegetation Management and Fire (including invasive plants and juniper encroachment)***

Impacts of vegetation management would be similar in nature to those described in Alternative B. Under Alternative D, actions would include treating PHMA to maintain and expand healthy GRSG habitat. Vegetation treatments would reduce fuel loading, which would affect fire size, extent, and allow fires to be more easily controlled. Vegetation treatments also create early seral stage vegetation communities that generally fuel low-intensity fires.

Restoration priority would include seasonal habitats identified as the limiting factor for GRSG distribution and/or abundance and would include collaborating with local government and planning agencies. As a result, restoration efforts would likely address management concerns for other resources than GRSG, including fire management. Actions would result in a trend towards historic FRCC and reduction in fire risk.

Impacts of fire management would be similar in nature to those described in 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 PHMA; therefore, the long-term reduction in high-intensity fire risk would occur in these areas, of particular importance for the 2,977,515 acres currently in Fire Regime Class IV and 1,892,600 acres in Condition Class III in PHMA (see **Table 4.18** and **Table 4.19**). Seasonal restrictions could result in site-specific limitations on fuels management options but are not likely to impact the program objectives overall. Some additional flexibility would be incorporated into management, allowing for use of prescribed fire on a site-specific level within GRSG habitat, as appropriate, which could reduce wildfire severity and extent in these areas.

Creating and maintaining effective fuelbreaks in strategic locations, prioritizing suppression of fires in PHMA, and other proactive fire management activities in PHMA would likely reduce the size and extent of wildland fires in PHMA, but would also require additional suppression resources, as described under Alternative B. As a result, it is anticipated that suppression costs would generally be increased as compared to Alternative A.

***Livestock Grazing and Wild Horses and Burros***

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

***Travel and Transportation***

Impacts under Alternative D would be similar in nature to those described in Alternative B. Under Alternative D, travel management planning on BLM-administered lands would be prioritized in the Bald Hills, Box Elder, Hamlin Valley, Ibapah, Rich, and Sheeprocks population Areas. As a result, risk of human-caused ignition would be reduced in these areas, which would be of particular importance in the Bald Hill, Box Elder, Hamlin Valley, Ibapah, and Sheeprocks Population Areas, where wildfire has been identified as a primary concern.

***Infrastructure Development (including all ROWs and utility corridors)***

Impacts under Alternative D would be similar in nature to those described in Alternative B. Under Alternative D, exclusion areas would be defined by particular types of ROW development, so there would be more site-specific variation in development and the level of human-caused ignition risk reduction (see **Table 2.3** for specific acres).

***Mineral Development (including geothermal)***

Impacts from mineral development would be similar in nature to those described in Alternative B. Closures and restrictions in Alternative D would focus on PHMA, and PHMA and GHMA adjacent to leks (see **Table 2.3** for acres). Therefore, the reduction in human-caused ignition risk would be the greatest in these areas.

***Other Actions***

Impacts from recreation management would be similar in nature to those described in Alternative B.

No ACECs would be designated; therefore, no impacts would occur on fire management.

**4.14.6 Alternative E**

Under Alternative E, management objectives would focus on reducing the threats to GRSG in the planning areas, including wildfire. Management actions would allow for some level of fuels treatments, thereby providing greater flexibility for wildfire management.

***Greater Sage-Grouse 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 mapped GRSG habitat in SGMAs/core areas. Actions to increase the total amount of mapped GRSG habitat acreage within and adjacent to GRSG habitat in SGMAs/core areas by an average of 50,000 acres per year would result in long-term improvements in sagebrush habitat and associate shifts in FRCC to historic condition in these areas.

Mapped GRSG habitat outside of SGMAs/noncore areas would not be managed for GRSG conservation. No specific management actions are provided for in these areas. Fuels conditions and associated fire risk would be similar to Alternative A in these areas.

Disturbance limits in Alternative E would include a general limit on new permanent disturbance of 5 percent of habitat on state or federally managed lands within any particular SGMA. The 5 percent disturbance calculation under Alternative E includes burned areas not yet recovered, unlike the 5 percent disturbance calculation under Alternative D, which only includes burned areas that have been recovered. As a result, likelihood of human-caused ignitions would be reduced in these areas under Alternative E.

As in Alternative D, season- and GRSG habitat-specific restriction on development would result in site-specific variation in habitat changes and associated changes to FRCC and fire risk.

***Vegetation Management and Fire (including invasive plants and juniper encroachment)***

Under Alternative E, active vegetation treatments would be allowed under certain circumstances to improve sagebrush habitat. As discussed under Alternative D, where treatments occur, fuels levels would be reduced, high-intensity fire risk would decrease, and fire size and extent would likely decrease. In particular, aggressive removal of cheatgrass would reduce risk of high-intensity fire.

Impacts from fire management activities in Alternative E would be similar in nature to those described in Alternative B. Under Alternative E, habitat loss due to fire would be the single greatest threat to GRSG habitat. Statewide agreements, research, and prioritization of resources may improve the efficiency of fire treatments and response, with potential to decrease the risk of large-scale wildfire in GRSG habitat in the long term. Of particular importance for wildland fire management are actions in the 3,018,050 acres currently in Fire Regime Class IV and 2,011,500 acres in Condition Class III in mapped GRSG habitat in SGMAs/core areas (see **Table 4.18** and **Table 4.19**). The emphasis on fire suppression in GRSG habitat under Alternative E would require use of additional suppression resources, as described under Alternative B. As such, it is anticipated that suppression costs would generally be increased as compared to Alternative A.

***Livestock Grazing and Wild Horses and Burros***

Impacts from livestock grazing would be similar in nature to those described in Alternative B. Under Alternative E, GRSG seasonal habitat requirements would be considered when managing sagebrush rangelands, resulting in more site-specific variation in management and related variation in fuel levels, and fire size, extent, and occurrence.

Aggressively responding to new infestations to keep invasive species from spreading would also reduce risk of fire and decrease fire size and extent.

***Travel and Transportation***

Impacts from travel and transportation would be similar in nature to those described in Alternative B. Under Alternative E, mapped GRSG habitat in SGMAs/core areas with nesting and winter habitat without designed routes would be limited to existing routes, and mapped GRSG

habitat in SGMAs/core areas with designed routes would be managed as limited to designed routes. As such, risk of human-caused ignition would be reduced.

***Infrastructure Development (including all ROWs and utility corridors)***

Impacts under Alternative E would be similar in nature to those described in Alternative B, with some additional limits to development and related reduced risk of human-caused ignition in opportunity habitat.

***Mineral Development (including geothermal)***

Impacts from mineral development would be similar to those described in Alternative B. Under Alternative E, mineral development management would include TL stipulations and GRSG habitat-type specific NSO stipulations. As a result, site-specific variation in the reduction of human-caused ignition risk would occur.

***Other Actions***

Impacts from recreation management would include reductions in GRSG habitat disturbance, including seasonal avoidance of activities in specific GRSG habitats, resulting in seasonal and spatial variation in human-caused ignition risk.

No ACECs would be designated; therefore, no impacts would occur on fire management.

**4.14.7 Proposed Plans**

Management actions under the Proposed Plans and related impacts would be similar to those described in Alternative B and D but with the addition of more specific objectives for GRSG habitat type and refined protocols for monitoring current conditions and developing site-specific management. These actions would result in less departure from historic reference conditions and fewer acres would shift towards FRCC 3 in GRSG habitat and a trend towards more historic frequency and intensity of wildfire.

***Greater Sage-Grouse Management***

Under the Proposed Plans, impacts would be similar to those described under Alternative B and D. As in Alternative D, management for GRSG seasonal habitat types could provide site-specific variation in FRCC and level of fire risk.

Under the Proposed Plans, guidance would include more specific indicators and desired conditions for each habitat type than any other alternative. In addition, specific acreage objectives have been identified for conifer removal (180,900 acres) and annual grass treatments (48,000 acres) on BLM and National Forest System lands in PHMA for a ten year period based on VDDT. These actions would allow for vegetation treatments that could target areas most in need of improvement, resulting in the reduction of annual invasive grasses, and conifer encroachment resulting in an increasing trend towards FRCC desired historic conditions.

As in Alternative B and D, anthropogenic disturbance would be capped. Under the Proposed Plans, a 3 percent disturbance cap (5 percent on National Forest System lands in Wyoming) on discrete anthropogenic disturbances would be applied in PHMA at both the BSU and project levels, and a limit would be placed on the density of energy/mining facilities. Anthropogenic disturbances in PHMA and GHMA would be also mitigated to ensure a net conservation gain to

GRSG, and conservation measures would be implemented in PHMA and GHMA such as RDFs (**Appendix G**) and lek buffers (**Appendix F**) to reduce impacts from human activities in PHMA and GHMA. These actions would further reduce the risk of human caused ignitions and, in the long term, improve vegetation condition, contributing to a reduction in FRCC (for example, a shift from FRCC 3 towards FRCC 2) and a trend towards desired historic fire occurrence and intensity.

***Vegetation Management and Fire (including invasive plants and juniper encroachment)***

Under the Proposed Plans, management actions and related impacts would be similar to those described under Alternatives B and D, but with added emphasis on sub-regional specific habitat needs and variations and requirements for specific GRSG habitat types. Strategic wildland fire planning would help return PHMA to historic FRCC and natural fire intensities and intervals. Emphasis would be concentrated in PHMA; therefore, the long-term reduction in high-intensity fire risk would occur in these areas, of particular importance for 2,029,400 acres in Condition Class III in PHMA (see **Table 4.18** and **Table 4.19**).

The Proposed Plans incorporate the concepts from Chambers et al. (2014) in the FIAT (**Appendix K**). This assessment process would allow for more accurate assessment of site-specific conditions and prioritization of fire operations, fuels management, post-fire rehabilitation, and habitat restoration. This plan would allow for more effective prioritization of fire management resources and improvement of vegetation conditions, which would reduce the size and intensity of wildland fires, and trend towards desired FRCC conditions in the long term.

Creating and maintaining effective fuel treatments in strategic locations, and prioritizing suppression of fires in SFA, followed by PHMA outside of SFA then GHMA when suppression resources permit would likely reduce the size and intensity of wildland fires but would result in an increase in both fuels management and fire suppression costs as compared to Alternative A.

Management under the Proposed Plans would prescribe added measures 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 effectiveness of treatments and increase the awareness and encourage partnerships with other agencies and resource programs.

***Livestock Grazing and Wild Horses and Burros***

Total acres available for grazing and permitted AUMs would be the same as described for Alternative D. Other management actions would be the similar to Alternative D. In addition, under the Proposed Plans, the review and processing of grazing permits/leases in SFA and PHMA would be prioritized, particularly in areas not meeting Land Health Standards. These measures would help to improve and protect habitat quality in SFA and PHMA, likely reducing the spread of invasive grasses and related fire risk.

Potential restrictions on grazing in the Proposed Plans, including potential retirement of voluntarily relinquished allotments could lead to increased fine fuels in those site-specific locations, and potentially result in a slightly higher risk of fire. However, the Proposed Plans also have management focuses on achieving ecological site potential, which would likely reduce annual invasive grasses and increase habitat health, minimizing the risk of wildfire.

***Travel and Transportation***

Under the Proposed Plans the nature and type of impacts would be as described under Alternatives A, B, and D. Under the Proposed Plans, 525 acres are available for cross-county travel (a 99-percent reduction in the decision area compared with Alternative A). Additionally, PHMA and GHMA would be limited to existing routes until travel management planning occurred (1,274,700 acres, 2.9 times more acres than Alternative A). As a result, risk of human-caused ignition is likely to be reduced in GRSG habitat compared to Alternative A. Under the Proposed Plans, temporary closures would also be permitted as determined necessary for resource protection. With a decrease in access, potential for human-caused ignition would be further reduced as compared to Alternative A.

***Infrastructure Development (including all ROWs and utility corridors)***

Under the Proposed Plans, the nature and type of impacts from ROW development would be as described under Alternatives A, B, and D. In the Proposed Plans, areas with designed aboveground corridors would remain open (25,100 acres). ROW development would be limited within the 2,764,800 acres of avoidance areas and 28,100 acres of exclusion areas. Reduction of ROW development would limit risk of human-caused ignition as compared to Alternative A. However, as discussed under Alternative A, limiting ROW grants may reduce roads and in turn reduce potential fire suppression control lines. Fire suppression response times could increase in the long term where limitations on new road construction restrict access. Limiting ROW grants could decrease the potential for using roads as fuelbreaks and control lines during fire suppression.

Under the Proposed Plans, there would also be a 3 percent cap on disturbance within GRSG habitat. With less surface disturbance compared to Alternative A, risk of human caused ignitions would be decreased and more areas will trend towards historic FRCC levels, however, development and related risk of ignition could potentially shift to areas outside of GRSG habitat if the cap is reached. In addition, requirements for the net conservation gain in the Proposed Plans would increase disturbance and move vegetation towards GRSG habitat objectives in the long term. This would affect the FRCC in GRSG habitat by trending towards more historic levels, which would decrease fire management cost, reduce fire size and intensity, and limit extent of wildfires.

***Mineral Development (including geothermal)***

Under the Proposed Plans restrictions would be applied to mineral and energy development as in Alternatives B and D. Restrictions under the Proposed Plans include the closure of PHMA and some portions of GHMA to nonenergy mineral leasing (3,370,000 acres closed, 24 times more than under Alternative A), and closure to mineral materials development on 3,340,200 acres (45 times more than under Alternative A). SFA (would be recommended for withdrawal from the Mining Law of 1872, as amended. Further, coal management would emphasize underground mining, reducing risk of development related ignition. Acres closed to fluid mineral leasing in GRSG habitat would be the same as Alternative A, but NSO stipulations would be applied on 3,258,300 acres (7 times more than under Alternative A).

As in Alternative B and D, anthropogenic disturbance would be capped. The 3 percent disturbance cap (5 percent on National Forest System lands in Wyoming) on discrete

anthropogenic disturbances would be applied in PHMA at both the BSU and project levels, and a limit would be placed on the density of energy/mining facilities. Anthropogenic disturbances in PHMA and GHMA would be also mitigated to ensure a net conservation gain to GRSG, and conservation measures would be implemented in PHMA and GHMA such as RDFs (**Appendix G**) and lek buffers (**Appendix F**) to reduce impacts from human activities in PHMA and GHMA. Development and related risk of ignition could potentially shift to areas outside of GRSG habitat if the cap is reached.

These actions would further reduce the risk of human caused ignitions and, in the long term, improve vegetation condition, contributing to a shift in FRCC in GRSG towards desired historic conditions.

#### **Other Actions**

Under the Proposed Plans, recreational activities would need to meet GRSG habitat objectives and the creation of new facilities would be prohibited; this could reduce human activity in PHMA and GHMA, which would lessen the potential for human-caused ignitions.

### **4.15 WILDERNESS CHARACTERISTICS**

#### **4.15.1 Methods and Assumptions**

##### **Indicators**

Indicators of impacts on wilderness characteristics are the management actions and allowable uses that would either protect or degrade the inventoried characteristics to a level at which the value of one or more wilderness characteristic would no longer be present within the specific area. The inventoried wilderness characteristics are roadless areas of sufficient size, naturalness, outstanding opportunities for solitude or a primitive and unconfined type of recreation, and supplemental values, as described in the Wilderness Characteristics section of **Chapter 3**.

##### **Assumptions**

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- Some inventoried lands with wilderness characteristics have not yet been assessed in an RMP revision; therefore, no decisions have been made about whether to protect their wilderness characteristics. In this analysis, these lands with wilderness characteristics are treated like their wilderness characteristics are not protected.
- Management for GRSG has the potential to provide protection to lands with wilderness characteristics where the BLM has made a determination not to apply specific management to protect the wilderness characteristics, or are areas where no determination has yet been made in an RMP. This analysis discusses the impacts on the 86,100 acres of such lands.
- The BLM would continue to manage natural areas to protect their wilderness characteristics where a determination has been made to manage for wilderness characteristics. Management to protect GRSG under the various alternatives could provide additional protections for natural areas and, at a minimum, would provide

complimentary management. Impacts are not discussed further for the 52,000 acres of such lands.

#### 4.15.2 Alternatives Analysis

Wilderness characteristics are primarily influenced by actions that impact the undeveloped nature of the area, or by activities that increase the sights and sounds of other visitors. Generally, actions that create surface disturbance degrade the naturalness of lands with wilderness characteristics, as well as the setting for experiences of solitude and primitive recreation. In addition, restrictions on dispersed recreation (e.g., prohibiting campfires or permitting camping only in designated sites) diminish the opportunities for unconfined recreation.

Management actions that could impact an area's natural appearance could include the presence or absence of roads and trails and use of motorized vehicles along those roads and trails, fences and other improvements, the nature and extent of landscape modifications, or other actions that result in surface-disturbing activities. All of these activities affect the presence of human activity and, therefore, could affect an area's natural appearance. Prohibiting surface-disturbing activities and new developments within lands with wilderness characteristics would protect naturalness.

Two other wilderness characteristics—outstanding opportunities for solitude or primitive and unconfined types of recreation—are related to the human experience in an area. Visitors can have outstanding opportunities for solitude or for primitive, unconfined recreation when the sights, sounds, and evidence of other people are rare or infrequent; where visitors can be isolated, alone, or secluded from others; where the use of the area is through nonmotorized, nonmechanized means; and where there are no or only minimal developed recreation facilities. High concentrations of recreation users (large group sizes or frequent group encounters) would decrease outstanding opportunities for solitude. Limiting visitor use to prevent substantial degradation to wilderness characteristics (i.e., naturalness and opportunities for solitude) would protect opportunities for unconfined recreation.

Allowing travel on designated routes could reduce opportunities for solitude by increasing sights and sounds of other people. Motorized and mechanized access would also reduce opportunities for primitive recreation. The existence of motorized and mechanized trails could reduce the natural appearance near the trails. Effects would be localized and might not be experienced in the unit as a whole. Due to the nature of these areas having wilderness characteristics, it is assumed that there are not any roads maintained by mechanical means. All access to the area would be limited to existing or designated routes, so the risk of new route creation, which would impact naturalness and size (if created by mechanical means), would be the same under all alternatives and the Proposed Plan, except Alternative C. Under Alternative C, approximately 555,700 of mapped occupied habitat would be closed to OHV travel, which includes 32,200 acres that are currently closed as well as 523,500 acres of new closed areas (**Map 2.56**). Where these closures overlap lands with wilderness characteristics, the areas' naturalness, opportunities for solitude, and opportunities for primitive types of recreation would be protected or enhanced.

Where vegetation treatments are implemented, both naturalness and solitude experienced by recreational users could be impacted in the short term. After the treatment is over, solitude would be restored. Over the long term, naturalness would likely be enhanced by restoring natural vegetation structures and patterns. Impacts would be the same under all alternatives and the Proposed Plan, though would be the least under Alternative C due to its focus on passive restoration. Short-term loss of solitude and naturalness would be greatest under Alternative E and the Proposed Plan given the levels of vegetation treatment proposed, though even under these alternatives, the impacts would be limited to the time of treatment, after which solitude would be restored and naturalness improved in the long-term.

Management associated with wildland fire could impact lands with wilderness characteristics due to a focus on suppression in PHMA. In areas where suppression is a priority, there is the potential for vegetation modification to prevent the spread of fires, such as fire lines or fuelbreaks, potentially reducing the naturalness of appearance. Fire suppression, prescribed burns, and fuelbreaks could all have short-term impacts on wilderness characteristics by disturbing naturalness and solitude.

Allowing any type of energy or mineral development (i.e., fluid, coal, nonenergy solid, locatable, and salable minerals, as well as renewable energy) could result in surface disturbance that would diminish the area's natural characteristic. Any new roads authorized for access to the development area could eliminate wilderness characteristics of the entire unit if the road were to bisect the unit so that it would no longer be considered a roadless area of adequate size. In addition, regular access to the lease area or mine site by developers would reduce opportunities for solitude.

Impacts on lands with wilderness characteristics are possible from livestock grazing, particularly from new developments in these areas (e.g., water developments and fences), which could lessen the naturalness of appearance or could limit unconfined recreation. Existing range improvements used for grazing, such as fences, stock trails, springs, and stock ponds, would continue to be maintained. Structures could diminish the naturalness characteristic of lands with wilderness characteristics. Maintenance of range improvements could result in short-term impacts on solitude and naturalness.

Under current management (Alternative A), where surface-disturbing activities are not precluded, lands with wilderness characteristics are at risk of diminished wilderness characteristics if future activities are permitted in those areas. **Table 4.20** displays the distribution of allocations that minimize or preclude certain surface-disturbing activities that would diminish wilderness characteristics. The table provides a comparative summary by alternative of how wilderness characteristics could potentially be impacted based on allocation decisions made to protect GRSG and its habitat under the various alternatives.

Overall, management under Alternative C would have the greatest potential to maintain lands with wilderness characteristics. Such allowable uses as ROWs, wind energy development, utility-scale solar energy development, nonenergy mineral leasing, coal leasing, mineral material disposal, and fluid mineral leasing would be prohibited. In addition, PHMA (i.e., all mapped occupied habitat) would be recommended for withdrawal from locatable mineral entry. These

**Table 4.20**  
**Acres of Allocations Potentially Affecting Lands with Wilderness Characteristics**

Management Action	Alternative A	Alternative B		Alternative C	Alternative D		Alternative E		Proposed Plan	
	Mapped Occupied Habitat	PHMA	GHMA	PHMA <i>(all mapped occupied habitat)</i>	PHMA	GHMA	GRSG Habitat in SGMA/ Core Areas	GRSG Habitat outside of SGMA/ Noncore Areas	PHMA	GHMA
ROW exclusion	15	47,600	0	86,100			0	15	15	0
Aboveground linear					25,100	0				
Underground					15	0				
Wind					76,900	0			61,200	0
ROW avoidance	12,600	0	0	0			48,000	0	61,200	0
Aboveground linear					51,800	0				
Underground					76,800	0				
Wind					0	0			0	0
Closed to fluid mineral leasing	12,700	47,600	0	86,100	12,700	0	12,700	0	12,600	0
Open to fluid mineral leasing subject to NSO stipulations	3,000	0	1,300	0	19,700	1,300	100	2,900	48,600	1,800
Open to fluid mineral leasing subject to CSU or TL stipulations	32,300	0	1,900	0	44,600	7,800	35,300	32,200	0	21,100
Closed to nonenergy mineral leasing	12,700	47,600	0	86,100			12,700	0	61,200	0
Closed to all leasing					14,000	0				
Closed to surface mining					69,900	0				
Closed to mineral material disposal	4,200	47,600	800	86,100			3,300	900	61,200	900
Closed to all disposal					5,400	800				
Closed to commercial disposal					71,500	0				
Recommend for withdrawal from locatable mineral entry	39,300	32,700	6,600	86,100	300	39,000	300	39,000	0	0

types of activities and associated development can reduce the size of lands with wilderness characteristics and can impair the apparent naturalness of the area and the feeling of solitude. Precluding these types of activities would help protect wilderness characteristics on 86,100 acres of lands with wilderness characteristics. New disturbances would only result from vegetation or fuels treatments or wildland fire. As under the other alternatives, vegetation and fuels treatments could impact naturalness and solitude in both natural areas and lands with wilderness characteristics in the short term but would have limited long-term impacts. Impacts from vegetation treatments on lands with wilderness characteristics would also be diminished under Alternative C because an emphasis would be placed on passive restoration. Further, under Alternative C, some form of vegetation treatments would also be counted as surface disturbance, which is capped at 3 percent. As such, fewer treatments would occur in lands with wilderness characteristics and those treatments would likely be conducted using less invasive methods (e.g., hand thinning).

By the nature of these areas having wilderness characteristics, there are minimal discrete disturbances of the type subject to the 3 percent disturbance cap. Restoration or reclamation of disturbances on lands with wilderness characteristics would enhance naturalness over the long term.

In addition, under Alternative C1, livestock grazing would be prohibited in PHMA (i.e., all mapped occupied habitat). This would eliminate the need developments for livestock (e.g., fences, cattle guards, guzzlers, stock ponds, and access roads) and would protect wilderness characteristics. Impacts under Alternative C2 would be similar to other alternatives in that any existing structures for livestock are not precluding the areas from having wilderness characteristics. If future development occurred, naturalness could be affected.

Except for livestock grazing management, Alternative B would apply similar management to PHMA as under Alternative C, and impacts would be the same in these areas. However, because fewer acres would be managed as PHMA under Alternative B, there is less potential for wilderness characteristics to be maintained on all 86,100 acres with those characteristics. Where lands with wilderness characteristics overlap GHMA, restrictions on surface-disturbing activities could be applied to permits at the project phase to protect GRSG and its habitat; however, lands with wilderness characteristics could be at risk if surface-disturbing activities are not precluded.

Under Alternative D, the majority of lands with wilderness characteristics fall within PHMA. In general, most types of surface-disturbing activities would be allowed with stipulations, design features, or BMPs. Although stipulations, design features, and BMPs could mitigate some impacts on wilderness characteristics, any long-term disturbance would likely result in the loss of at least one of the wilderness characteristics.

Under Alternative E, no surface-disturbing activities would be outright precluded, so risks to lands with wilderness characteristics would be greater than under Alternatives B, C, and D. During project-level permitting, considerations to protect GRSG and its habitat could provide incidental protection to lands with wilderness characteristics by minimizing habitat disturbance and possibly avoiding certain areas altogether, depending upon the project.

Where lands with wilderness characteristics overlap mapped GRSG habitat outside SGMAs/noncore areas under Alternative E, impacts would be similar to those described for Alternative A because there would be no specific management in place to protect GRSG and its habitat. As such, management would be at least as protective of lands with wilderness characteristics as Alternative A.

In the Proposed Plan, the majority of lands with wilderness characteristics would be closed to such surface-disturbing activities as nonenergy mineral leasing and mineral material disposal. They would also be either closed to fluid mineral leasing or open subject to NSO stipulations and exclusion areas for wind energy development and avoidance areas for other types of ROWs. Where surface-disturbing activities are allowed, RDFs could mitigate some impacts on wilderness characteristics. Because disturbance under the Proposed Plan would be mitigated in the long term, there would be no long-term impacts on wilderness characteristics.

## 4.16 LIVESTOCK GRAZING/RANGE MANAGEMENT

### 4.16.1 Methods and Assumptions

#### *Indicators*

Indicators of impacts on range management are as follows:

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

#### *Assumptions*

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- Changes in seasons in use would not necessarily result in a reduction in AUMs because grazing could occur during other times of the year at the same level.
- All new and renewed leases and permits would be subject to terms and conditions determined by the Authorized Officer to achieve the management and resource condition objectives for public lands and to meet BLM Utah Public Land Health Standards and desired conditions on National Forest System 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 along water pipelines and naturally along fence lines within 5 years to the extent possible, whereas a portion of the disturbed areas with water wells, troughs, and reservoirs could 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 LUP. Range improvements are generally intended to better 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 LUPA, 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.

#### **4.16.2 Alternative A**

No PHMA or GHMA is designated for GRSG under this alternative. In general, Alternative A would be the least restrictive on resource uses, including livestock grazing. As a result, grazing permittees would continue to manage their grazing operations under the current management. This alternative would also be the least restrictive for other resource uses and associated development; therefore, there is an increased chance of disturbance from mineral development, recreation, and other uses on livestock grazing operations.

#### ***Greater Sage-Grouse Management***

In general, management actions to protect GRSG involve limiting surface disturbance and fragmentation of habitat from other land uses. Such actions are likely to decrease disturbance on livestock grazing from other land use activities. Restrictions on surface disturbances may also limit construction of rangeland improvements by limiting livestock grazing management options and livestock use opportunities.

Under Alternative A, special provisions for GRSG protection are limited. There are few direct limitations on resource uses specifically for GRSG protection. A few LUPs (e.g., Vernal RMP and Uinta LRMP) include detailed habitat objectives for GRSG habitat, which could impact suitability of lands for livestock grazing, but such provisions are not present in most LUPs. There is also limited potential for site-specific restrictions on range management because of measures to protect, maintain, and enhance special status species habitat. In addition, many LUPs contain management actions to prohibit surface-disturbing or other disruptive activities within GRSG breeding and nesting habitat and, in some cases, winter habitat, within a certain distance and between certain dates. The level of impacts on grazing management would depend on site-specific restrictions in place under current LUPs, but is likely to be lower under Alternative A than all other alternatives.

#### ***Vegetation Management and Fire (including invasive plants and juniper encroachment)***

##### *Vegetation Management*

Vegetation management could directly affect livestock grazing if management requires limitations on available grazing acreage or changes to permitted AUMs, grazing strategies, or season of use, which could result in increased cost to permittees.

Under Alternative A, there would be some vegetation management actions specifically for GRSG habitat enhancement in individual RMPs. These actions could require adjustment to livestock grazing management. GRSG-specific management actions for vegetation would not, however, be consistent across the planning area. Vegetation could be managed to improve forage, and impacts on range management would be minimal. Management actions for invasive species would continue under the direction of current LUPs with the focus on areas not meeting land health standards. Under Alternative A, no priorities are established specific to the improvement of GRSG habitat, but rather, prioritization is given to projects that benefit multiple resources; therefore, restoration activities may result in short-term limits on grazing but could improve forage for multiple resource uses in the long term, including livestock grazing.

#### *Wildland Fire Management*

Wildland fire alters sagebrush habitat due to the long time required for sagebrush to regenerate, which may allow for invasion of invasive species (NTT 2011). Wildland fire would remove livestock forage over the short term but can result in forage increases post-fire.

Prescribed burn areas could temporarily reduce available forage in the short term but improve conditions in the long term.

Impacts on livestock operations could also occur when a rest period is required following rehabilitation before grazing resumes and could impact ability of permittees to fully use permitted AUMs.

Under Alternative A, mechanical treatments, prescribed fires, and other treatments would be used to prevent conifer encroachment and remove undesirable annual grass and weed species. These actions could improve forage in the long term. A minimum rest period from livestock grazing of two growing seasons would be required on BLM-administered lands after seeding post any major vegetative disturbance, including wildfire. On National Forest System lands, rest recovery period would be site-specific and based on recovery. For all lands, specific timing and the type of rest, as well as any modification needed to livestock grazing use, would be determined at the site-specific environmental assessment phase. As a result, livestock grazing would be excluded from areas following a fire; impacts on and costs and time for permittees would depend on the fire location relative to grazing allotments.

#### ***Livestock Grazing and Wild Horses and Burros***

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. Some management requirements could result in short- and long-term cost increases to permittees, or AUMs could decrease for some permittees due to the following:

- Implementation of a grazing strategy
- Change in season-of-use or livestock class
- Modification to grazing systems
- Construction, modification, or removal of range improvements
- Requirements for lighter levels of use than historically provided

These management requirements could result in direct and indirect economic impacts on individuals and the community at large. For example, if a ranch is dependent seasonally on federal forage, a reduction or eliminations of federal AUMs could create forage imbalances that produce a greater reduction in grazing capacity than just the loss of federal AUMs (Torell et al. 2002).

Some management changes may require a short-term cost output for permittees but would 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 and provide additional forage in the long term; however, it would have short-term costs. 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.

Under Alternative A, 329,521 AUMs would be permitted on BLM-administered lands and 265,373 AUMs on National Forest System lands, although site-specific temporary changes to use of AUMs may occur. All permits under Alternative A on BLM-administered lands would continue to be required to meet or make progress toward meeting BLM Utah's rangeland health standards. Evaluations of achievement or significant progress towards achievement would continue to occur. Modifications to grazing permits, including grazing systems, permitted AUMs, allotment boundaries, etc. would be made as needed to conform to the Standards and Guidelines for Livestock Grazing Management if grazing has been determined to be the causal factor for non-achievement of a standard, as required by BLM grazing regulations. As a result, any changes to grazing management would occur on a rolling basis at the time of the determination.

Lands would be managed to maintain and restore healthy native desired plant and animal species, and changes to rangeland management would be directed first to allotments identified as not meeting achieving land health standards during permit renewal. Similarly, the focus in riparian areas and wetlands would be to manage, maintain, protect, and restore riparian areas and wetlands towards proper functioning condition. As described above, managing riparian habitat can directly impact livestock grazing through excluding livestock at specific sites, increasing herding, and adding range improvements (such as cross fences, water gaps, and off site waters). Such changes in grazing management options could result in increased time or costs for permittees.

Measures for GRSG and other sensitive species habitat under Alternative A are limited to requirements for, "maintenance of desired species including native, threatened, endangered, and special status species at a level appropriate for the site and species." This alternative would not direct the BLM or Forest Service to manage certain areas more intensively for GRSG habitat objectives; therefore, impacts on grazing in GRSG habitat would be similar to those throughout the planning area.

In general, structural range improvement construction and modification, including fences and water developments and vegetation treatments to improve forage, would be allowed in the decision area when needed to support grazing systems or improve livestock distribution on a case-by-case basis, providing increased options for livestock management for the BLM and Forest Service and the permittees. Fences would be constructed to protect and benefit livestock and wildlife, but no specific provision are included for GRSG, so additional costs could be limited.

#### ***Travel and Transportation***

Limits on construction or use of transportation routes could affect livestock grazing practices. Road construction could 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. As discussed further under *Other Actions* (recreation), below, there is potential for conflicts between recreational use and livestock grazing to occur, particularly in areas open to cross-country travel. Limitations on cross-country travel, however, could impact permittees' ability to effectively manage livestock if exemptions are not granted for allotment access.

Under Alternative A, conflicts are most likely to occur between livestock grazing and OHV use in the 797,000 acres of the decision area open to cross-county travel and to some extent on the 437,400 acres limited to existing routes. Access to allotments would be maintained. OHV use on National Forest System lands is limited to roads, trails, and areas that have been designated through a transportation planning process and, therefore, impacts on livestock disturbance or allotment access from travel management would be the same across all alternatives on National Forest System lands.

***Infrastructure Development (including all ROWs and utility corridors)***

Restrictions on ROWs, particularly ROW exclusion areas, may indirectly impact grazing by reducing construction impacts from development of these ROWs (such as dust reducing forage palatability, harassment or displacement of livestock, and introduction of noxious weeds). In all cases, impacts would be concentrated on areas where restrictions on development overlap with areas available for livestock grazing.

Under Alternative A, approximately 27,600 acres within mapped GRSG habitat are classified as ROW exclusion areas for new ROW development. Outside of mapped occupied habitat in population areas, there are an additional 74,900 acres of ROW exclusion areas. Indirect impacts on livestock from development would be reduced where areas available for livestock grazing overlap these ROW exclusion areas. Some additional limitations on disturbance from development could occur in ROW avoidance areas.

***Mineral Development (including geothermal)***

During the exploration and testing phase of 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. Outside of the exploration and testing phase, surface-disturbing mineral development directly affects areas of grazing in the short term during construction of well pads, roads, pipelines, and other facilities. Potential impacts include changes in available forage, reduced forage palatability because of dust on vegetation, limits 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 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 maintain rangeland health and forage levels for livestock. Management for energy and mineral development on split-estate lands would not impact BLM permittees; however, impacts could occur to livestock grazing on National Forest System lands, as well as private, state, or other lands.

In general, Alternative A is the least restrictive on energy and mineral development of all the alternatives (**Table 2.3**). As a result, the indirect impacts of development on livestock grazing, including spread of noxious weeds and disturbance of livestock, would be the greatest under this alternative.

#### **Other Actions**

Recreation can affect livestock grazing directly through human disturbance and indirectly through rangeland habitat 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 recreational vehicle use or from recreational shooting. Disturbance could occur during the hunting seasons due to increased presence of people, vehicles, and noise and livestock shooting. In addition, OHV use causes indirect impacts, such as increased dust on forage in high-use areas, leading to lower forage palatability.

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 (such as, 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).

Under Alternative A, there would be no new restrictions to SRPs in the decision area; therefore, livestock could be disturbed by recreational activities or groups in the planning area. Some limited potential for disturbance from general recreational activities is possible, as described above.

#### **4.16.3 Alternative B**

Mapped occupied GRSG habitat would be designated as PHMA and GHMA under this alternative, and impacts would primarily occur to range management in PHMA due to restrictions on resource uses.

#### **Greater Sage-Grouse Management**

Management actions designed to enhance GRSG habitat could affect livestock grazing by restricting grazing intensity, changing season of use, or requiring more intensive and costly management practices, in order to maintain residual herbaceous cover in sagebrush habitat (NTT 2011). Management of vegetation to benefit GRSG, could, 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 sagebrush community composition may have occurred that have reduced cover or forage for GRSG (Cagney et al. 2010) and grazing livestock.

Under Alternative B, PHMA and GHMA would be designated in the planning area, and measures would be put into place to manage or restore PHMA so that at least 70 percent of the land cover provides adequate sagebrush habitat to meet GRSG needs. Where cover requirements do

not meet forage objectives for livestock grazing, this would result in the need to modify grazing practices with increased costs for permittees. Management of PHMA so that discrete anthropogenic disturbances cover less than 3 percent of the total GRSG habitat would result in decreased indirect disturbance on livestock grazing from other land uses such as mineral development and roads as compared with Alternative A. The ability to construct range improvements could be limited in some instances by these requirements. Reduction of disturbance could also indirectly affect livestock management maintaining or improving forage production, vegetation productivity, riparian resources, and decreasing soil disturbance, thereby maintaining or improving overall rangeland conditions.

### ***Vegetation Management and Fire (including invasive plants and juniper encroachment)***

#### *Vegetation Management*

Under Alternative B, meeting GRSG habitat objectives within PHMA would be 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/or abundance. Post-restoration management to ensure long-term persistence could include changes in livestock grazing management to achieve and maintain the desired conditions. As a result, limitations on livestock grazing management as a result of vegetation management could occur in PHMA, particularly in important seasonal habitats and in areas post-restoration. Management actions for invasive species would continue under the direction of Integrative Vegetation management directives, with limited impacts on livestock grazing.

#### *Wildland Fire Management*

Overall, changes in wildland fire suppression and fuels management to protect GRSG habitat would have varying effects on livestock grazing. Measures to protect sagebrush habitat could reduce the spread of wildland fire and the associated disruption to livestock. If grazing allotments are allowed to burn because they are not priority suppression areas, it could result in a reduction in available forage in the short term.

Use of livestock to aid in thinning fine fuels could provide some increased opportunities for grazing at a site-specific scale. This would likely involve high-intensity, short-duration grazing in the late fall or early spring/late winter to target cheatgrass and would involve intensive management such as increased herding and temporary fencing in order to concentrate livestock in the desired area. As a result, management costs and time would be high and may result in reduced livestock productivity.

Under Alternative B, fuels treatments and fire suppression in PHMA would be prioritized, with the focus on GRSG habitat protection. As a result, there is potential for fewer disturbances to grazing with fewer wildland fires in the long term.

Management actions to restore PHMA post-fire could result in impacts on range management; under Alternative B, management activities could be adjusted to support restoration/post-rehabilitation efforts. This adjustment could result in a temporary grazing reduction in areas of post-fire rehabilitation. The level of impacts would depend on size, location, and intensity of fire and related level of restoration needed. Upon successful rehabilitation, the temporary reductions could be re-authorized

***Livestock Grazing and Wild Horses and Burros***

Under Alternative B, acres available for livestock grazing and permitted AUMs would be the same as Alternative A. Consideration of GRSG habitat objectives and management would be required in grazing management in PHMA and incorporated into all grazing allotments through allotment management plans or their equivalent, permit renewal terms or conditions, or Forest Service NEPA processes. As a result, impacts described below would occur over time at a site-specific level as measures are incorporated into individual allotments. Land health assessment and permit renewals would be prioritized in PHMA; therefore, there is potential for further degradation of lands outside of PHMA in the decision area.

Modifying LUP decisions to make PHMA unavailable for livestock use would result in potential reductions in AUMs in the planning area in the long term. Compensation for permittee-constructed authorized range improvements would be provided as appropriate for BLM permittees based on requirements in 43 CFR 4120.3-6(c) and in certain limited circumstances for Forest Service permittees per 36 CFR 222.6 (a).

Under Alternative B, 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 for livestock grazing in PHMA could be reduced. Land health assessments using ESDs would be required to evaluate if standards for rangeland health, as well as GRSG habitat objectives, were being met, with potential modifications to grazing management required if allotments were found to not be meeting standards or objectives, resulting in increased time and costs for permittees.

Managing riparian habitat can directly impact livestock grazing by excluding livestock at specific sites, increasing herding, adding range improvements (such as cross fences, off-site waters, and water gaps), and adjusting season of use and livestock numbers. As in Alternative A, managing riparian habitat to maintain proper functioning condition would benefit grazing livestock by indirectly providing cleaner, 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 livestock or other restrictions on livestock management, these limitations could result in increased costs to permittees if changes resulted in AUM reduction or increased livestock management costs. Increased range improvement maintenance would also add to operating costs and decrease permittee profitability.

Under Alternative B, similar to Alternative A, riparian areas would be managed for proper functioning condition or similar standards at a minimum with increased emphasis in PHMA, with potential limitations on grazing within these areas or increased use of fencing/herding, seasonal limitations on grazing, or creation of water developments or other measures to manage distribution of livestock. These measures could result in increased permittee cost or time. In both PHMA and GHMA, additional measures would be implemented to conserve and enhance wet meadows, also with potential for increased permittee time and cost in these areas.

In the long term, livestock grazing in PHMA could be reduced under Alternative B in order to conform to GRSG habitat guidelines identified by Connelly et al. (2000) and Hagen et al. (2007); timing and degree of reduction would depend on permit renewal timing and site-specific conditions.

Structural range improvements (e.g., fences) in PHMA under Alternative B would be allowed, but would be developed to conserve, enhance, or restore GRSG habitat. In addition, some fences would require marking to lessen the risk of GRSG impacts; therefore, the cost of building or maintaining these structures could be increased compared with Alternative A.

Similarly, new water developments from spring or seep source diversions would only be permitted when GRSG habitat would also benefit and, therefore, would be limited. Consequently, permittees could have increased management costs, and AUMs could require reduction if water is limited on a given allotment. Overall, water improvements and fences would likely be removed or modified to some extent in Alternative B, which would result in decreased grazing or shifts in grazing use patterns in the long term.

#### ***Travel and Transportation***

Travel management actions for GRSG protection generally involve increased limitations or restrictions on travel management. As described under Alternative A, limitations on travel management could result in decreased disturbance to livestock but could also limit the ability of permittees to access livestock for management. Under Alternative B, 34,600 acres of the decision area would be open to cross-country use (a 95 percent decrease from Alternative A), with a related increase in areas limited to existing routes (1,213,500 acres, a 270-percent increase from Alternative A). Additionally, in PHMA, OHV travel would be limited to existing roads, primitive roads, and trails until travel management planning is complete and the need for additional closures evaluated. As a result, disturbance to livestock is likely to be reduced, particularly in PHMA. Access to livestock and structural range improvements is not likely to be impacted by the creation of activity-based plans under Alternative B.

#### ***Infrastructure Development (including all ROWs and utility corridors)***

Lands and realty actions to protect GRSG habitat would generally involve ROW avoidance or exclusion areas (e.g., for power lines, pipelines, and other structures) or land transfers in GRSG habitat and could result in a slight decrease in disturbance in these areas.

Under Alternative B, all PHMA, approximately 2,784,200 acres within mapped occupied GRSG habitat, would be ROW exclusion (100 times more than Alternative A). Impacts would be the same as those discussed in Alternative A; however, the overall potential for disturbance would be decreased due to the larger exclusion area. Outside of occupied GRSG habitat in population areas, ROW exclusion and avoidance areas would be the same as under Alternative A.

#### ***Mineral Development (including geothermal)***

Under Alternative B, additional restrictions would be placed on mineral development as compared with Alternative A; lands in PHMA would be recommended for withdrawal from mineral entry for locatable minerals, closed to mineral materials removal, and closed to new leasing for fluid minerals. For currently leased parcels, NSO stipulations would be applied in

PHMA. As a result, indirect disturbance of livestock from mineral development would be minimized in PHMA.

#### **Other Actions**

As discussed under Alternative A, limitations on recreational use in GRSG habitat in PHMA could indirectly benefit livestock by reducing direct disturbance. Limiting use could also reduce the likelihood of livestock dispersing into unauthorized areas through gates being left open.

#### **4.16.4 Alternative C**

Alternative C would be the most restrictive of grazing management; no livestock grazing would be authorized in mapped occupied GRSG habitat under Alternative C1, and livestock grazing would be reduced in Alternative C2. Activities for all other resource uses would also be restricted under this alternative; however, impacts of all other resources and resource uses on livestock grazing under Alternative C would be limited due to reduced permitted grazing under this alternative.

#### **Greater Sage-Grouse Management**

Under Alternative C, all mapped occupied GRSG habitat would be classified as PHMA and would be unavailable for livestock grazing in Alternative C1 and would have permitted grazing reduced in Alternative C2.

Objectives would include the restoration and maintenance of the sagebrush steppe to its ecological potential in PHMA. These objectives could impact livestock grazing management where these objectives are not consistent with livestock forage requirements. Due to the exclusion of grazing in PHMA under Alternative C1 and the reduction of grazing in Alternative C2, no impacts would occur in Alternative C1, and impacts from GRSG management on livestock grazing would be limited in Alternative C2.

Limitation on surface disturbance in PHMA to one instance per section of GRSG habitat regardless of ownership, with no more than 3 percent surface disturbance, could result in indirect impacts by limiting disturbance to livestock grazing from other land uses such as mineral development and road construction, as compared with Alternative A. However, due to the exclusion of grazing under Alternative C1 and reduction of grazing in Alternative C2, there would be negligible impacts from this management action.

In contrast to other alternatives, the disturbance cap in Alternative C could result in direct impacts on livestock grazing at a site-specific level, as it does apply to “heavily grazed areas.” However, due to the exclusion of grazing in Alternative C1 and reduction in grazing in Alternative C2, the likelihood of incurring heavily grazed areas under this alternative would be low, even on a site-specific level; therefore, impacts on grazing management would be limited.

Due to other management actions limiting the construction of range improvements under Alternative C and elimination (Alternative C1) or reduction (Alternative C2) in grazing under this alternative, the disturbance cap is not likely to impact the ability of permittees to construct structural range improvements or distribute livestock.

Under Alternative C, a portion of mapped occupied habitat would be closed to OHV travel. While it is assumed that routes used by permittees would remain available for administrative access, it is possible that there would be reduced access under Alternative C2.

### ***Vegetation Management and Fire (including invasive plants and juniper encroachment)***

#### *Vegetation Management*

Under Alternative C, prioritization of areas for restoration and vegetation management actions would be similar to those discussed in Alternative B. Impacts on livestock grazing management would be limited due to no authorized grazing under Alternative C1 and reduced grazing under Alternative C2.

#### *Wildland Fire Management*

Under Alternative C, management priorities and impacts would be similar to those described in Alternative B. Due to no authorized grazing under Alternative C1 and reduced grazing under Alternative C2, impacts from wildland fire management on livestock grazing would be limited.

### ***Livestock Grazing and Wild Horses and Burros***

#### *Alternative C1*

Alternative C1 would remove livestock grazing from all allotments totally in or partially within mapped occupied GRSG habitat following a 2-year notice to cancel existing permits. In the planning area overall, this represents a 100-percent reduction in AUMs compared with Alternative A. Removal of grazing from all allotments intersecting mapped occupied habitat would result in economic impacts on permittees. As discussed under Alternatives A and B, permittees would be faced with reducing AUMs for their operations or locating replacement forage, often at higher costs than that currently obtained from federal lands and with limited availability. Changes to permitted AUM levels could also impact property values of ranches adjacent to federal lands. Closures would also impact permittees' current seasonal rotations or other management strategies that use both federal and private lands.

Due to these factors, the elimination of permitted grazing in PHMA could result in permittees going out of business. Loss of business could impact both individual permittees and local communities as a whole, and could result in the sale or transfer of private grazing lands, and subsequent development of these lands for other uses. Details of the social and economic impacts are discussed in **Section 4.23**, Social and Economic Impacts (Including Environmental Justice).

No specific management actions related to range infrastructure are in place under Alternative C1 due to the lack of permitted grazing. It is unclear whether a concerted effort to remove any or all livestock management infrastructure would occur. In areas made unavailable for grazing, any maintenance requirements for remaining infrastructure and associated costs would likely fall to the BLM and Forest Service to complete. Permittees who have investments on federal lands in mapped occupied habitat that would be impacted would receive compensation as appropriate based on federal regulations in 43 CFR 4120.3-6(c) and 36 CFR 222.6 (a). The BLM's and Forest Service's funds or other investments towards the construction of range infrastructure could also be impacted. Furthermore, fencing could be required to avoid trespass of livestock onto lands

where grazing is excluded, representing potential additional costs for permittees. Increased time or costs could be substantial in areas with checkerboard land ownership, where public land is interspersed with private or state land.

Lack of ability to use range improvements and water developments on occupied habitat could result in other indirect costs. Permittees who currently rotate pastures between private and federal lands could need to construct additional water developments or other structural range improvements on private pastures, resulting in increased time and costs.

As a result of removal of grazing from mapped occupied habitat, there is also the potential for increased conflicts between grazing and other resources and resource uses on lands of other surface ownership should livestock grazing increase in areas outside of occupied habitat.

#### *Alternative C2*

Under Alternative C2, livestock grazing would be significantly reduced in the decision area, with 197,713 AUMs on BLM-administered lands and 159,224 AUMs on National Forest System lands (an approximate 52-percent and 40-percent reduction, respectively, compared with Alternative A). Site-specific closure of allotments would be determined when an allotment is analyzed, as described in Alternative B, above. Impacts of closing allotments would be similar to those described in Alternative C1.

In areas where grazing would still be permitted, management would be similar to that described in Alternative B, with the addition of other protective measures for GRSG habitat (such as prohibition of grazing during the growing season). As a result, time and costs for permittees would be substantially increased as compared with Alternative A.

Existing structural range improvements under Alternative C2 could require modifications or removal when determined to have a high risk of GRSG strike. In addition, management actions would allow no new water developments and could require dismantling existing developments. Other structural range improvements would be permitted only when shown in peer-reviewed studies to be beneficial to GRSG, and, therefore, few are likely to be permitted. The modification of range improvements would represent direct increased costs to permittees. Modification and removal of existing improvements and prohibitions on new improvements could also limit ability to effectively distribute livestock, resulting in inability to improve range conditions and potential for indirect increases in time and costs for permittees. As discussed under Alternative C1, loss of use of range improvements in areas made unavailable for livestock grazing also has the potential to result in direct and indirect costs. As under Alternative C1, fencing could be required to avoid trespass of livestock onto lands where grazing is excluded, representing potential additional costs for permittees. Increased time or costs could be substantial in areas with checkerboard land ownership, where public land is interspersed with private or state land.

Wild horse AMLs would be reduced by 25 percent in HMAs that are entirely or partially within PHMA under Alternative C2. This reduction could decrease competition for forage in these areas.

### ***Travel and Transportation***

Under Alternative C, the nature and type of impacts would be as described under Alternatives A and B. Under Alternative C, no areas would be available for cross-county travel (a 100-percent reduction in the decision area compared with Alternative A), and areas limited to existing or designated routes would increase (1,943,700 acres, 17 percent more acres than under Alternative A). As under Alternative B, additional limitations for OHV travel would apply in PHMA. Additionally, new road construction would be prohibited. Alternative C would close existing routes on 555,700 acres. This closure would reduce conflicts between recreation and livestock grazing. Permittees would be allowed to use existing routes within these areas to access range improvements. Under Alternative C1, however, impacts on livestock grazing would not occur due to PHMA being unavailable for livestock grazing. Under Alternative C2, impacts would occur on the limited allotments available for grazing under this reduced grazing Alternative. Prohibition of new roads could limit long-term disturbance of livestock from vehicles but could also impact the ability to access allotments for management as compared to Alternative A.

### ***Infrastructure Development (including all ROWs and utility corridors)***

Under Alternative C, ROWs would be excluded on all 3,313,800 acres of mapped GRSG occupied habitat. Due to the exclusion of grazing from PHMA under Alternative C1, however, the lack of disturbance in this area would not impact livestock management. Under Alternative C2, impacts would occur in areas that remained available for livestock grazing. In population areas outside of occupied habitat, there would be some potential for decreased disturbance due to management actions limiting development in this area.

### ***Mineral Development (including geothermal)***

Under Alternative C, additional restrictions would be applied to mineral and energy development (**Table 2.3**). No impacts would occur from energy and mineral development on livestock grazing under Alternative C1 due to the exclusion of grazing from PHMA. Under Alternative C2, energy and mineral management actions would result in decreased disturbance and increased forage production for areas remaining available for grazing.

### ***Other Actions***

Under Alternative C, SRPs in PHMA would be restricted when they were found to have negative impacts on GRSG, as described in Alternative B; no impacts would occur under Alternative C1 due to the exclusion of grazing from PHMA, and impacts would be limited under Alternative C2 due to reduced grazing.

## **4.16.5 Alternative D**

Alternative D management actions and related impacts would be similar to those described in Alternative B; however, many grazing management actions would be determined at the BLM District or Forest Service unit level in order to emphasize management appropriate for local vegetation communities and GRSG habitats, rather than at the planning-unit scale. As a result, impacts on range management would vary at a site-specific level.

### ***Greater Sage-Grouse Management***

Under Alternative D, PHMA and GHMA would be designated in the planning area. Objectives for sagebrush, grasses, and forbs would follow habitat guidelines from scientific literature based

on documented regional variation. As a result, the nature and type of impacts on livestock management would be similar to those described under Alternative B, but could be reduced in intensity due to the ability to take into account region-specific habitat limitations to meeting these objectives.

In addition, disturbance in PHMA would be limited to less than 5 percent of the area within PHMA used by a population of GRSG, regardless of ownership. As a result, indirect disturbance of livestock grazing from other new mineral or road developed could be reduced as compared with Alternative A.

Season-specific limitations on disturbance could impact the time during which range improvements, such as stock ponds to improve livestock distribution, could be constructed, with some potential impacts on management time and cost for permittees.

***Vegetation Management and Fire (including invasive plants and juniper encroachment)***

Under Alternative D, priority for restoration and vegetation treatment would be on treating PHMA to maintain and expand healthy GRSG habitat. There would be objectives for short- and long-term habitat conditions, and they would include specific objectives for the establishment of sagebrush cover and height, as well as cover and heights for understory perennial grasses and forbs necessary for GRSG seasonal habitats. Impacts could occur should treatments in this habitat not match with vegetation objectives for livestock grazing; however, in most cases, treatments (e.g., conifer removal) would improve forage conditions in the long term.

Restoration projects would be developed with involvement from local agencies; therefore, impacts on livestock grazing would be reduced due to incorporation of local habitat needs.

Under Alternative D, wildland fire management would be prioritized in PHMA, with an emphasis on maintaining, protecting, and expanding sagebrush ecosystems. Management actions would be similar to those described in Alternative B, with additional measures providing direction for site-specific variables and specific GRSG habitat types (e.g., winter habitat) and use of strategic suppression planning in PHMA. As a result, impacts would be similar to those in Alternative B, with increased potential for limitations on grazing management and decreased change disturbance from wildfire in the long term, as compared with Alternative A.

As in Alternative B, fine fuels management projects using livestock grazing have the potential to result in site-specific opportunities for short-term site-specific increases in grazing in PHMA requiring intensive management, but impacts are likely to be minimal overall.

***Livestock Grazing and Wild Horses and Burros***

Under Alternative D, acres available for livestock grazing and permitted AUMs would be the same as under Alternative A.

Grazing management actions and impacts would be similar to those described in Alternative B, with a moderate decline in permitted grazing anticipated over time as permits are modified to incorporate GRSG objectives at renewal or allotment analysis. As described in Alternative B, GRSG habitat objectives and management considerations would be incorporated into grazing allotments through allotment management plans or permit renewals, or Forest Service NEPA

processes. However, under Alternative D, local objectives would be developed with the state and local governments. As a result, impacts on grazing systems could occur upon permit renewal or allotment NEPA analysis, as discussed in Alternative B, but collaboration with the state should decrease conflicts in livestock grazing practices and provide a location-appropriate framework, assisting permittees' ability to adopt these measures and thereby reducing impacts.

As described in Alternative B, riparian and wetland habitat would be managed to move towards or maintain proper function condition or Forest Plan standards and guidelines, and strive towards GRSG habitat objectives; impacts on grazing would be as described in Alternatives A and B.

Water developments and structural range improvements under Alternative D would be permitted with limitations; impacts on grazing would be as described in Alternative B.

Overall, impacts would be as described for Alternative B but would vary on a site-specific basis.

#### ***Travel and Transportation***

Under Alternative D the nature and type of impacts would be as described under Alternatives A and B. Under Alternative D, 77,000 acres are available for cross-county travel (a 90-percent reduction in the decision area compared with Alternative A), and areas limited to existing routes would be increased (1,249,500 acres, nearly 3 times more acres than Alternative A). Additionally, PHMA would be limited to existing routes at a minimum, and road restoration would be prioritized. As a result, livestock disturbance is likely to be reduced, particularly in PHMA and in certain population areas prioritized for travel management planning. Access to livestock and structural range improvements is not likely to be impacted by the creation of activity-based plans under Alternative D.

#### ***Infrastructure Development (including all ROWs and utility corridors)***

Under Alternative D, the nature and type of impacts from ROW development would be as described under Alternatives A and B. Under Alternative D, however, restrictions on ROW development in GRSG occupied habitat would differ based on the type of ROW authorization (**Table 2.3**). Exclusion areas for aboveground linear ROWs would be 1,422,300 acres, 50 times more than exclusion areas in Alternative A. Therefore, the chance of disturbance from linear projects (e.g., transmission lines) would be decreased as compared with Alternative A. Exclusion areas for underground ROWs would cover a more limited area, but development of these areas would be less likely to disturb livestock. Finally, exclusion areas for site-type ROWs would be 219,900 acres in mapped GRSG habitat (approximately 8 times more than Alternative A), with additional limitations on disturbance. Outside of occupied habitat, population areas would have restrictions placed on ROW development, similar in magnitude to Alternative A. Overall, impacts from all types of ROW development would be decreased in GRSG habitat under Alternative D as compared with Alternative A, which would benefit forage sustainability and livestock grazing in general.

#### ***Mineral Development (including geothermal)***

Under Alternative D, restrictions would be applied to mineral and energy development as in Alternative B (**Table 2.3**). Additional restrictions and stipulations on energy and mineral development would be applied for seasonal habitat requirements, as well as areas adjacent to

leks in PHMA and GHMA. As a result, disturbance to livestock grazing could be reduced in these areas as compared with Alternative A.

#### **Other Actions**

Impacts from recreation would be the same as those described under Alternative B.

#### **4.16.6 Alternative E**

Under Alternative E1, mapped GRSG habitat in SGMAs would be managed for the conservation of the species and no specific management actions are proposed for mapped GRSG habitat outside SGMAs. This alternative would allow for greater flexibility in management options, thereby limiting impacts on range management. Site-specific variation is more likely to occur due to variation in management actions based on season of use and type of GRSG habitat.

Under Alternative E2, as in Alternative B, management objectives would focus on core habitat as identified by the state of Wyoming. As described for Alternative E1, this alternative would allow for greater flexibility in management options limiting impacts on range management. Site-specific variation is more likely to occur due to variation in management actions based on season of use and type of GRSG habitat.

#### **Greater Sage-Grouse Management**

##### *Alternative E1*

Under Alternative E1, mapped GRSG habitat in SGMAs would be designated. Objectives for enhancement of mapped GRSG habitat in SGMAs and to increase the total acres of GRSG habitat adjacent to SGMAs would be developed; with potential for impacts on livestock management should GRSG objectives not match livestock needs.

Similar to Alternative D, Alternative E1 would include a limit on permanent disturbance of 5 percent of habitat. However, under Alternative E1, this would only apply to new disturbances within any particular SGMA. As a result, there are not likely to be substantial changes to the level of disturbance to livestock from other activities (including mineral development, etc.) as compared with Alternative A. Ability to construct range improvements is also not likely to be impacted by the proposed cap.

Specific limitations on disturbance would be based on habitat type (e.g., winter and breeding) and season, with potential for related limitations on range improvements. However, some flexibility in implementation would be permitted and would limit impacts.

##### *Alternative E2*

Under Alternative E2, core areas and noncore areas would be designated in the project area. Vegetation composition and structure would be managed consistent with ecological site potential to achieve seasonal GRSG seasonal habitat objectives within core areas. The document "Grazing Influence, Management, and Objective Development in Wyoming's Greater Sage-Grouse habitat (Cagney et al. 2010) would be used as guidance when determining appropriate management actions to be considered.

Opportunities for habitat enhancement and conservation within core areas would be prioritized based on threats and the ability to manage GRSG habitat, and site-specific conservation and mitigation objectives would be included in project planning within GRSG habitats. Given these management strategies, forage is likely to be improved in many circumstances in the long term.

Range improvements would be authorized only if they maintain and/or improve GRSG and its habitat within core areas. This could limit where water developments and fences are located, which could affect livestock management in some areas.

### ***Vegetation Management and Fire (including invasive plants and juniper encroachment)***

#### *Vegetation Management*

Alternative E1. Under Alternative E1, protection of GRSG habitat would be prioritized, and active vegetation projects (e.g., conifer removal) would be permitted to improve GRSG habitat. Protection of GRSG habitat and vegetation management projects could restrict management options for livestock grazing, but are also likely to improve forage conditions in the long term. Treatment projects within nesting and winter habitat would be limited; therefore, impacts in these habitats would be limited.

Alternative E2. Under Alternative E2, protection of GRSG habitat would be prioritized, and projects that have the greatest chance to improve habitat for GRSG would be implemented over other projects. As described for Alternative E1, implementation of vegetation restoration projects that improve GRSG habitat could restrict management options for livestock grazing but are also likely to improve forage conditions in the long term.

#### *Wildland Fire Management*

Alternative E1. Under Alternative E1, fire suppression and fuels treatments would be designed to minimize the replacement of burned native vegetation by invasive plants. Use of prescribed fire would be limited, and treatment efforts would be designed with state government. Retention of native plants could benefit forage conditions. Creation of a state fire plan would improve ability to respond to wildfire across all lands in the planning area and would reduce the risk of livestock grazing disturbance from fire.

The use of prescriptive grazing would be considered specifically to reduce fire size and intensity on all types of land ownership, where appropriate. As discussed in Alternative B, this could involve high-intensity, short-duration grazing, which would require more intensive management than standard season-long grazing practices to keep the livestock focused on the areas where the effect is needed. To support such management, there is a potential for increased herding and temporary fencing in order to concentrate livestock in the desired area. As a result, management costs and time could be greater compared with standard season-long grazing practices.

Alternative E2. Under Alternative E2, vegetation and fuels treatments would be designed with an emphasis on protecting existing sagebrush ecosystems and enhancing and protecting future sagebrush ecosystems. Recommended protocols such as WGFD Protocols for Treating Sagebrush to Benefit Sage-Grouse (WGFD 2011) and BLM IM 2011-138 (Sage-Grouse

Conservation Related to Wildland Fire and Fuels Management) would be used in determining whether a proposed treatment constitutes a “disturbance” that would contribute toward the 5 percent disturbance cap for habitat maintenance. Additionally, these protocols would be used to determine whether the proposed treatment configuration would be expected to have neutral or beneficial impact for priority populations or if they represent additional habitat loss or fragmentation.

In core areas, suppression would be prioritized immediately after firefighter and public safety to conserve GRSG habitat. Grazing on treated areas would be deferred for two full growing seasons unless vegetation objectives or vegetation recovery indicates a shorter or longer rest period is necessary based on vegetation monitoring results.

The focus on protecting existing sagebrush ecosystems and enhancing future sagebrush ecosystems, and limitations placed on grazing after fire could reduce the current amount of forage available for livestock in the short and long term, especially if sagebrush density is not reduced in some areas on the landscape.

### ***Livestock Grazing and Wild Horses and Burros***

#### *Alternative E1*

Under Alternative E1, acres available for livestock grazing and permitted AUMs would be the same as Alternative A. Existing grazing operations would use recognized rangeland BMPs to improve habitat for GRSG, thereby increasing the potential for nesting success and population recruitment with limited impacts on grazing management. GRSG seasonal requirements would be considered at the site-specific level during grazing management operations based on specific guidelines for different types of GRSG habitat (e.g., breeding and winter habitat). While other alternatives allow for potential changes to grazing strategies to meet GRSG habitat objectives, under Alternative E1, more specific implementation direction is provided that has the potential to impose limits on grazing in specific habitats or vegetation conditions with potential impacts on grazing systems and resulting in increased time and costs for permittees. For example, management of the time, timing, and intensity of grazing to provide for the seasonal needs of GRSG could require increased time and costs for permittees compared with Alternative A.

In general, under Alternative E1, impacts would be similar to those described in Alternative D; however, under Alternative E1, the management direction is more prescriptive.

In riparian and wetland habitat, as well as water developments, management would emphasize the protection and enhancement of mesic habitat. Rangeland improvements, including water developments in and around riparian and wetland areas, would be managed for the protection and enhancement of the mesic habitat. As a result, there would be potential limitations on placement or type of range improvement or water development and a related cost increase for permittees.

#### *Alternative E2*

Under Alternative E2, acres available for livestock grazing and permitted AUMs would be the same as Alternative A (see **Table 2.3**). In GRSG habitat, livestock numbers (AUMs) and season of use could be adjusted during site-specific evaluations conducted during term grazing permit

renewals, allotment management plan development, or other appropriate implementation activity. Additionally, temporary adjustments could be made annually to livestock numbers, season of use, and other aspects of grazing management within the terms and conditions of the permit.

Under Alternative E2, landscape management strategies on both public and private lands would be coordinated to improve GRSG habitat. Similar to current conditions, if periods of drought occur, the season of use and stocking rate would be evaluated and adjusted through coordination with grazing permittees, which would maintain forage production for livestock in the long term.

Under Alternative E2, management in riparian and wetland habitat management would be the same as described for Alternative E1. As a result, there would be potential limitations on placement or type of range improvement or water development and related increase in costs for permittees.

Under Alternative E2, priority would be placed on retaining sagebrush ecosystems, which would likely reduce the number and extent of seeding projects. This would likely reduce forage for livestock in the long term.

### ***Travel and Transportation***

#### *Alternative E1*

Under Alternative E1, the nature and type of impacts would be as described under Alternatives A and B. Under Alternative E1, 351,700 acres of the decision area would be available for cross-county travel (a 55 percent reduction from Alternative A), and areas limited to existing routes would be increased (888,000 acres, a 100-percent increase in the decision area from Alternative A). Additionally, mapped GRSG habitat in SGMAs with nesting and winter habitat would be managed at least as limited to existing routes until travel management planning is complete. As a result, disturbance to livestock would likely be reduced, particularly in mapped GRSG habitat in SGMAs. However, ability to access livestock or structural range improvements could be reduced as compared with Alternative A. Adoption of travel management plans would be at the county level; therefore, impacts are difficult to predict, but plans would likely provide access for permittees.

#### *Alternative E2*

Under Alternative E2, all acres of the planning area in Wyoming are on National Forest System lands. OHV use on National Forest System lands within the planning area is limited to roads, trails, and areas that have been designated through a transportation planning process; therefore, effects on livestock grazing would be similar to those described under Alternative A.

### ***Infrastructure Development (including all ROWs and utility corridors)***

#### *Alternative E1*

Under Alternative E1, the nature and type of impacts from ROW development would be as described in Alternatives A and B. ROW exclusion areas would be the same as Alternative A, and ROW avoidance areas would be increased to 2,654,000 acres in mapped occupied GRSG

habitat (approximately 40 times more than Alternative A). Similarly, in population areas outside of occupied habitat, exclusion areas would be the same as Alternative A, and avoidance areas would be doubled (103,200 acres). These management actions would result in decreased potential for disturbance of livestock from development. Management stipulations mitigating direct construction disturbance for GRSG would also decrease livestock disturbance.

#### *Alternative E2*

Under Alternative E2, the nature and type of impacts from ROW development would be as described for Alternative E1. Management actions would result in fewer disturbances from development, and management mitigating construction disturbance for GRSG would decrease disturbance of livestock.

Under Alternative E2, wind energy development would not be allowed inside core areas unless it could be sufficiently demonstrated that the development activity would not result in declines of core area populations. Areas that are currently unavailable due to the need to protect sensitive resources would remain unavailable for wind energy development. These management actions would also reduce disturbance for livestock.

#### ***Mineral Development (including geothermal)***

Under Alternatives E1 and E2, mineral and energy development would be limited compared with Alternative A (**Table 2.3**). Additional limitations would be placed on permanent disturbances, as well as on season-specific limitations on development activities, further limiting disturbance to livestock grazing as compared with Alternative A.

#### ***Other Actions***

Under Alternatives E1 and E2, impacts from recreation would be similar to those described in Alternative B but would vary depending on season of use and type of GRSG habitat (e.g., winter and breeding) based on management actions targeting these specific habitat requirements.

#### **4.16.7 Proposed Plans**

Mapped occupied GRSG habitat would be designated as PHMA and GHMA under this alternative, and impacts would primarily occur to range management in PHMA due to restrictions on resource uses within this area. Many management actions and related impacts would be similar to those described in Alternative B and D.

#### ***Greater Sage-Grouse Management***

Similar to Alternative B, under the Proposed Plans, livestock grazing would be managed to achieve or maintain desired conditions in GRSG seasonal habitats. For BLM administered lands, general guidelines would be applied from Objective GRSG-3. In addition to restrictions on management in PHMA and GHMA, 228,500 acres designated as SFA, which provide additional restrictions on disturbance for this area.

On National Forest System lands, livestock grazing would be managed to achieve or maintain desired conditions in GRSG seasonal habitats as described in **Sections 2.6.3** and **2.6.4**. Livestock grazing would be managed to maintain residual herbaceous grass height for overhead and lateral concealment for GRSG nesting and early brood rearing life stages by implementing grazing use guidelines as described in **Sections 2.6.3** and **2.6.4**. Wet meadows and riparian

areas would be managed to sustain a rich diversity of perennial forb species relative to site potential, and winter habitat would provide sufficient sagebrush height and density for food and cover for GRSG during this seasonal period.

In the Proposed Plans, management actions include certain vegetation objectives in PHMA based on VDDT modeling. Approximately 180,900 acres have been identified for conifer removal treatments and 48,000 acres for annual grass treatment to meet GRSG objectives on BLM and National Forest System lands. Where vegetation objectives do not meet forage objectives for livestock grazing, this would result in the need to modify grazing practices with potential for increased time and costs for permittees in these areas.

Management actions designed to enhance GRSG habitat on BLM and National Forest System lands could affect livestock grazing modification of grazing strategies or rotation schedules, changes to duration and/or the season of use, changes to the kind and class of livestock, or reduction of livestock numbers. These modifications could result in the reduction of AUMs on some allotments. Management to achieve these desired conditions would also impact permittees by increasing the amount of time permittees spend to manage livestock on National Forest System lands as well as the total costs to a livestock operation.

Indirectly, implementation of management direction to achieve desired conditions in GRSG seasonal habitat could be beneficial to livestock grazing in the long term, particularly on allotments where rangeland conditions could be improved, by implementing management that improves rangeland conditions. Improved rangeland condition could also contribute to increased forage production.

Similar to Alternatives B and D, the Proposed Plans would include a cap on anthropogenic disturbance; the 3 percent disturbance cap (5 percent on National Forest System lands in Wyoming) on discrete anthropogenic disturbances would be applied in PHMA at both the BSU and project levels, and a limit would be placed on the density of energy/mining facilities. Anthropogenic disturbances in PHMA and GHMA would also be mitigated to ensure a net conservation gain to GRSG. In addition, conservation measures would be implemented in PHMA and GHMA such as adaptive management and defined monitoring protocols (**Appendices B and C**), RDFs (**Appendix G**), and lek buffers (**Appendix F**). As a result, indirect disturbance of livestock grazing or livestock forage from other new mineral or road development could be reduced as compared with Alternative A.

As under Alternative D, season-specific limitations on disturbance could impact the timing of range improvement construction, with some potential impacts on management time and cost for permittees. Tall structure restrictions may also impose some location specific limits on range improvement structures.

***Vegetation Management and Fire (including invasive plants and juniper encroachment)***

Impacts from vegetation management under the Proposed Plans would be similar to those described for Alternative D. The Proposed Plans would include additional measures such as conifer removal, improved management of wet meadows, and implementation of RDFs.

Impacts could occur should treatments for GRSG do not match with vegetation objectives for livestock grazing; however, in most cases, treatments (e.g., conifer removal) would improve forage conditions in the long term.

Impacts from wildland fire management would also be similar to those described for Alternative D with an emphasis on maintaining, protecting, and expanding sagebrush ecosystems. The Proposed Plans would also include assessment of management needs based on local conditions as detailed in **Appendix K**. These actions may result in site-specific limitations on grazing management in GRSG habitat but would help to reduce the likelihood of catastrophic wildfire and subsequent disturbance of livestock and reduction of forage as compared to Alternative A. Fires outside of GRSG habitat would possibly be at risk of decreased suppression efforts, therefore the amount of forage in these areas could be impacted should fires occur.

As in Alternative B and D, fine fuels management projects using livestock grazing have the potential to result in site-specific opportunities for short-term site-specific increases in grazing in PHMA requiring intensive management at the expense of livestock performance, but impacts are likely to be minimal overall.

Under the Proposed Plans on National Forest System lands, measures to protect GRSG habitat from fire and associated fire operations would be beneficial to livestock grazing, especially in the 12-inch or less precipitation zone, because it would help prevent expansion of nonnative invasive species such as cheatgrass. Management direction to protect GRSG habitat from fire in higher elevation sagebrush habitats (i.e., mountain big sagebrush) could indirectly negatively impact livestock grazing in the long term as sagebrush potentially increases and forage production decreases.

#### ***Livestock Grazing and Wild Horses and Burros***

Under the Proposed Plans, acres available for livestock grazing and permitted AUMs would be the same as under Alternative A on BLM-administered and National Forest System lands.

As described in Alternative D, GRSG habitat objectives would be incorporated into grazing allotments through allotment management plans or permit renewals, or Forest Service NEPA processes, with consideration for local objectives. Current direction for livestock grazing under Alternative A is generally less restrictive than direction described under the Proposed Plans, therefore, grazing use guidelines would directly impact livestock grazing management on National Forest System lands. Impacts could include modification of grazing strategies or rotation schedules, changes to the season of use, changes to kind and class of livestock, closure of a portion of an allotment, or reduction of livestock numbers. Implementation of this management direction could result in the reduction of AUMs on some allotments, and possibly overall operation viability.

Impacts would be similar to those described in Alternatives B and D, with a moderate decline in permitted grazing anticipated over time as permits are modified to meet objectives. Under the Proposed Plans, priority for land health assessment and permit renewal on BLM-administered lands would include SFA first followed by PHMA outside the SFA. Precedence will be given to existing permits/leases in these areas not meeting Land Health Standards, with a specific focus

on those containing riparian areas, including wet meadows. Timeline for changes in management would follow this priority.

On BLM-administered lands, adjustments to grazing management or authorized grazing use level would be tailored to achieve Land Health Standards and specific management thresholds based on the GRSG Habitat Objectives Table for the GRSG habitat type in the areas assessed (i.e., breeding, nesting, wintering, etc.). Site-specific review of seasonal habitat type would be required as part of the land assessment process on BLM-administered lands; quantitative analysis of current GRSG seasonal habitat conditions of allotments is not available and is likely to change over time based on precipitation level and other factors. Modifications to grazing systems could be required to meet seasonal habitat objectives, increasing costs to lessees and permittees. Acres within nesting habitat may be more likely to require changes to grazing management, due to the various desired conditions for this habitat type. Impacts would occur on an allotment scale as permit renewal and related management changes were implemented. The level and intensity of impacts would vary on a site-specific basis.

Under the Proposed Plan on National Forest System lands, livestock grazing would be managed to achieve or maintain desired conditions in GRSG seasonal habitats as described in **Sections 2.6.3** and **2.6.4**. Livestock grazing would also be managed in order to maintain residual perennial grass height to provide for adequate GRSG nesting cover according to the guidelines described in **Sections 2.6.3** and **2.6.4**. Implementation of grazing use guidelines under the Proposed Plan on National Forest System lands would impact about 117 allotments, 726,553 acres, and 214,955 AUMs in nesting and brood-rearing habitats within active grazing allotments. Implementation of Forest Service grazing guidelines could also directly impact permittees by increasing the amount of time permittees spend to manage livestock on National Forest System lands as well as the total costs to a livestock operation. Impacts would occur at the allotment scale as management direction is incorporated into permits, allotment management plans, and annual operating instructions. The level and intensity of impacts could vary on a site-specific basis with permitted grazing likely decreasing moderately over time as permits are modified to achieve desired conditions and meet annual grazing use guidelines.

Managing livestock grazing to achieve the desired conditions in on BLM and Forest Service System lands and livestock use guidelines on National Forest System Lands may indirectly benefit rangeland conditions by increasing vegetation productivity and increasing forage in the long term. This in turn would provide managers and permittees better management options, especially on those allotments where livestock numbers are approaching a sustainability threshold or during drought and other disturbances such as wildfire.

Monitoring of site conditions would be mandated as detailed in **Appendix C**. Areas not achieving the GRSG habitat objectives due to grazing, would be required to apply adjustments to livestock grazing to achieve these objectives. This strategy could result in site-specific changes in permitted use levels or grazing management strategy.

Water developments and structural range improvements would be permitted with limitations similar to Alternatives B and D. Under the Proposed Plans, new and existing structural range improvements would be required to have a neutral effect or conserve, enhance, or restore GRSG. Additional constraints on National Forest System lands would be applied as compared to

Alternative A, these include prohibiting fence construction or reconstruction within 1.2 miles from the perimeter of occupied leks unless the collision risk can be mitigated through design features or markings, not constructing new permanent livestock facilities (e.g., windmills, water tanks, corrals) within 1.2 miles from the perimeter of occupied leks, and not constructing water developments in PHMA unless they are beneficial to GRSG.

Prohibitions on new structural improvements on BLM and National Forest System Lands could limit the ability of permittees to effectively distribute livestock resulting in increases in time and costs to permittees and potentially the ability to full use of permitted AUMs. Although these constraints could increase the amount of time permittees spend to manage livestock, it should allow sufficient flexibility that permittees could continue to use structural range improvements to effectively distribute livestock.

Under the Proposed Plans on National Forest System lands, sheep camps would not be located within 1.2 miles from the perimeter of a lek during lekking season and trailing of livestock during breeding and nesting seasons would be minimized during breeding and nesting seasons. This management direction would result in the need to modify grazing practices with increased costs for permittees in these areas.

Under the Proposed Plans, as under Alternatives B, C, and D voluntary relinquishment of grazing privileges would be permitted. Under the Proposed Plan, the BLM may determine if relinquished allotments should remain available for livestock grazing or be used for other resource management objectives per WO IM 2013-184. This may result in some reduction of overall available AUMs. Economic impacts on local communities that depend on livestock grazing are further discussed in **Section 4.23**. Under the Proposed Plans, the Forest Service would consider closure of grazing allotments, pastures, or portions of pastures, or managing the allotment as a forage reserve as opportunities arise where removal of livestock would enhance the ability to achieve desired habitat conditions. These actions would occur according to applicable regulations and, when implemented, would result in the reduction of overall available AUMs.

Managing wild horse and burro populations within AMLs, or adjusting AML, to restore, enhance, or maintain GRSG desired habitat conditions would be beneficial to livestock grazing in the long term by increasing vegetation productivity and increasing forage production, particularly where rangeland conditions could be improved.

Prioritizing gathers in HMAs and herd areas in PHMA to meet established AMLs would reduce any current levels of forage competition between wild horses and burros and livestock on allotments in PHMA and aid in meeting GRSG habitat objectives.

#### ***Travel and Transportation***

Under the Proposed Plans the nature and type of impacts would be as described under Alternatives A, B, and D. Under the BLM Proposed Plan, 525 acres are available for cross-county travel (a 99-percent reduction in the decision area compared with Alternative A). Additionally, PHMA and GHMA would be limited to existing routes on BLM-administered lands until travel management planning occurred (1,274,700 acres, 2.9 times more acres than Alternative A). On National Forest System lands, new road or trail and construction would be

prohibited in GRSG habitat, and road construction within riparian and mesic meadows would be restricted. As a result, disturbance of livestock and forage is likely to be reduced in GRSG habitat compared to Alternative A. This could indirectly improve forage production and improve overall rangeland conditions.

Under the Proposed Plan, temporary closures on BLM-administered lands would also be permitted as determined necessary for resource protection. Closures would further reduce disturbance to livestock but have the potential to impact ability of permittees/leases to access allotments and livestock.

***Infrastructure Development (including all ROWs and utility corridors)***

Under the Proposed Plans, the nature and type of impacts from ROW development would be as described under Alternatives A, B, and D. In the Proposed Plans, areas with designated aboveground corridors would remain open (25,100 acres). ROW development would be limited within the 2,764,800 acres of avoidance areas and 28,100 acres of exclusion areas, which would benefit forage sustainability and livestock grazing. Within GHMA, the majority (594,400 acres) would remain open to ROW development. As a result, ROW development and associated disturbance to livestock and livestock forage are likely to be concentrated in designated corridors and GHMA.

Under the Proposed Plan on National Forest System lands, SUAs, land ownership adjustments, and land withdrawals would be restricted or mitigated to avoid or reduce adverse impacts on GRSG in PHMA and GHMA. This management direction would limit the direct and indirect impacts of development and surface disturbance on rangelands where livestock grazing is permitted.

PHMA would be designated as exclusion areas for wind energy development on BLM-administered lands and limits would be placed on authorizations in GHMA. Management direction on Forest Service System lands would prohibit solar and wind development in PHMA and impose restrictions on development in GHMA. As a result, impacts associated with ground disturbances from development of future development these resources would be limited. This management direction could limit the direct impacts of development and surface disturbances on existing rangelands. However, this may shift development to areas outside of PHMA and GHMA.

As discussed under *Greater Sage-Grouse Management*, above, limits on anthropogenic disturbance, mitigation strategy, lek buffers and other conservation measures in the Proposed Plans would further limit disturbance as compared to Alternative A, resulting in reduced indirect impacts on livestock and livestock forage in PHMA.

***Mineral Development (including geothermal)***

Under the Proposed Plans restrictions would be applied to mineral and energy development as in Alternatives B and D. Restrictions under the Proposed Plans include the closure of PHMA and some portions of GHMA to nonenergy mineral leasing (3,370,000 acres closed, 24 times more than under Alternative A), and closure to mineral materials development on 3,340,200 acres (45 times more than under Alternative A). SFA would be recommended for withdrawal from the Mining Law of 1872, as amended. Further, coal management would emphasize underground

mining, surface disturbances would be limited in all PHMA and prohibited on Forest Service and other mitigation measures would be applied to reduce disturbances for leased coal mines and associated facilities, which would reduce disturbance to livestock grazing.

Acres closed to fluid mineral leasing in GRSG habitat would be the same as Alternative A, but NSO stipulations would be applied on 3,258,300 acres (7 times more than under Alternative A), thereby reducing acreage of surface-disturbing impacts from fluid mineral development in these areas. CSU and timing restrictions would be applied in GHMA. New leases would be prioritized in non-habitat first and then in the least suitable habitat for GRSG. For existing leases under the Proposed Plans, leaseholders would be required to avoid and minimize surface-disturbing and disruptive activities in PHMA for leases that are not yet developed. In addition, on National Forest System lands, reclamation plans would be designed to restore habitat to desired conditions. Fluid mineral operations would be mitigated in PHMA to reduce soil compaction to improve vegetation reestablishment and keep GRSG habitat disturbance to a minimum.

Minerals management direction under the Proposed Plans would limit development and surface disturbance, therefore reducing related disturbance of rangeland and forage resources would be reduced. As discussed under *Greater Sage-Grouse Management*, above, limits on anthropogenic disturbance, mitigation strategy, lek buffers and other conservation measures in the Proposed Plans would further limit disturbance as compared to Alternative A, resulting in reduced indirect impacts on livestock and livestock forage in GRSG habitat.

#### **Other Actions**

Under the Proposed Plans, limitations would be applied on recreational use in GRSG habitat in PHMA. Limitations include the prohibition of construction of new recreation facilities or expansion of existing recreational facilities (e.g., roads, trails, campgrounds) unless the development results in a net conservation gain to GRSG and/or their habitats. In addition, issuance of SRPs on BLM administered lands and SUPs on National Forest System lands would be restricted in PHMA; terms and conditions that protect or restore GRSG habitat would be included in new permits/authorizations and existing permits and operating plans would be modified to protect and/or restore GRSG habitat. Temporary recreation uses that result in the loss of GRSG habitat would not be authorized on National Forest System lands.

Impacts from restrictions on recreation on livestock would be similar to those discussed under Alternative A and D, and include benefits such as reduced disturbance of livestock and livestock forage and reduction of unwanted dispersal.

## **4.17 RECREATION**

### **4.17.1 Methods and Assumptions**

Impacts on recreation can be direct or indirect. Management actions that alter or prohibit users' opportunities to access recreation areas or participate in recreation activities would result in a direct impact. Indirect impacts are those that change the physical, social, or administrative setting within which recreation activities take place. In areas where management prescriptions are in place to achieve or maintain desired settings and/or activities, a change to the setting or availability of recreation opportunities would result in an impact.

**Indicators**

Indicators of impacts on recreation are as follows:

- Change in the types of recreation activities and opportunities in the decision area, especially those within areas where recreation is the management focus
- Change in the number and type of recreation permits issued on an annual basis within the decision area

**Assumptions**

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- Recreational OHV use will continue to be a recreation activity, especially in the Sheeprocks, Bald Hills, Uintah, and Panguitch Population Areas.
- Recreation activity, particularly recreational OHV use and mountain biking, is expected to increase throughout the life of current LUPs.
- Outside areas where recreation is the management focus, the BLM and Forest Service will manage for recreation activities that consist mostly of dispersed activities where users participate in activities individually or in small groups.
- The potential for resource impacts and conflicts between all types of users, but particularly between motorized and nonmotorized users, will increase with increasing use.
- BLM and Forest Service management of areas as unsuitable for public utilities (i.e., ROW exclusion areas) preserves recreation opportunities.
- Closure of areas to mineral development decreases the likelihood for conflict with recreation users and maintains desired recreation settings in those areas.
- Outdoor recreation will continue to be an important component of the local economy.
- Demand for recreation permits will remain steady or gradually increase.
- The BLM and Forest Service will continue to issue recreation permits on a discretionary basis.

**4.17.2 Alternatives Analysis**

Compared with a continuation of existing management under Alternative A, proposed actions for other resource programs under Alternatives B through E would result in fewer conflicts with recreational activities. Management under Alternatives B through E includes reductions in AUMs for livestock grazing, designation of ROW exclusion and avoidance areas, and closure to mineral leasing and development. **Table 2.3** provides a quantitative overview of how management actions with the potential to affect recreation would vary across alternatives. Acreages shown apply to all areas within identified population areas. Some acres shown may be for areas outside GRSG habitat but within the population area boundaries.

While BLM and Forest Service management for the protection of GRSG habitat would generally result in a reduction in surface-disturbing activities that conflict with recreation opportunities,

BLM and Forest Service management under Alternatives B through E for recreation would also limit recreation opportunities. Impacts on recreation under each alternative from BLM and Forest Service recreation management is described below.

Under Alternative A, the BLM and Forest Service would continue to manage recreation uses as identified in the existing LUPs. The BLM and Forest Service would continue to review and approve recreation permits on a case-by-case basis. Current recreational opportunities in the decision area would continue, and there would be no new impacts on recreation under Alternative A.

Under Alternative B, the BLM and Forest Service would only issue recreation permits for activities in PHMA that have a neutral or beneficial effect on PHMA. As a result, some types of permitted activities (e.g., OHV races) that could negatively affect GRSG habitat could be impacted under Alternative B. This would result in a reduction in the number and type of recreation permits issued in the decision area and would result in fewer opportunities to engage in the types of events and activities affected. The potential for impacts would be greatest where OHV use is most popular, such as in the Sheeprocks population area.

BLM and Forest Service management under Alternative C would contain the most restrictions on recreational activities. For example, under Alternative C, BLM and Forest Service management would seasonally prohibit camping and other nonmotorized recreation within 4 miles of active leks. This would result in temporary reductions in recreational opportunities and would decrease the area available for recreational opportunities such as camping, mountain biking, and hiking. Impacts would be greatest in proximity to those developed recreation sites identified on **Map 3.17-2**, particularly in population areas coinciding with the National Forests along the Wasatch Front and BLM sites in the Uintah, Parker Mountain, Sheeprocks, and Rich County Population Areas. Opportunities for other popular nonmotorized recreation activities such as mountain biking, rock climbing, and equestrian use would also be reduced in these areas.

Alternative C contains the greatest restrictions on coal leasing, ROWs, fluid mineral leasing, and livestock grazing. These restrictions would reduce the potential for conflict with recreational access and degradation of physical setting characteristics within SRMAs. However, a portion of mapped occupied habitat would also be closed to OHV travel under this alternative, reducing the availability of motorized recreational opportunities in the closure areas. It should be noted, however, that the majority of the closed areas are absent mapped routes.

Impacts on recreation and visitor services under Alternative D would be the same as Alternative B, with the exception that the BLM and Forest Service would also evaluate existing recreation permits and modify or cancel those that are determined to have adverse effects on GRSG habitat. In addition to restrictions on future recreational activities and events that are required to be permitted, Alternative D would result in a loss of opportunities to continue engaging in current activities and events if they are found to have adverse effects on GRSG habitat.

Alternative D proposes several restrictions on surface-disturbing activities (see **Table 2.3**). These restrictions would affect recreation as described under Alternative C, although across a smaller portion of the decision area.

BLM and Forest Service management under Alternative E would include permanent, seasonal, and time-of-day limitations on activities within 1 mile of occupied leks if the activity disrupts GRSG nesting and brood rearing. Similar to Alternative C, this would result in temporary (or permanent) loss of recreational opportunities, particularly for activities that generate noise or result in surface disturbance. Locations of the greatest impacts would be similar to Alternative C.

Impacts under the Proposed Plans would be similar to those under Alternative D, except that there would be additional restrictions on recreation facilities in PHMA, possibly leading to a partial inability to fulfill long-term recreation opportunities in those areas. The 3 percent anthropogenic disturbance cap would similarly restrict recreation facility placement in PHMA over the long term in areas that exceed the cap. The Utah sub-regional adaptive management strategy could limit recreational opportunities and activities over the short or long term if recreation is found to be a causal factor in not meeting GRSG conservation objectives. Adaptive management responses that restrict other uses (e.g., ROW development), could improve recreational opportunities due to reduced conflicts.

## 4.18 COMPREHENSIVE TRAVEL AND TRANSPORTATION MANAGEMENT

### 4.18.1 Methods and Assumptions

#### *Indicators*

Indicators of impacts on travel management are as follows:

- Change in the types of transportation activities occurring on routes that could impact GRSG or habitat
- Change in the acreages designated as open, limited, or closed to OHV travel
- Change in the number of acres where new road development would be allowed

#### *Assumptions*

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- The demand for access to travel routes on BLM-administered and National Forest System lands would continue to increase over the life of the LUPs.
- Administration of updated agency travel management policy, rules, and planning and design guidelines will change public land travel systems through design, making them more sustainable while decreasing potential impacts on resources.
- OHV use will continue to increase.
- The designation of individual routes as open, closed, or limited for motorized use is an implementation-level process and not considered as part of a LUP (planning-level) process.
- The potential for resource and user conflict increases as OHV use increases and becomes more concentrated.

- Travel systems are dynamic and will be changed through subsequent implementation-level planning efforts.
- Implementation of a travel management plan would include increased public education, signing, enforcement, and resource monitoring in regard to travel management.
- Effects of implementing travel management under the Proposed Plans on National Forest System lands are similar to those described in Alternative A.

#### **4.18.2 Alternatives Analysis**

Impacts on travel and transportation management are those that restrict or enhance transportation and access (e.g., managing areas as closed to OHV travel or limiting such use to existing routes and applying seasonal travel limitations). New travel and transportation management actions in response to GRSG habitat-protection strategies could limit the types of travel-related activities allowed in GRSG habitat. For example, closing areas to OHV travel or restricting OHV travel to existing routes in areas that were previously open to cross-country OHV travel would reduce access. Additionally, management actions that restrict future route construction limit the ability of the travel network to accommodate increased travel demands over time. Conflicts among route users could increase if the existing network becomes congested.

All alternatives would defer travel management route designations to a separate process following the current LUPA process. As such, for each alternative, the BLM and Forest Service would manage varying acreages as open, limited, or closed to cross-country OHV travel. **Table 2.3** shows the total areas open, limited, and closed to cross-county OHV travel by alternative.

Under Alternative A, the BLM and Forest Service would maintain current levels of travel management as identified in the existing LUPs. For example, areas currently designated as open to cross-country OHV use would continue to be managed as such. There would be no new restrictions related to GRSG habitat management and no change in impacts on travel management under Alternative A.

Under Alternative B, the BLM would limit OHV travel to existing roads and trails in PHMA until travel management is completed, at which time OHV travel would be change to limited to designated routes. OHV travel on National Forest System lands would continue to be limited to existing routes. The area designation change on BLM-administered lands from open to limited would reduce cross-country access in those portions of PHMA that were previously managed as open. Applications for the upgrading or realignment of existing routes would be required to meet certain design, location, and mitigation criteria intended to protect GRSG habitat. These requirements may preclude the construction of some new routes, but would be unlikely to reduce access across the decision area. Alternative B would also require increased signage and education alerting OHV users of limitations on cross-country travel and added processing requirements for transportation-related projects in GRSG habitat. Signage and education would likely improve travel management by reducing user and resource conflicts, while added processing requirements could increase the time needed to approve new projects and result in site-specific increases in congestion if portions of the current route system become overcrowded. Alterations to the larger transportation system may be required to accommodate

future route construction in GRSG population areas if they exceed the disturbance cap. Because fire would not count toward the disturbance cap under Alternative B, none of the population areas currently exceed the disturbance cap (see **Appendix L**, Baseline Disturbance Inventory). Future restrictions on route construction could occur as population areas reach the disturbance cap threshold. This would limit long-term expansion of the travel system, but is not expected to result in congestion or other access concerns because of the dispersed nature of the travel system in these areas.

Alternative C would result in the greatest reduction in access when compared with Alternative A. For example, under Alternative C, motorized cross-country travel would be prohibited in all GRSG habitat areas. Additionally, a portion of mapped important seasonal habitats (i.e., nesting, brood-rearing, and winter habitats) would be closed to OHV travel. Closures would occur in portions of these habitats throughout the planning area with the largest concentrations of closed areas within the Box Elder and Uintah Population Areas. While the majority of the closed areas are absent mapped routes, there are some existing or designated routes in the areas identified for closure. Furthermore, new road construction within 4 miles of active leks would be prohibited. Upgrading existing routes in mapped occupied habitat where such action would damage GRSG habitat would also be precluded. Together, these actions would result in site-specific losses of opportunity for OHV travel and future route construction and improved access. Alterations to the larger transportation system may be required to accommodate future route construction in GRSG population areas that exceed the disturbance cap outlined in. Because fire is included in the disturbance cap under Alternative C, three population areas currently exceed the disturbance cap (see **Appendix L**). This would limit long-term expansion of the travel system, but is not expected to result in congestion or other access concerns because of the dispersed nature of the travel system in these areas.

Under Alternative D, areas in PHMA that currently do not have designated routes would be designated in a travel management plan. In those areas managed as limited to existing routes, impacts on travel and transportation management under Alternative D would be the same as Alternative B. Impacts on future route construction would be similar to Alternative B. Because the disturbance cap threshold is higher under this alternative, future impacts are less likely to occur or would more likely occur later in time than under Alternative B.

Alternative E would designate mapped GRSG habitat in SGMAs/core areas with nesting and winter habitat that do not have designated routes in a travel management plan as limited to existing routes. Impacts on travel and transportation management under Alternative E would be the same as Alternative B, but would occur across a smaller area. The types of impacts on future route construction would be similar to Alternatives B and D. However, the disturbance cap would only apply or be calculated for new disturbances and would be set at 5 percent (including fire, but excluding vegetation treatments). Depending upon wildfire frequency and size, future impacts are less likely to occur or would more likely occur later in time than under Alternatives B and D.

Impacts from implementing the Proposed Plans would be similar to those under Alternative D, except that allocating 525 acres open to cross-country OHV use on BLM-administered land (one area each in the Parker Mountain and Uintah Population Areas) would preserve this type

of access in the long term. There would be slight (approximately one percent) differences from Alternative D in the number of acres allocated as limited to existing routes, limited to designated routes, and closed to OHV use, and, as a result, the impacts from these allocations would be similar to those under Alternative D. The types of impacts on future route construction from the 3 percent anthropogenic disturbance cap in PHMA would be the same as under Alternative D. The adaptive management strategy described in **Appendix B** could limit route construction and maintenance over the short or long term if travel-related ROWs are found to be a causal factor in not meeting GRSG conservation objectives.

## **4.19 LANDS AND REALTY**

### **4.19.1 Methods and Assumptions**

While solar and wind developments are permitted via ROWs, analysis of impacts on these resource uses is discussed in **Section 4.20**, Renewable Energy.

#### **Indicators**

Indicators of impacts on lands and realty are as follows:

- Acres of surface ownership in the planning area
- Acres of ROW restrictions (i.e., avoidance and exclusion areas)
- Number, acres/miles, and types of ROWs, permits, and leases, including communication site leases and ancillary access
- Number and type of land tenure/landownership adjustments (i.e., lands identified for disposal, withdrawal, acquisition, exchange, purchase, donation, and ROW acquisition)

#### **Assumptions**

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- National Forest System lands, a ROW is typically used to grant use of National Forest System land for a roadway or to accommodate the access needs for the protection, development, and use of lands and resources owned by private individuals or administered by public agencies. The Forest Service issues and administers SUAs when authorizing the uses on National Forest System lands that contribute to the national infrastructure for generating and transmitting energy resources such as an electrical transmission line or gas pipeline for electrical transmission lines and gas pipelines. Accordingly, for an electrical transmission line or gas pipeline, a BLM ROW grant is equivalent to a Forest Service SUA.
- The term ROW includes BLM ROWs, land leases, and permits, and Forest Service SUAs, as applicable. Under the Proposed Plans, the Forest Service would not make new decisions for SUAs (i.e., any decisions from Alternative A would be carried forward to the Proposed Plans). As such, acreages associated with ROW exclusion and avoidance are specific to BLM-administered lands except where current Forest Service decisions are carried forward.

- Existing ROWs, designated utility corridors, and communication sites would be managed to protect valid existing rights.
- On renewal, assignment, or amendment of existing ROWs, permits, and leases, additional stipulations could be included in the land use authorization.
- Maintaining and upgrading utilities, communication sites, and other ROWs is preferred before the construction of new facilities in the decision area, but only if the upgrading can be accommodated within the existing ROW.
- Activities on dispersed private parcels within the planning area would continue to require new or upgraded access, communication, and utility services.
- Federal energy policy (42 USC Section 13201 et seq. [2005]), would continue to support domestic energy production, including renewable energy such as wind and solar.
- A central focus of the BLM and Forest Service lands and realty programs in Utah would continue to be management for regional and interstate transmission lines through the state, particularly those needed to transport wind energy from Wyoming and the Dakotas to population centers in the southwest. Applications for high voltage (100 kV or greater) lines would increase in response to new wind energy development and corresponding energy demand in urban areas such as Phoenix, Las Vegas, and southern California.
- The number of ROW applications for new communication and computer technology, such as fiber optic cable, would continue to increase.
- Where demand for new ROWs exists on public lands, restricting ROW development in those areas would likely redirect ROW development to adjacent nonfederal or non-GSRG habitat federal land areas to accommodate the demand where feasible.
- Power lines and other vertical structures in areas naturally devoid of perching opportunities provide a perch for raptors and subsequently increase the potential for GRS to abandon leks (Ellis 1984). Mitigation in the form of burying lines or including non-perching design features on lines would reduce perching opportunities and subsequent impacts on GRS (Connelly et al. 2000).
- In accordance with the Omnibus Public Land Management Act of 2009 [Public Law 111-111], the BLM and Forest Service would continue to manage all previously withdrawn lands as withdrawn from entry, appropriation, or disposal under the public land laws. The BLM and Forest Service would review withdrawals as needed and when necessary, make recommendations for extensions, modifications, revocations, or terminations.

Implementing management for the following resources would have negligible or no impact on lands and realty, and are therefore not discussed in detail: Vegetation Management, Integrated Invasive Species Management, Wild Horses and Burros, Wildland Fire Management, Livestock Grazing/Range Management, and Recreation.

#### 4.19.2 Alternative A

##### ***Greater Sage-Grouse Management***

GRSG management actions have been incorporated in recently adopted LUPs, such as the Vernal RMP and Uinta LRMP. Management for GRSG habitat protection in these areas includes the placement of buffers ranging from 0.5 to 3.1 miles around leks and seasonal restrictions on surface-disturbing activities in winter habitat. Within the portions of the decision area where these management actions apply, impacts on the lands and realty program would include additional siting criteria for ROWs proposed adjacent to leks or within breeding or nesting habitat, RDFs for certain types of infrastructure, and extended processing times to review ROW applications for compliance with GRSG habitat management objectives. In the portions of the decision where existing LUPs do not contain GRSG management actions, there would be no impacts on lands and realty under Alternative A.

##### ***Travel and Transportation***

Under Alternative A, 797,000 acres of mapped occupied habitat would be open to cross-country OHV travel, while 1,655,100 acres would be limited to existing (437,400 acres) or designated (1,217,700 acres) routes. Accordingly, existing transportation routes 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 travel and transportation management.

##### ***Lands and Realty (Land Tenure)***

Land tenure adjustments are intended to maintain or improve the efficiency of BLM and Forest Service management. Under Alternative A, approximately 24,400 acres would be available for disposal via sale. Land disposal, which must meet the criteria under FLPMA Section 203 and applicable LUPs, would improve the BLM-administered and National Forest System lands and realty programs and overall management efficiency.

##### ***Infrastructure Development (including all ROWs and utility corridors)***

Under Alternative A, existing and identified ROWs in mapped occupied habitat would continue to provide opportunities for collocation of new infrastructure. A total of 67,200 acres would continue to be managed as ROW avoidance areas and 27,600 acres managed as ROW exclusion areas within mapped occupied habitat. Avoidance designations require ROW applicants to meet additional project criteria, which could influence project location, delay availability of energy supply (by delaying or restricting pipelines, transmission lines, or renewable energy projects), or delay or restrict communications service availability. Within exclusion areas, new ROW development is prohibited, which prevents the lands and realty program from approving new applications within these areas. Impacts under Alternative A would continue within avoidance and exclusions areas; however, these restrictions would prevent the BLM or Forest Service from accommodating future demand for ROW development within the decision area.

Under Alternative A, there are 177,700 acres of designated ROW corridors. These corridors would continue to be the preferred locations for new ROW development. Under this alternative, designated corridors would provide adequate opportunities to accommodate future demand for ROW development within the decision area.

BLM-administered and National Forest System lands would continue to be available for multiple-use and single-use communication sites and road access ROWs on a case-by-case basis pursuant to Title V of FLPMA and 43 CFR 2800 regulations. All ROW applications would be reviewed using the criteria of collocating new ROWs adjacent to existing ROWs wherever practical and avoiding the proliferation of separate ROWs. Collocation reduces land use conflicts and additional land disturbance and demarcates the preferred locations for utilities, therefore simplifying processing on BLM-administered and National Forest System lands.

#### *Wind ROWs*

Wind energy projects would be permitted through the ROW permitting process. For wind energy development under Alternative A, 27,600 acres in mapped GRSG habitat are managed as ROW exclusion and 67,200 acres are managed as ROW avoidance. In areas outside GRSG habitat, but within the population areas, 74,900 acres are managed as ROW exclusion and 50,800 acres are managed as avoidance.

ROW exclusion and avoidance designations decrease the amount of land available for new development. Refer to **Section 4.20** for additional information regarding impacts on wind energy development. Under Alternative A, management would provide sufficient opportunities to accommodate future wind energy development within the decision area. Therefore, there would be little to no impacts on wind energy development under Alternative A.

The Forest Service has not identified avoidance, exclusion, or open areas for wind energy development because, to date, wind energy development on National Forest System lands has been minor.

#### ***Mineral Development (including geothermal)***

Mineral development indirectly impacts the lands and realty program through the requirement for new infrastructure development, such as roadways and communication facilities. In mapped occupied habitat under Alternative A, 3,866,200 acres of nonenergy mineral leasing, 3,977,400 acres of mineral materials development, and 3,822,661 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 small and variable demand on the lands and realty program. Because less than 1 percent of mapped GRSG habitat would be managed as ROW exclusion, the BLM-administered and National Forest System lands and realty programs would be able to accommodate new ROW development associated with mineral activity. Therefore, little to no impacts on lands and realty from mineral development would occur under Alternative A.

### **4.19.3 Alternative B**

#### ***Greater Sage-Grouse Management***

Alternative B management to protect GRSG habitat would impact lands and realty through the closure of areas to ROW authorizations, establishment of a 3 percent disturbance cap, application of additional criteria for land tenure adjustments, and limitations on new mineral development and road construction. This management would prevent the BLM and Forest Service from accommodating new ROW development in PHMA and would require additional development stipulations and siting criteria in other areas of occupied habitat, thereby reducing energy and communication opportunities in the decision area to meet a growing public demand.

***Travel and Transportation***

Under Alternative B, new roads in PHMA would be allowed only 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. The surface disturbance associated with any newly constructed road would be added to the total surface disturbance in PHMA. If the disturbance exceeds 3 percent, the BLM and Forest Service would require additional mitigation to offset impacts on GRSG habitat as part of any new road ROW application. Limitations on new road construction and the incorporation of supplemental mitigation requirements could make certain areas impractical for new ROW development, particularly in areas not readily accessible via existing roadways, which would decrease the demand for new ROW authorizations in those areas. Refer to **Section 4.18**, Comprehensive Travel and Transportation Management, for further analysis.

***Lands and Realty (Land Tenure)***

Under Alternative B, federal lands would be retained in public ownership in PHMA except where land tenure adjustments 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 GHMA, the amount of land available for disposal (5,490 acres) would be the same as under Alternative A. Land disposal would be subject to the criteria in FLPMA Section 203. Limitations on BLM and Forest Service land tenure/landownership adjustments, such as restrictions on land disposal to retain GRSG habitat in public ownership, could result in decreased management efficiency. Land tenure adjustments that result in a more contiguous ownership pattern would allow the BLM and Forest Service to provide more consistent management actions across larger portions of the decision area.

***Infrastructure Development (including all ROWs and utility corridors)***

Under Alternative B, new ROWs would be excluded on 2,784,200 acres within mapped occupied GRSG habitat and within population areas where anthropogenic disturbances exceed 3 percent. Managing PHMA as ROW exclusion would prevent the BLM and Forest Service from accommodating new ROW development in those areas. With a continuing demand for new ROWs in the planning area, including major inter- and intra-state electrical transmission and gas pipelines, ROW developments would be diverted to adjacent nonfederal lands or prevented altogether. If new ROW development, particularly inter-state electrical transmission, fiber optic, and gas pipelines could not be feasibly developed due to ROW exclusion areas, the result would be reduced energy and communication opportunities to meet growing demand until alternative routes (e.g., on nonfederal land or federal lands outside occupied GRSG habitat) or technology could be developed.

Additionally, the BLM and Forest Service would continue to designate 130,200 acres of ROW corridors in PHMA while un-designating 47,500 acres of ROW corridors that currently do not contain any authorized ROWs, resulting in a 27-percent reduction in the total designated corridor area in PHMA. Corridors are planning tools that direct future ROW development to preferred locations. Corridors are open to ROW development, subject to standard design criteria and stipulations. Un-designating corridors would further limit opportunities for ROW development within GRSG habitat and prevent the BLM and Forest Service from accommodating future demand for ROW development.

GHMA in the decision area would be managed as ROW avoidance. Within avoidance areas, the BLM and Forest Service would continue to process ROW applications, but would require additional requirements prior to authorizing the ROW. Supplemental design criteria and siting limitations would decrease the amount of future ROW development in avoidance areas.

Within exclusion areas, the BLM and Forest Service would only consider new ROW authorizations where the proposed infrastructure, including construction and staging during construction, could be collocated entirely within the footprint of an existing ROW. The BLM and Forest Service would require collocation in GHMA where possible. Impacts on the lands and realty program under Alternative B would include the need to locate proposed facilities outside exclusion areas or within existing ROWs, which limits the BLM's and Forest Service's ability to accommodate the demand for new infrastructure development, including any wind energy development. Additionally, under Alternative B, the BLM and Forest Service would take advantage of opportunities to remove, bury, or modify existing power lines. Limitations on new ROWs and aboveground linear features, such as transmission lines and pipelines, could restrict the availability of energy or service availability and reliability for communication systems. Where underground placement of power lines is determined to be the preferred option to minimize impacts on GRSG habitat, technical (e.g., engineering and service reliability) and financial limitations could preclude ROW development in those areas. Refer to **Section 4.3** for analysis of the impacts of burying power lines on GRSG.

#### *Wind ROWs*

Under Alternative B, 2,784,200 acres of PHMA would be managed as ROW exclusion for all ROWs, including utility-scale wind energy. Management of PHMA as ROW exclusion would substantially decrease the BLM's and Forest Service's ability to accommodate any new wind energy development demand in GRSG habitat areas. However, of the total areas statewide considered developable (i.e., wind speeds greater than 7 meters per second), 19 percent are located within mapped GRSG occupied habitat. Therefore, excluding wind energy development in PHMA would reduce but not eliminate wind energy development potential within the state. Refer also to **Section 4.20** for additional impacts analysis for wind energy development.

#### *Surface Disturbance Cap*

Under Alternative B, the total surface area covered by anthropogenic disturbances (e.g., power lines, communication towers, roads, railroads, oil and gas wells, mineral material sites, coal mines, and locatable mineral sites) would be limited to 3 percent within each population area. If surface disturbance in a population area exceeds 3 percent, then no new surface-disturbing activities would be allowed in that area. Future restrictions on ROW development and communication facility leasing would occur in population areas where disturbances exceed the disturbance cap. Impacts from excluding new ROW would be the same as those described above.

Neither the ROW avoidance and exclusion area criteria nor the 3 percent disturbance cap proposed under Alternative B would directly affect valid existing rights. Existing development would be allowed to continue operation, subject to RDFs upon renewal or reauthorization, in their existing footprints. Any expansion of a valid existing operation outside of an exclusion area would be subject to the ROW avoidance criteria and would be required to mitigate any new

surface disturbance. In some cases where a valid existing right exists within an unfragmented area of GRSG habitat, avoidance criteria and RDFs may by default indirectly limit access to and subsequent development of that right.

#### ***Mineral Development (including geothermal)***

Alternative B would decrease the demand for new ROW infrastructure to support new mineral development. Under Alternative B, management to protect GRSG habitat would result in the closure of PHMA to nonenergy leasable minerals, surface coal mining, mineral material sales, and oil and gas leasing. Prohibitions on new mineral development would decrease the number of ROW applications received by the BLM and Forest Service for roads, distribution lines, and related infrastructure necessary to support mineral activity. This impact would be especially notable to the south and southeast of the Wasatch Front where coal development potential is high. ROWs serving existing mineral development sites would continue to place demand on the lands and realty program (e.g., for renewals and applications to upgrade or maintain infrastructure). Under Alternative B, lands and realty programs would continue to process ROW applications associated with valid existing rights. ROW applications that require expansion of existing infrastructure beyond existing ROW footprints would not be authorized. Refer to **Section 4.21**, Minerals, for further analysis related to mineral development.

#### ***Withdrawals***

Under Alternative B, the BLM and Forest Service would propose for mineral withdrawal 3,650,900 acres within PHMA. However, withdrawal would be subject to secretarial order. The BLM and Forest Service would not recommend approval of withdrawals for reasons other than mineral activity unless justified by adequate GRSG conservation measures. Mineral withdrawal would reduce the number of new ROW authorization requests for infrastructure to support mineral activity. Reduced demand for new ROWs associated with mineral activity would, however, partially offset the impact of managing PHMA as ROW exclusion. Refer to **Section 4.21** for further analysis related to mineral development.

### **4.19.4 Alternative C**

#### ***Greater Sage-Grouse Management***

Management actions under Alternative C to protect GRSG habitat would impact lands and realty through the closure of all mapped occupied GRSG habitat (3,313,800 acres) to new ROW authorizations, additional criteria for land tenure adjustments, and limitations on new mineral development and road construction. This management would prevent the BLM and Forest Service from accommodating new ROW development in all mapped occupied habitat, thereby eliminating energy and communication development opportunities in those areas. Prohibitions on new road ROW authorizations in PHMA would further limit opportunities for infrastructure development that relies on roadways for access.

#### ***Travel and Transportation***

Under Alternative C, a portion of mapped occupied habitat would be closed to OHV travel and new road construction would be prohibited within 4 miles of active leks in PHMA. Because of the density of active lek sites, new road construction would be limited throughout many areas in all mapped occupied habitat. Limitations on new road construction and closure of some existing

routes would limit the BLM's and Forest Service's ability to authorize new and modify existing ROW applications in PHMA. Prohibitions on new road ROW authorizations in PHMA would impact other resource uses (e.g., mineral development and infrastructure) that require roads for access. Refer to **Section 4.18** for further analysis.

#### ***Lands and Realty (Land Tenure)***

Under Alternative C, federal lands would be retained in public ownership in PHMA with no exceptions. Impacts from land tenure would be the same as Alternative B.

#### ***Infrastructure Development (including all ROWs and utility corridors)***

Under Alternative C, new ROWs, including large-scale inter-state transmission lines anticipated to cross the planning area to transmit energy generated in adjacent states to demand centers throughout the west, would be excluded in all mapped occupied habitat (3,313,800 acres); therefore, no areas in mapped habitat would be open to new ROW development. Additionally, all currently designated ROW corridors (177,700 acres) within mapped occupied habitat would be un-designated. 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. Impacts under Alternative C from managing all mapped occupied habitat as ROW exclusion would be similar to Alternative B, except that under Alternative C, no new ROW developments would be authorized in mapped occupied habitat. Therefore, Alternative C would further reduce opportunities for renewable energy, communication facilities, gas pipelines, fiber optic cables, electrical transmission lines, and similar ROW development from occurring in the decision area. There is a continuing demand for these ROWs in the planning area to meet energy and communication needs outside the planning area; Alternative C would prevent the BLM and Forest Service from meeting those needs.

#### ***Wind ROWs***

Management of all mapped GRSG occupied habitat as ROW exclusion would eliminate the BLM's and Forest Service's ability to accommodate any new wind energy development demand in those areas. Therefore, Alternative C would result in a 19-percent decrease in the total number of acres in Utah with sufficient wind resources to be considered developable. ROW exclusions would also limit development on adjacent nonfederal land where transmission infrastructure would be needed across BLM-administered or National Forest System lands. Refer also to **Section 4.20** for additional impacts analysis for wind energy development.

#### ***Mineral Development (including geothermal)***

Impacts under Alternative C from mineral development would be similar to Alternative B, with the exception that all mapped occupied habitat (4,008,580 acres) would be withdrawn from mineral entry. Prohibitions on new mineral development across such a large area would decrease the number of ROW applications received by the BLM and Forest Service to support mineral activity. This impact would be especially notable in areas where coal development potential is higher, such as east of the Wasatch Front. Refer to **Section 4.21** for further analysis related to mineral development.

#### ***Withdrawals***

Under Alternative C, all mapped occupied habitat, including surface and split-estate (4,008,580 acres), would be recommended for withdrawal from locatable mineral entry. Impacts under

Alternative C from withdrawals would be similar to Alternative B, except that mineral withdrawal would apply to all mapped occupied habitat. Mineral withdrawal in mapped occupied habitat would further reduce the number of new ROW authorization requests for infrastructure to support mineral activity. Reduced demand for new ROWs associated with mineral activity would, however, partially offset the impact of managing occupied as ROW exclusion. Refer to **Section 4.21** for further analysis related to mineral development.

#### **Other Actions**

Under Alternative C, the BLM and Forest Service would designate a combination of 15 new ACECs and zoological areas on 1,834,200 acres. Management of the ACECs and zoological areas would be tailored to protect the relevant and important values (e.g., GRSG habitat) for which the areas would be designated. All lands within the ACECs and zoological areas would be managed as ROW exclusion; therefore, BLM and Forest Service management of lands and realty would be similar inside the ACEC or zoological area boundary as it would be in PHMA outside. However, within the boundaries, the BLM and Forest Service would prioritize the removal of infrastructure, including unnecessary roads and other equipment, consistent with valid existing rights. Impacts from ROW exclusion are the same as those described for exclusion areas under Alternative B. Identification of unnecessary infrastructure would require the BLM and Forest Service to inventory existing ROWs to determine which ones are no longer needed and require further collaboration and oversight during the removal of the infrastructure. Identification and removal of unneeded infrastructure would, however, improve the efficiency of the lands and realty program by concentrating management efforts on critical ROWs and functioning infrastructure.

#### **4.19.5 Alternative D**

##### **Greater Sage-Grouse Management**

By prescribing specific management for certain types of ROWs, Alternative D would enable the BLM and Forest Service to accommodate increasing demand for ROW development, including inter-state electrical transmission, fiber optic, and gas pipelines, while protecting GRSG habitat, particularly buffer areas surrounding lek sites. While impacts under Alternative D would be similar to those under Alternative B, by designating areas for ROW development, establishing a 5 percent (rather than 3 percent) surface disturbance cap, and allowing mineral development in more areas subject to stipulations, Alternative D would allow for more ROW and mineral development than Alternative B. Impacts on lands and realty under Alternative D would be a decreased ability to accommodate site and linear ROW development, especially aboveground ROWs and ROWs outside designated corridors. Although less restrictive than Alternative B, limitations on new mineral development and road development under Alternative D would further reduce the potential for new ROW development in the decision area.

##### **Travel and Transportation**

Impacts on the lands and realty program under Alternative D would be the same as those described above under Alternative B. Refer to **Section 4.18** for further analysis.

**Lands and Realty (Land Tenure)**

Under Alternative D, federal lands would be retained in public ownership in PHMA with no exceptions, while allowing 5,540 acres in GHMA for disposal. As a result, impacts on lands and realty from land tenure would be the same as Alternative B.

**Infrastructure Development (including all ROWs and utility corridors)**

Under Alternative D, the BLM and Forest Service would manage for ROW development based on the type of ROW and location within the planning area (i.e., proximity to existing lek sites). Unless within a designated corridor, aboveground linear ROWs within 4 miles of a lek located in PHMA would be excluded, resulting in 1,422,300 acres of ROW exclusion in mapped occupied habitat. Areas beyond 4 miles of a lek, within mapped occupied habitat or areas outside GRSG habitat and within a 4-mile lek buffer would be managed as avoidance areas. The result would be 1,368,900 acres of avoidance area. New ROW development in the avoidance area would be required to comply with criteria to protect GRSG populations (see the description under Alternative D in **Table 2.4** for a list of avoidance area criteria). The BLM and Forest Service would deny actions not able to comply with avoidance criteria.

The BLM and Forest Service would manage 2,754,200 acres (83 percent) of PHMA as ROW avoidance for underground (e.g., pipelines and electrical lines) or on-ground ROWs (e.g., pipelines and roads). Development of new underground or on-ground ROWs could occur if the ROW applicant could meet the criteria listed in **Table 2.4**. Impacts on lands and realty from restrictions on infrastructure development within avoidance areas would be the same as those described in Alternative B.

Alternative D would impact the BLM and Forest Service lands and realty programs by reducing the agencies' ability to authorize aboveground linear ROWs, such as electrical transmission lines, on 51 percent of PHMA. On the remaining 49 percent of PHMA, additional stipulations for the development of electrical transmission lines could result in denial of projects that cannot meet ROW grant requirements for the protection of GRSG habitat. To meet demand for new energy and communication infrastructure, some aboveground ROW development would likely be diverted to adjacent nonfederal lands on non-GRSG habitat federal land.

Alternative D could also result in an increase in the number of underground ROW applications received as ROW applicants seek opportunities to place ROW infrastructure in areas otherwise excluded for aboveground infrastructure. Even where new underground placement meets the criteria in **Table 2.4**, technical (e.g., engineering and service reliability) and financial limitations could preclude ROW development depending on specific topographic constraints in those areas. Refer to **Section 4.3** for analysis of the impacts of burying power lines on GRSG.

For aboveground site-type ROWs (e.g., communication towers), excluding wind facilities, all areas within 1 mile of an occupied lek located in PHMA would be managed as exclusion. PHMA beyond 1 mile of a lek located in PHMA would be managed as avoidance. Areas outside PHMA but still within the 1-mile buffer would also be exclusion areas (see **Table 2.4** for a list of avoidance area criteria). The result would be 219,900 acres of exclusion and 2,562,000 acres of avoidance areas. While Alternative D would impact the BLM and Forest Service lands and realty programs by reducing the agencies' ability to authorize communication towers adjacent to leks, impacts on communication services would only result when a ROW application could not find

another suitable location, not meet the stipulations in the avoidance areas, or the stipulations in avoidance areas would diminish the effectiveness of the communication infrastructure to the point where the development would not be practical. In GHMA, all areas within 1 mile of an occupied lek located in GHMA would be managed as avoidance areas for new ROWs. Approval of new development would be subject to the criteria listed in **Table 2.4**. GHMA beyond 1 mile of a lek would be open to new ROW development, subject to coordination with UDWR and implementation of RDFs. In avoidance areas, impacts on lands and realty from restrictions on infrastructure development would be the same as those described in Alternative B. In open areas beyond 1 mile of a lek, coordination with UDWR and agreement on appropriate RDFs could extend processing times for ROW applications.

**Table 2.3** shows potential management of each ROW type under Alternative D for areas within mapped GRSG habitat.

**Table 4.21** summarizes management of each ROW type under Alternative D for areas that are within the population areas but outside occupied GRSG habitat.

**Table 4.21**  
**Acres of ROW Management in Population Areas outside of GRSG**  
**Habitat, Alternative D**

	ROW Type		
	Above-Ground Linear	Underground Linear	Above-ground Site (non-wind or solar)
Open	1,925,900	2,337,000	2,337,100
Avoided	462,500	58,200	51,700
Excluded	81,700	74,900	81,300

Source: BLM 2012d

Under Alternative D, the BLM and Forest Service would retain 89,400 acres of existing designated ROW corridors with no new development stipulations and 48,400 acres of existing designated ROW corridors where new development would be limited to underground placement only. They would also designate 31,700 acres as new ROW corridors, while undesignating 39,700 acres. Within exclusion areas, new aboveground linear ROWs would be allowed only in those designated ROW corridors where underground stipulations would not apply. Corridors wider than 3,500 feet would not be allowed. The need to locate proposed facilities within designated corridors in exclusion areas would decrease the amount of federal land available to accommodate new infrastructure development. These restrictions could redirect some new ROW development to adjacent nonfederal lands or non-GRSG habitat federal land. However, new corridor designations in GRSG habitat would improve the ability of the BLM and Forest Service to plan for and evaluate ROW applications, and manage approved ROW authorizations, while managing for the protection of GRSG habitat. Identification of corridor locations and associated development stipulations would enable the BLM and Forest Service to provide additional certainty for potential ROW applicants seeking ROW locations within GRSG habitat.

#### *Wind ROWs*

Under Alternative D, 2,781,900 acres of mapped GRSG habitat would be managed as ROW exclusion and 9,400 acres as avoidance for utility-scale wind energy. Outside mapped occupied GRSG, but within population areas, 82,400 acres would be managed as ROW exclusion and 462,500 as avoidance. All wind energy development would be excluded within 1 mile of an occupied lek in PHMA. Impacts on wind energy ROWs under Alternative D would be similar to Alternative C, with the exception that additional exclusion and avoidance criteria would apply to areas outside mapped occupied habitat. Accordingly, Alternative D would impact the additional 12,600 acres of wind energy areas within population areas but outside occupied habitat considered developable due to wind speeds greater than 7 meters per second by limiting or preventing the approval of new wind energy development in those areas. Refer also to **Section 4.20** for additional impacts analysis for wind energy development.

#### *Surface Disturbance Cap*

Under Alternative D, the total surface area covered by anthropogenic disturbances would be limited to 5 percent within each population area. If surface disturbance in a population area exceeds 5 percent, then no new surface-disturbing activities would be allowed in that area. Future restrictions on ROW development and communication facility leasing would occur in population areas where disturbance exceeds 5 percent, respectively. Impacts from excluding new ROW would be the same as those described above.

Impacts on valid existing rights would be the same as those under Alternative B.

#### ***Mineral Development (including geothermal)***

Impacts under Alternative D from mineral development would be similar to Alternative B, with the exceptions that underground coal mining would be allowed in GRSG habitat with stipulations specifically related to surface disturbance; GRSG habitat would be open to noncommercial mineral material development; and fluid mineral development would be allowed on 1,829,980 acres subject to CSU and/or TL stipulations. A 5 percent disturbance cap under Alternative D, compared to 3 percent under Alternative B, would also allow for more mineral activity. New mineral development in PHMA would place a demand on the lands and realty program through the need for new or modified ROW authorizations. Refer to **Section 4.21** for further analysis related to mineral development.

#### ***Withdrawals***

There would be no impacts from withdrawals under Alternative D.

### **4.19.6 Alternative E**

#### ***Greater Sage-Grouse Management***

Management actions under Alternative E to protect GRSG habitat would impact lands and realty through the placement of limitations on areas for new ROW authorizations. Avoidance area designations on 98 percent (2,654,000 acres) of mapped GRSG habitat in SGMAs/core areas would limit new ROW development in those areas or divert it to adjacent nonfederal lands unless ROW applicants could meet supplemental design criteria and siting requirements. Where these requirements could not be met, there could be reduced energy and communication opportunities to meet growing demand.

**Travel and Transportation**

Impacts on the lands and realty program under Alternative E would be the same as those described above under Alternative B. Refer to **Section 4.18** for further analysis.

**Lands and Realty (Land Tenure)**

There would be no impact on lands and realty from land tenure requirements under Alternative E.

**Infrastructure Development (including all ROWs and utility corridors)**

Under Alternative E, the total area managed as ROW exclusion (27,600 acres) would be the same as Alternative A, while 98 percent (2,654,000 acres) of mapped GRSG habitat in SGMAs/core areas under Alternative E would be managed as ROW avoidance. New ROWs would continue to be allowed on 632,200 acres within mapped GRSG habitat.

In areas outside occupied GRSG habitat but within population areas, management would be the same as Alternative A. Approximately 103,200 acres would be managed as ROW avoidance, and 2,292,000 acres would be open to new ROW development, including wind. Additionally, collocation would be required in GRSG habitat, where possible.

Management of mapped GRSG habitat outside SGMAs/noncore areas and subsequent impacts on lands and realty would be the same as Alternative A.

Under Alternative E2, all core areas would be managed as exclusion areas for new Forest Service SUAs. Noncore areas would be managed as avoidance areas for new Forest Service SUAs, except for areas currently managed as SUA exclusion areas. New Forest Service SUAs in noncore areas would be co-located within existing SUAs, where possible.

Management of 98 percent of mapped GRSG habitat in SGMAs/core areas under Alternative E as ROW avoidance would require ROW applications to meet additional stipulations for the protection of GRSG habitat, which could result in the denial of projects that cannot meet these requirements. Stipulations include no permanent disturbance within 1 mile of an occupied lek (unless the disturbance is not visible to the GRSG), no permanent disturbance within occupied leks, and justification from the ROW applicant as to why development is required in the avoidance area and cannot be placed elsewhere. Accordingly, although new development could be authorized, the stipulations associated with avoidance areas under Alternative E would limit the ability to accommodate the demand for new infrastructure development in GRSG habitat. With demand for new ROWs in the planning area, including major inter- and intra-state electrical transmission and gas pipeline ROW developments, expected to continue and increase over time, new ROW development would be diverted to adjacent nonfederal lands or would not occur at all. If new ROW development could not be feasibly developed, the result would be reduced energy and communication opportunities to meet growing demand.

**Wind ROWs**

Under Alternative E, 2,654,000 acres in mapped GRSG habitat would be managed as ROW avoidance, while 632,200 would be open to new wind energy development, and 27,600 would continue to be exclusion. Although wind energy ROWs could be approved in GRSG habitat under Alternative E, additional siting requirements and design criteria would decrease the

likelihood for development on BLM-administered and National Forest System lands, especially where favorable wind energy potential exists on adjacent nonfederal land. Outside GRSG habitat, but within population areas, impacts would be similar to Alternative A, with the exception that under Alternative E, an additional 52,400 acres would be ROW avoidance with subsequent impacts on the abilities of the BLM and Forest Service to accommodate wind energy demand in those areas. Refer also to **Section 4.20** for additional impacts analysis for wind energy development.

***Mineral Development (including geothermal)***

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. Stipulations may affect the location, size, and operations of mineral-development projects. Therefore, while the amount of land available for mineral development would be to the same as Alternative A, stipulations under Alternative E could reduce the number and distribution of ROW applications associated with new mineral-development projects. Refer to **Section 4.21** for further analysis related to mineral development.

***Withdrawals***

There would be no impacts from withdrawals under Alternative E.

**4.19.7 Proposed Plans**

***Greater Sage-Grouse Management***

The most notable impacts on the Lands and Realty program under the Proposed Plans would occur in PHMA. In addition to managing PHMA as avoidance areas for future land use authorizations, including ROWs, leases, and permits, the Proposed Plans would require discretionary surface-disturbing land use activities to:

- Achieve net conservation gain to GRSG,
- Incorporate RDFs,
- Avoid tall structures within key GRSG habitat areas,
- Meet noise requirements,
- Abide by lek buffer requirements, and
- Avoid disturbing more than 3 percent of a BSU and project area.

Collectively, these criteria could increase mitigation requirements, result in more complex designs, exclude infrastructure placement in the most cost effective locations, and result in overall greater development costs. The corresponding effect would likely be a reduction in the number of authorization applications received for activities in PHMA and longer, more complicated review periods for those that are proposed in PHMA. Implementation of the GRSG habitat conservation measures listed above could also limit new mineral development in PHMA, which would further reduce the demand for new ROW development in the decision area.

Less restrictive management for new land use authorizations in GHMA and in GRSG habitat outside of the decision area would allow for more ROW development, leases, and permits in those areas. However, because the Proposed Plans would still require discretionary surface-disturbing land use actions to achieve net conservation gain, incorporate RDFs, and abide by lek buffers, project proponents in GHMA would also be likely to seek less restrictive locations outside GRSG habitat or, if located in GHMA, incur added costs and longer project review periods.

The TransWest Express (including those portions of Energy Gateway South that are collocated) is not subject to the Proposed Plans decisions to designate PHMA as an avoidance area and to require net conservation gain, RDFs, and lek buffers in GHMA. The Obama Administration identified this transmission project as a priority project as part of the President's commitment to job creation and modernizing America's infrastructure. This transmission project was one of seven projects identified for expedited permit review and federal agency coordination among an interagency Rapid Response Team for Transmission established to foster coordination, expedite simultaneous permitting processes, and resolve permitting challenges, while ensuring appropriate environmental reviews.

The BLM is currently processing the application for TransWest Express (including those portions of Energy Gateway South that are collocated), a high-voltage transmission line, which includes alternatives through GRSG habitat. The BLM is analyzing conservation measures for GRSG as part of the review process for TransWest Express (including those portions of Energy Gateway South that are collocated).

TransWest Express (including those portions of Energy Gateway South that are collocated) is analyzed in detail in the cumulative impacts section of this LUPA.

#### ***Travel and Transportation***

Planning level impacts on the lands and realty program under the Proposed Plans from travel and transportation would be the same as those described above under Alternative B. Refer to **Section 4.18** for further analysis. Subsequent travel management planning, which designates allowable uses on specific routes, could modify the availability of routes to support the lands and realty program.

#### ***Lands and Realty (Land Tenure)***

The Proposed Plans would allow land disposal actions that result in a net conservation gain to GRSG and its habitat. By allowing realty actions that can demonstrate a benefit to GRSG and its habitat, the BLM and Forest Service could consolidate land ownership where applicable and improve overall land management efficiency.

#### ***Infrastructure Development (including all ROWs and utility corridors)***

Under the Proposed Plans, the BLM and Forest Service would manage for ROW development based on the type of ROW (e.g., major or minor; linear or site) and location within the planning area. In PHMA, new ROWs, leases, and permits would be avoided if possible. New ROWs, leases, and permits (except for roads) would only be allowed in PHMA and GHMA where the proposal could demonstrate a net conservation gain to GRSG habitat and application of RDFs and other GRSG conservation strategies (e.g., tall structure limitations and buffering from leks)

intended to reduce impacts on GRSG habitat. New road ROWs in PHMA would be authorized only where necessary for public safety, administrative access, or subject to valid existing rights and would be collocated as close as technically possible to existing ROWs or where GRSG impacts are best minimized. Unless within a designated corridor, aboveground linear ROWs would be avoided on 1,997,000 acres of BLM-administered lands and 767,800 as restricted on National Forest System lands. In addition to meeting requirements for a net conservation gain for GRSG, ROWs in avoidance areas would be subject to strict design and siting criteria to ensure no impacts on GRSG. The BLM and Forest Service would deny projects that cannot meet ROW grant requirements for the protection of GRSG habitat, within PHMA. Adaptive management responses could further restrict ROW development by excluding high voltage transmission lines or major pipelines outside of corridors in PHMA or limiting the size of new lines within existing corridors. To meet demand, ROW development could be diverted to adjacent nonfederal lands or federal lands outside of PHMA. For projects approved in GRSG habitat, costs would likely be higher compared to areas outside GRSG habitat.

As ROW applicants seek opportunities to place ROW infrastructure in areas otherwise discouraged for infrastructure development, the Proposed Plans could also result in an increase in the number of ROW applications received that propose underground placement or collocation with other infrastructure. Even where new underground or collocated placement would achieve net conservation gain for GRSG habitat, technical (e.g., engineering and service reliability) and financial limitations could preclude ROW development depending on specific topographic constraints in those areas. Refer to **Section 4.3** for analysis of the impacts of burying power lines on GRSG.

The Proposed Plans would avoid site-type ROWs (e.g., communication towers) in PHMA, wherever possible and apply RDFs, lek buffers, and disturbance mitigation requirements to any development that would occur in PHMA. Wind energy generation facilities would be excluded in PHMA. While the Proposed Plans would impact the BLM and Forest Service lands and realty programs by reducing the agencies' ability to authorize communication towers if GRSG conservation measures are not met, impacts on communication services would only result when a ROW applicant could not find another suitable location, not meet the stipulations in the avoidance areas, or the stipulations in avoidance areas would diminish the effectiveness of the communication infrastructure to the point where the development would not be practical.

**Table 2.3** shows potential management of each ROW type under the Proposed Plans for areas within mapped GRSG habitat.

One of the potential effects of restricting land use authorizations within GRSG habitat under the Proposed Plans would be the redistribution of development to portions of the planning area outside GRSG habitat. **Table 4.22** summarizes management of each ROW type under the Proposed Plans for areas that are within the population areas but outside occupied GRSG habitat.

No new ROW corridors would be designated under the Proposed Plans. The BLM and Forest Service would retain 25,100 acres of existing designated ROW corridors in PHMA with no new development stipulations and 44,400 acres of existing designated ROW corridors where new

**Table 4.22**  
**Acres of ROW Management in Population Areas outside of GRSG**  
**Habitat, Proposed Plans**

	ROW Type		
	Above-Ground Linear	Underground Linear	Above-ground Site (non-wind or solar)
Open	1,151,900	933,000	2,084,900
Avoided	165,500	56,500	222,000
Excluded	73,900	0	73,900

Source: BLM 2015

development would be limited to underground placement only. They would also undesignated 33,200 acres of ROW corridors. While the first priority under the Proposed Plans would be to avoid new ROW development in designated corridors, the corridors would be preferred locations for new development compared to areas outside the corridors. Financial and technical feasibility concerns associated with collocating development in corridors could redirect some new ROW development to adjacent nonfederal lands or non-GRSG habitat federal land. However, new corridor designations in GRSG habitat would improve the ability of the BLM and Forest Service to plan for and evaluate ROW applications, and manage approved ROW authorizations, while managing for the protection of GRSG habitat. Identification of corridor locations and associated development stipulations would enable the BLM and Forest Service to provide additional certainty for potential ROW applicants seeking ROW locations within GRSG habitat.

Retaining 76,500 acres of existing corridors in GHMA would have similar benefits as described above for PHMA. However, fewer restrictions on land use authorizations in GHMA compared to PHMA would reduce the incentives for ROW developers to collocate with corridors.

#### *Wind ROWs*

Under the Proposed Plans, 2,797,100 acres of mapped GRSG habitat would be managed as ROW exclusion and 565,200 acres as avoidance or open for utility-scale wind energy. Impacts on wind energy ROWs under the Proposed Plans would be similar to Alternative D, with the exception that additional RDFs, lek buffer requirements, and mitigation requirements would apply to any development in areas that are not excluded. Refer also to **Section 4.20** for additional impacts analysis for wind energy development.

#### *Surface Disturbance Cap*

Under the Proposed Plans, the total surface area covered by anthropogenic disturbances would be limited to 3 percent within each BSU and project area. If surface disturbance in a BSU or project area exceeds 3 percent, then no new surface-disturbing activities (including ROW development and communication facility leasing) would be allowed in that area. Those impacts would continue until total disturbance within the BSU and project area falls below the cap.

Neither the ROW avoidance and exclusion area criteria nor the 3 percent disturbance cap (5 percent on National Forest System lands in Wyoming) proposed under the Proposed Plans would directly affect valid existing rights. Existing development would be allowed to continue

operation, subject to RDFs upon renewal or reauthorization, in their existing footprints. Any expansion of a valid existing operation outside of an exclusion area would be subject to the net conservation gain requirements, disturbance cap, and would be required to mitigate any new surface disturbance. In some cases where a valid existing right exists within an unfragmented area of GRSG habitat, GRSG conservation criteria and RDFs may indirectly limit access to and subsequent development of that right.

### **Withdrawals**

Under the Proposed Plans, areas identified as SFA would be recommended for withdrawal from locatable mineral entry. Impacts on lands and realty would include a decreased demand for ROW development (e.g., roads, pipelines, and transmission lines) to support locatable mineral activities.

## **4.20 RENEWABLE ENERGY**

### **4.20.1 Methods and Assumptions**

While geothermal energy is considered a fluid leasable, it is discussed in this section instead of **Section 4.21**.

#### *Reasonably Foreseeable Development Scenarios*

RFD scenarios for wind and geothermal were developed within the population areas being analyzed, as follows.

#### Wind

It is projected that wind energy projects could occur within occupied habitat in the Bald Hills and Hamlin Valley Population Areas. The reasonably foreseeable wind projects are estimated to cover approximately 5,000 acres and have an electrical capacity of approximately 210 MW. Actual ground disturbance associated with these projects would be in the range of 250 to 500 acres.

#### Geothermal

It is possible that the existing Thermo Geothermal Field (currently, Cyrq-owned wells and generation plant) could expand in the future to include an adjacent 980-acre geothermal lease (UTU-087662) that is located within the Bald Hills Populated Area. Development of this lease is expected to comprise of drilling five geothermal energy production or produced fluid injection wells. With an estimated surface disturbance of 7 acres per well, including respective access roads and pipelines, a total of 35 acres of long-term surface disturbance would result.

This impact analysis analyzes the impacts on lands with good or better wind potential, and lands with moderate or high geothermal potential. This analysis also addresses the effects of the various alternatives on the specific wind and geothermal areas identified above in the RFD scenarios.

#### Solar

The Approved RMP Amendments/ROD for Solar Energy Development in Six Southwestern States (October 2012) excluded all GRSG occupied habitat to new utility-scale solar development. The existing BLM LUPs already exclude solar development in GRSG habitat and

the National Forest System lands would be excluded from solar ROW development; this plan amendment process does not need to make additional decisions related to solar development.

### **Indicators**

Indicators of impacts on renewable energy are as follows:

- Acres of land with good or better wind potential within ROW exclusion areas
- Acres of land with good or better wind potential within ROW avoidance areas
- Restrictions on ROW development in GRSG habitat that would limit or preclude new transmission line development to support renewable energy generation projects
- The amount of land identified as closed to geothermal exploration and development
- The amount of land subject to NSO stipulations
- The amount of land subject to CSU and/or TL stipulations
- The application of lease notices for the protection of GRSG on new leases
- The application of COAs for the protection of GRSG on existing leases
- Restrictions on geothermal exploration in GRSG habitat

### **Assumptions**

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- The term ROW includes BLM ROWs, land leases, and permits, and Forest Service SUAs, as applicable. Under the Proposed Plans, the Forest Service would not make new decisions for SUAs (i.e., any decisions from Alternative A would be carried forward to the Proposed Plans). As such, acreages associated with ROW exclusion and avoidance are specific to BLM-administered lands except where current Forest Service decisions are carried forward.
- Renewable energy resources include solar, wind, geothermal, and biomass facilities. The Solar Programmatic EIS specifically excluded identified GRSG habitat (occupied, brooding, and winter habitat) from BLM-administered lands in Utah that have been identified by the US Department of Energy as having solar energy capacity to support utility-scale facilities of 20 MW or larger. Therefore, utility-scale solar energy development will not be addressed or included in the analysis of this LUPA. For ROW applications to support non-utility-scale solar facilities (i.e., less than 20 MW), the BLM will consider such project requests on a case-by-case basis, which may require an LUPA to allow for an otherwise nonconforming proposal.
- Good or better wind potential is classified as wind speeds of 7.0 meters per second at 50 meter height or at greater wind turbine hub heights (e.g., 80 or 100 meters) or at wind power density of above 400 watts per meter (DOE 2012).
- Existing ROWs may be modified on their renewal, assignment, or amendment if the requested actions meet the objectives of the amended LUPs.

- ROW holders may continue their authorized use as long as they comply with the terms and conditions of their grant.
- The demand for ROWs would increase over the life of the amended LUPs.
- For wind resources, impacts on anticipated projects would only occur because of the change in management of lands within the Bald Hills and Hamlin Valley Population Areas, per the wind RFD scenario.
- Existing geothermal leases would not be affected by the closures proposed under this LUPA.
- Geothermal operations on existing federal leases, regardless of surface ownership, would be subject to COAs by the BLM and Forest Service Authorized Officer. The BLM and Forest Service can deny surface occupancy on portions of leases with COAs to avoid or minimize resource conflicts if this action does not eliminate reasonable opportunities to develop the lease.
- Valid existing geothermal 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.
- 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 developing geothermal resources.
- Technological advancements, such as enhanced/engineered geothermal systems or commercial exploitation of moderate (lower) temperature reservoirs or deeper basin-centric reservoirs, could lead to changes in levels of geothermal mineral development potential throughout the planning area.
- Stipulations apply to geothermal leasing on all lands overlying federal mineral estate, which includes federal mineral estate underlying BLM-administered and National Forest System lands and non-BLM-administered and non-National Forest System lands.
- For geothermal energy, the above criteria were evaluated in addition to areas closed to leasing, and areas with NSO, CSU, and TL stipulations. All of these factors are considered impediments to renewable energy development. Alternatives with greater acreages of such restrictions are considered to have a greater impact on renewable energy development potential than alternatives with fewer acres of such restrictions. For geothermal resources, impacts on anticipated projects would only occur because of the change in management of lands within the Bald Hills Population Area, per the geothermal RFD scenario.
- Restrictions on transmission line development within or adjacent to areas with renewable energy resource potential would result in diminished output capacity (e.g., fewer wind turbines) or prevent the energy resource from being developed.

Implementing management for the following resources to protect GRSG would have negligible or no impact on renewable energy and are therefore not discussed in detail: Vegetation Management, Integrated Invasive Species Management, Wild Horses and Burros, Wildland Fire Management, Livestock Grazing/Range Management, Recreation, Comprehensive Travel and Transportation Management, and ACECs.

#### 4.20.2 Alternative A

##### **Lands and Realty**

Impacts on renewable energy projects are generally related to where ROW authorizations and geothermal leasing are allowed on leased lands. Impacts are also related to the mitigation measures required for specific project siting and special stipulations required for resource protection.

Wind energy projects and electrical transmission projects to connect both wind and geothermal energy projects to the grid can only occur on lands that are not ROW exclusion areas (see **Table 2.3** for a summary of acres of exclusion areas by alternative). Greater ROW exclusion acreages result in long-term direct impacts on the ability for wind and geothermal resources to be developed.

As discussed in **Section 4.19**, ROW applications may be filed within ROW avoidance areas; however, projects proposed in such areas may be subject to restrictions that would add application processing time and increased project costs. Greater ROW avoidance areas 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. Because transmission lines are an essential element of renewable energy projects, there would be no opportunities for the development of renewable energy resources in areas where technical (e.g., engineering and reliability) and financial limitations associated with meeting ROW avoidance criteria preclude transmission line development.

Under Alternative A, zero acres of lands with good or better wind potential would be affected by ROW exclusion or avoidance areas or by management actions that would avoid or exclude new transmission line development. All lands with such potential would continue to be open for ROW applications on a case-by-case basis. **Table 4.23** provides an overview of impacts across alternatives on wind development potential through showing the number of acres of good or better (Class 4 or higher) wind potential within ROW exclusion and avoidance areas.

The areas in the wind RFD scenario in Hamlin Valley and Bald Hills Population Areas are open to ROW applications. Applications would likely be accepted by the BLM and Forest Service with few restrictions. However, if, GRSG becomes a federally listed species, then the ESA Section 7 consultation process would likely result in substantial project constraints.

The Forest Service has not identified avoidance, exclusion, or open areas for wind energy development because, to date, wind energy development on National Forest System lands has been minor.

**Table 4.23**  
**Acres of Good or Better Wind Potential that would be Managed as ROW Exclusion and Avoidance Areas**

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Proposed Plans
ROW Exclusion	0	12,600	35,500	12,600 plus within 1 mile of occupied leks	0	14,300
ROW Avoidance	0	22,900	0	Areas outside PHMA and within 4 miles of an occupied lek	12,600	0

Source: BLM 2012d, 2015

***Mineral Development (including geothermal)***

Geothermal energy cannot be developed in areas closed to leasing. In areas with NSO stipulations, geothermal resources can only be accessed by directional drilling from a point on the surface that is not covered by NSO stipulations. NSO stipulations are nearly as restrictive to geothermal energy development as an area being closed to leasing. Any geothermal projects proposed in areas of CSU and TL stipulations would have added cost and scheduling challenges.

**Table 4.24** compares the acres of categories of geothermal potential within the decision area by whether they would be open or closed to leasing and what stipulations would be applied.

**Table 4.24**  
**Geothermal Leasing Categories, Alternative A**

Geothermal Potential	Closed to Leasing (acres)	Open Subject to NSO Stipulations (acres)	Open Subject to CSU/TL Stipulations (acres)	Open Subject to Standard Terms and Conditions (acres)
High Potential	0	0	0	9,700
Moderate Potential	500	1,720	50,500	103,400
Low/No Known Potential	0	0	260	8,980
<b>Total</b>	<b>500</b>	<b>1,720</b>	<b>50,760</b>	<b>122,080</b>

Source: BLM 2012d

Under Alternative A, 500 acres of federal mineral estate would remain closed to geothermal leasing. None of these closed acres is considered to have high geothermal potential; all of the acres of high geothermal potential would continue to be open without restrictions or stipulations. However, there is still very little reasonably foreseeable development within the planning area. This is due to overall unsuitability for geothermal development within the planning area when compared to nearby areas.

Existing leases within occupied habitat would continue to be developed according to their lease terms, which may include disturbance buffers and TL stipulations in GRSG habitat. COAs could

be applied to mitigate or prevent impacts on public lands or other resources. BMPs could be incorporated as a COA.

Continuing to apply disturbance buffers and seasonal TL stipulations on surface-disturbing and disruptive activities in portions of GRSG breeding, nesting, and winter habitat would directly impact development of geothermal resources by limiting the siting, design, and operations of geothermal development projects. This, in turn, could force operators to use more costly development methods (such as horizontal drilling) than they otherwise might have used. Equipment shortages could result from application of TL stipulations because a bottleneck could be created during the time period in which activity would be allowed.

Geothermal exploration would continue to be allowed in the decision area wherever acres are open to geothermal leasing. However, geothermal exploration in GRSG habitat would continue to be subject to any applicable disturbance buffers or TL stipulations described above.

The geothermal RFD scenario area within the Bald Hills Population Area is already leased. The lease was issued with stipulations in place, and no more stipulations can be added to the lease. Geothermal development within the population area would be subject to COAs placed upon the project at the time of subsequent NEPA analysis and would be subject to any restrictions resulting from ESA Section 7 Consultation with USFWS regarding any listed species in the project area.

#### **4.20.3 Alternative B**

##### ***Lands and Realty***

Managing a total of 2,784,200 acres as ROW exclusion and 532,100 acres as ROW avoidance within mapped occupied GRSG habitat under Alternative B would decrease the BLM's and Forest Service's ability to accommodate wind energy development demand in GRSG habitat areas. However, of the total areas statewide considered developable (i.e., wind speeds greater than 7 meters per second), 19 percent are located within mapped GRSG occupied habitat. Specifically, 12,600 acres considered as having good or better wind potential would be managed as ROW exclusion areas and would not be open for ROW applications (**Table 4.23**). This represents 12,600 fewer acres open to wind energy development than under Alternative A and a reduction of 7 percent in developable windy lands across Utah as compared with Alternative A.

Under Alternative B, an additional 22,900 acres considered as having good or better wind potential would be managed as ROW avoidance areas. This represents 22,900 fewer acres available for wind development without substantial restrictions than Alternative A and an increased restriction on 12 percent of all developable windy lands across Utah as compared with Alternative A.

In total, 74 percent of the 48,100 acres of lands with good or better wind potential within the decision area would be unavailable or restricted under Alternative B: 26 percent would be completely unavailable for wind development due to ROW exclusion management, and another 48 percent would be substantially restricted due to ROW avoidance management.

7,880 acres (52 percent) of the 15,100 acres of BLM-administered lands identified in the wind RFD in Hamlin Valley and Bald Hills Population Areas that are open to ROW applications under Alternative A would become ROW exclusion areas under Alternative B. These ROW exclusion areas would be the result of these areas being designated as PHMA under Alternative B. The potential for development to occur as anticipated in the RFD would be reduced by approximately half with implementation of Alternative B.

Limitations on new ROWs, such as transmission lines and pipelines, throughout PHMA and GHMA could also restrict opportunities to develop renewable energy resources, particularly where exclusion and avoidance areas abut public and private lands with developable renewable energy resource potential. Where excluded or infeasible (technically and/or financially because of avoidance criteria), renewable energy and transmission line developments would be diverted to adjacent nonfederal lands or prevented altogether. The result would be reduced opportunity to meet demand for renewable energy.

Collocating utilities 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, 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.

***Mineral Development (including geothermal)***

**Table 4.25** compares the acres of categories of geothermal potential within the decision area by whether they would be open or closed to leasing and what stipulations would be applied.

**Table 4.25**  
**Geothermal Leasing Categories, Alternative B**

<b>Geothermal Potential</b>	<b>Closed to Leasing (acres)</b>	<b>Open Subject to NSO Stipulations (acres)</b>	<b>Open Subject to CSU/TL Stipulations (acres)</b>	<b>Open Subject to Standard Terms and Conditions (acres)</b>
High Potential	8,050	0	0	1,670
Moderate Potential	118,500	610	27,700	16,400
Low/No Known Potential	9,620	0	260	0
<b>Total</b>	<b>136,170</b>	<b>610</b>	<b>27,960</b>	<b>18,070</b>

Source: BLM 2012d

Under Alternative B, 136,170 acres would be closed to geothermal leasing, including 8,050 acres of high potential and 118,500 acres of moderate potential lands. Alternative B would close to leasing 83 percent of all high potential geothermal lands and 77 percent of all moderate potential lands within the decision area that are open under Alternative A.

These closures would directly impact the fluid minerals program by prohibiting the development of geothermal energy on portions of federal mineral estate. Geothermal operations would be

limited in their choice of project locations and could be forced to develop in areas that are challenging to access or have fewer economic resources because more-ideal areas could be closed to leasing. This could raise the cost of geothermal development in the planning area and could result in operators moving to nearby nonfederal minerals that are open to leasing.

Continuing to apply disturbance buffers and seasonal TL stipulations on surface-disturbing and disruptive activities in portions of GRSG breeding, nesting, and winter habitat would have the same impacts as described under Alternative A.

Under Alternative B, conservation measures in addition to RDFs would be applied as COAs to existing leases within PHMA overlying federal mineral estate. These RDFs and conservation measures would include requirements such as surface-disturbance limitations, TL stipulations, noise restrictions, structure height limitations, design requirements, water development standards, remote monitoring requirements, and reclamation standards. Application of these requirements through COAs would impact geothermal operations by increasing costs if they resulted in the application of additional requirements and/or use of more expensive technology (such as remote monitoring systems) than would otherwise have been used by operators. To avoid these costs, operators could move to nearby nonfederal minerals, though these options are limited.

The geothermal RFD scenario area within the Bald Hills Population Area is already leased. The lease was issued with stipulations in place, and no more stipulations could be added to the lease. The geothermal RFD scenario area is within mapped occupied habitat but not within PHMA; as such, the estimated 35 acres of habitat that may be disturbed would not be subject to RDFs. The potential for the development of geothermal resources within the geothermal RFD scenario area under Alternative B is the same as under Alternative A.

#### **4.20.4 Alternative C**

##### ***Lands and Realty***

Under Alternative C, 35,500 acres considered as having good or better wind potential would be managed as ROW exclusion areas and would not be open for ROW applications (**Table 4.23**). This represents 35,500 fewer acres open to wind energy development than under Alternative A and a reduction of 19 percent in developable windy lands across Utah as compared with Alternative A. In total, 74 percent of the 48,100 acres of lands with good or better wind potential within the decision area would be unavailable under Alternative C.

Excluding ROW development in all mapped occupied GRSG habitat (3,313,800 acres) would prevent the development of transmission lines in these areas and further restrict wind energy development opportunities on public lands outside GRSG habitat. Alternative C would also limit renewable energy development opportunities on adjacent nonfederal land where transmission infrastructure would be needed across BLM-administered or National Forest System lands.

##### ***Mineral Development (including geothermal)***

**Table 4.26** compares the acres of categories of geothermal potential within the decision area by whether they would be open or closed to leasing and what stipulations would be applied.

**Table 4.26**  
**Geothermal Leasing Categories, Alternative C**

<b>Geothermal Potential</b>	<b>Closed to Leasing (acres)</b>	<b>Open Subject to NSO Stipulations (acres)</b>	<b>Open Subject to CSU/TL Stipulations (acres)</b>	<b>Open Subject to Standard Terms and Conditions (acres)</b>
High Potential	9,700	0	0	0
Moderate Potential	166,800	0	0	0
Low/No Known Potential	10,200	0	0	0
<b>Total</b>	<b>186,700</b>	<b>0</b>	<b>0</b>	<b>0</b>

Source: BLM 2012d

Under Alternative C, 186,700 acres would be closed to geothermal leasing, including 9,700 acres of high potential and 166,800 acres of moderate potential lands. Alternative C would close to leasing 100 percent of all high and moderate potential geothermal lands within the decision area that are open under Alternative A.

Management applicable to existing leases under Alternative C would be similar to those under Alternative B. In addition to applying the restrictive management under Alternative B to more acres, Alternative C would also 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 3 percent per section, with some exceptions. Impacts of these operating and siting restrictions would be the same type as those described under Alternative B.

Under Alternative C, geothermal exploration would be prohibited on 4,008,580 acres of federal mineral estate within mapped occupied habitat. Closing occupied habitat to geothermal exploration could reduce the availability of data on geothermal resources outside occupied habitat and could increase costs of geothermal development if it resulted in the use of more expensive technology to acquire such data by other means.

Impacts on the geothermal RFD scenario area from fluid minerals management would be the same as described under Alternative B.

#### **4.20.5 Alternative D**

##### ***Lands and Realty***

Under Alternative D, 2,864,300 acres in the planning area would be managed as ROW exclusion and 471,900 acres as avoidance for utility-scale wind energy. Impacts on wind energy ROWs under Alternative D would be similar to Alternative C, with the exception that additional exclusion and avoidance criteria would apply to areas outside mapped occupied habitat. Of those areas considered as having good or better wind potential, 12,600 acres (plus any lands within 1 mile of occupied leks) would be managed as ROW exclusion areas and would not be open for ROW applications (**Table 4.23**). Like Alternative B, this represents 12,600 fewer acres open to wind energy development than under Alternative A and a reduction of 7 percent

in developable windy lands across Utah as compared with Alternative A. Under Alternative D, any areas outside PHMA and within 4 miles of an occupied lek would be managed as ROW avoidance areas. This represents fewer acres available for wind development without substantial restrictions than Alternative A. In total, at least 26 percent of the 48,100 acres of lands with good or better wind potential within the decision area would be unavailable or substantially restricted due to ROW exclusion and avoidance management under Alternative D.

8,250 acres (55 percent) of the 15,100 acres of BLM-administered lands identified in the wind RFD in Hamlin Valley and Bald Hills Population Areas that are open to ROW applications under Alternative A would become ROW exclusion areas under Alternative D. An additional 2,380 acres (16 percent) of the 15,100 acres would become ROW avoidance area. The potential for development to occur as anticipated in the RFD would be reduced by more than half with implementation of Alternative D.

Alternative D would also exclude aboveground transmission lines in PHMA (1,422,300 acres) and avoid aboveground transmission lines on an additional 1,368,900 acres of occupied GRSG habitat. Impacts on renewable energy from restrictions on transmission line infrastructure development, including from requirements to collocate utilities within designated corridors within avoidance areas, would be the same as those described in Alternative B.

#### ***Mineral Development (including geothermal)***

**Table 4.27** compares the acres of categories of geothermal potential within the decision area by whether they would be open or closed to leasing and what stipulations would be applied.

**Table 4.27**  
**Geothermal Leasing Categories, Alternative D**

<b>Geothermal Potential</b>	<b>Closed to Leasing (acres)</b>	<b>Open Subject to NSO Stipulations (acres)</b>	<b>Open Subject to CSU/TL Stipulations (acres)</b>	<b>Open Subject to Standard Terms and Conditions (acres)</b>
High Potential	0	0	9,720	0
Moderate Potential	460	31,400	135,000	0
Low/No Known Potential	0	3,620	6,600	0
<b>Total</b>	<b>460</b>	<b>35,020</b>	<b>151,320</b>	<b>0</b>

Source: BLM 2012d

Under Alternative D, CSU and TL stipulations would be applied to the entire 9,720 acres of high potential lands that were open with only standard stipulations under Alternative A. Moderate potential lands would also be more restricted under Alternative D, with an additional 31,400 acres moving from open with standard stipulations under Alternative A into open with NSO stipulations. An additional 135,000 acres of moderate potential lands would change from open with only standard stipulations under Alternative A to open with CSU and TL stipulations under Alternative D.

The CSU stipulations would include noise and tall structure limitations and, at times, a site-specific plan of development to limit habitat fragmentation and a 5 percent disturbance limit.

Application of these surface-disturbance restrictions, TL stipulations, and other operating standards would limit the siting, design, and operations of geothermal development projects in the manner described under Alternative A. However, these impacts would be mitigated in GHMA where off-site mitigation would allow operators to waive the applicable stipulations.

For existing leases, the BLM and Forest Service would apply the same RDFs to the same acreage as under Alternative B. However, exceptions to application of RDFs could mitigate impacts. Exceptions would occur where a design feature was not applicable (e.g., a resource is not present on a given site) or where the design feature would not actually provide additional protection for GRSG or its habitat. See **Table 2.4** for more information on when these exceptions to RDFs would apply.

The conservation measures applied under Alternative D would also differ from Alternative B. A 5 percent disturbance limit would apply instead of a 3 percent limit, and surface occupancy buffers and TL stipulations would not apply to surface disturbance; rather, surface disturbance would minimize habitat loss, fragmentation, and direct and indirect effects on GRSG and its habitat. The impacts of applying these RDFs and conservation measures would be the same type as those described under Alternative B. On- or off-site mitigation would be used to minimize impacts on GRSG. Where operators use such mitigation to protect GRSG, geothermal development costs would increase as compared with Alternative A due to the additional expense of mitigation activities.

Geothermal exploration would be allowed in occupied habitat, but seasonal restrictions would apply in nesting, brood-rearing, and winter habitat. While these restrictions would continue to apply to exploration in some areas under Alternative A, more consistent application under Alternative D would increase impacts on geothermal development. These impacts would be the same type as those described under Alternative B.

Impacts on the geothermal RFD scenario area from fluid minerals management would be the same as described under Alternative B.

#### **4.20.6 Alternative E**

##### ***Lands and Realty***

Under Alternative E, impacts of ROW exclusion area management would be the same as described under Alternative A, as no areas considered as having good or better wind potential would be managed as ROW exclusion. In addition, 12,600 acres considered as having good or better wind potential would be managed as ROW avoidance areas (**Table 4.23**). This represents 12,600 fewer acres available for wind development without substantial restrictions than Alternative A and an increased restriction on 7 percent of all developable windy lands across Utah as compared with Alternative A. In total within the decision area, 27 percent of the 48,100 acres of lands with good or better wind potential would have restrictions for wind development through ROW avoidance management.

7,880 acres (52 percent) of the 15,100 acres of BLM-administered lands identified in the wind RFD in Hamlin Valley and Bald Hills Population Areas that are open to ROW applications under Alternative A would become ROW avoidance areas under Alternative E. These ROW

avoidance areas would place restrictions on potential development in these areas but would not prevent development from occurring. The potential for development to occur as anticipated in the RFD would be reduced due to physical and financial obstacles.

Impacts of collocating utilities within designated corridors would be the same as those described under Alternative B.

***Mineral Development (including geothermal)***

**Table 4.28** compares the acres of categories of geothermal potential within the decision area by whether they would be open or closed to leasing and what stipulations would be applied.

**Table 4.28**  
**Geothermal Leasing Categories, Alternative E**

<b>Geothermal Potential</b>	<b>Closed to Leasing (acres)</b>	<b>Open Subject to NSO Stipulations (acres)</b>	<b>Open Subject to CSU/TL Stipulations (acres)</b>	<b>Open Subject to Standard Terms and Conditions (acres)</b>
High Potential	0	0	8,000	1,700
Moderate Potential	500	4,700	141,600	15,600
Low/No Known Potential	0	0	16,800	800
<b>Total</b>	<b>500</b>	<b>4,700</b>	<b>166,700</b>	<b>18,000</b>

Source: BLM 2012d

Under Alternative E, no additional acres of high or moderate acres would be closed to geothermal leasing as compared with Alternative A. NSO stipulations would be added to 3,000 acres of moderate potential lands under Alternative E. Alternative E would change an additional 8,000 acres of high potential lands and an additional 91,100 acres of moderate potential lands from being open only with standard stipulations to being open subject to CSU and TL stipulations. Restriction of these acres would directly impact the potential for geothermal development in the manner described under Alternative A. Existing leases would remain valid through their term, but NSO/TL stipulations would be applied if the lease were renewed.

CSU and TL stipulations would also apply to geothermal exploration within mapped GRSG habitat in SGMAs/core areas. Impacts of these restrictions on geothermal exploration would be the same type as those described under Alternative A.

Under Alternative E, no management actions from this LUPA would apply to the federal mineral estate outside of mapped GRSG habitat in SGMAs/core areas in the decision area. Management of these areas and impacts of that management would be the same as described under Alternative A.

The geothermal RFD scenario area within the Bald Hills Population Area is already leased. The lease was issued with stipulations in place, and no more stipulations can be added to the lease.

The potential for the development of geothermal resources within the geothermal RFD scenario area is the same under Alternative E as under Alternative A.

#### 4.20.7 Proposed Plans

##### ***Lands and Realty***

Under the Proposed Plans, the BLM and Forest Service would manage 2,797,100 acres of mapped GRSG habitat as ROW exclusion and 565,200 acres as avoidance or open for utility-scale wind energy. Impacts on wind energy ROWs under the Proposed Plans would be similar to Alternative D, with the exception that RDFs, buffers requirements, and mitigation standards would apply to any development in areas that are not excluded. More than a quarter of the developable wind resources in the decision area would be unavailable or substantially restricted due to ROW exclusions.

Outside of exclusion areas, the requirement, under the Proposed Plans, for all discretionary projects to achieve net conservation gain in GRSG habitat, would have direct short- and long-term effects on wind energy development where projects could not meet those standards through design, placement, and/or mitigation. The Proposed Plans would also indirectly affect wind energy development through restrictions on transmission line ROWs. The combined effects would be a redirection of wind energy development to “good” wind resource areas outside GRSG habitat.

##### ***Mineral Development (including geothermal)***

**Table 4.29** compares the acres of categories of geothermal potential within the decision area by whether they would be open or closed to leasing and what stipulations would be applied.

**Table 4.29**  
**Geothermal Leasing Categories, Proposed Plans**

<b>Geothermal Potential</b>	<b>Closed to Leasing (acres)</b>	<b>Open Subject to NSO Stipulations (acres)</b>	<b>Open Subject to CSU/TL Stipulations (acres)</b>	<b>Open Subject to Standard Terms and Conditions (acres)</b>
High Potential	0	8,100	0	1,700
Moderate Potential	455	114,200	31,900	15,600
Low/No Known Potential	0	18,000	300	0
<b>Total</b>	<b>455</b>	<b>140,200</b>	<b>32,100</b>	<b>17,300</b>

Source: BLM 2015

Under the Proposed Plans, 8,100 acres (83 percent) of the high potential geothermal areas in the decision area would be managed as NSO with stipulations. Moderate potential lands would also be more restricted under the Proposed Plans compared to Alternative A, with an additional 112,500 acres moving from open with standard stipulations under Alternative A into open with NSO stipulations. Compared to Alternative A, 45 less acres with known geothermal potential would be closed to leasing. Short- and long-term direct and indirect impacts on geothermal development because of NSO stipulations would include reduced leasing and subsequent development opportunities in GRSG habitat. Future leasing and development would be more likely to occur in known resource areas outside GRSG habitat.

CSU stipulations and TLs under the Proposed Plans, which would apply to 31,900 acres of moderate potential areas, would include noise and tall structure limitations, RDFs, and a 3 percent disturbance limit. Application of these surface-disturbance restrictions, TL stipulations, and other operating standards would limit the siting, design, and operations of geothermal development projects in the manner described under Alternative A. However, these impacts could be mitigated in GHMA where design, siting, and mitigation could demonstrate net conservation gain for GRSG and its habitat.

For existing leases, the BLM and Forest Service would apply RDFs, except where the design feature would not actually provide additional protection for GRSG or its habitat. See **Section 2.6**, Proposed Plan Amendments, for more information on when these exceptions to RDFs would apply. The impacts of applying these RDFs and conservation measures would be the same type as those described under Alternative D. On- or off-site mitigation would be used to minimize impacts on GRSG. Where operators use such mitigation to protect GRSG, geothermal development costs would increase as compared with Alternative A due to the additional expense of mitigation activities.

Impacts on geothermal exploration and the geothermal RFD scenario area from fluid minerals management would be the same as those described under Alternative B.

## 4.21 MINERALS

### 4.21.1 Oil and Gas

#### ***Methods and Assumptions***

Analysis of impacts on oil and gas 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 closing an area to oil and gas leasing. An indirect impact would result from managing an area as ROW exclusion, which would change the economic feasibility of developing a lease. Additional actions or conditions that could cause direct or indirect impacts on oil and gas are described under *Indicators*, below.

While geothermal energy is considered a fluid leasable, it is discussed in **Section 4.20**, Renewable Energy. Similarly, indirect impacts on oil shale and tar sands are discussed in **Section 4.21.6**, Oil Shale and Tar Sands.

#### *Indicators*

Indicators of impacts on oil and gas are as follows:

- The amount of land identified as closed to new leasing
- The amount of land subject to NSO stipulations
- The amount of land subject to CSU and/or TL stipulations
- Application of COAs for the protection of GRSG on existing leases
- Restrictions on exploration in GRSG habitat
- The amount of land managed as ROW avoidance areas

- The amount of land managed as ROW exclusion areas
- The amount of land closed to mineral material disposal

Where information is available, consideration is given to the potential for fluid mineral resources on lands closed to new leasing. For example, an indicator of an impact on fluid minerals is if there were substantial reductions in federal leasing and development of fluid mineral resources in high potential areas.

#### *Assumptions*

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- Fluid mineral operations on existing federal leases, regardless of surface ownership, would be subject to COAs by the BLM Authorized Officer and the authorized officer of the surface management agency at the time of APD approval. The BLM and Forest Service can deny surface occupancy on portions of leases with COAs to avoid or minimize resource conflicts if this action does not eliminate reasonable opportunities to develop the lease. Existing leases would be developed consistent with applicable laws and valid existing rights, using as many of the RDFs and conservation measures as possible while still allowing reasonable opportunities for development. Access to producing leases, including roads and pipelines to those leases, would not be affected by this LUPA.
- Because ROWs are not required for construction of roads and facilities within a lease or between leases within a unit, these areas would not be impacted by ROW exclusion or avoidance areas proposed under any alternative. Road and facility construction to access existing leases from outside the lease may be impacted by restrictions described under individual alternatives.
- 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.
- Under all alternatives, reclamation bonds would be required, pursuant to 43 CFR 3104, in an amount sufficient to ensure full restoration of lands to the condition in which they were found. In addition, APDs, including drilling plans and surface use plans of operations, would be required under all alternatives in accordance with 43 CFR 3162.
- If an area is leased, it could be developed; however, not all leases would be developed within the life of this LUPA.
- As the demand for energy increases, so will the demand for extracting energy resources in areas with potential.
- Technological advancements, such as directional drilling, could lead to changes in levels of fluid mineral development potential throughout the planning area as additional resources become more easily accessible.
- Stipulations apply to fluid mineral leasing on all surface lands overlying federal mineral estate, which includes federal mineral estate underlying BLM-administered

and National Forest System surface and non-BLM-administered and non-National Forest System surface. There are 4,008,600 acres of federal mineral estate within the decision area (3,313,800 acres of BLM-administered and National Forest System surface with federal minerals, and 694,800 acres of non-BLM-administered and non-National Forest System surface with federal minerals).

- As discussed in the Minerals section of **Chapter 3**, it is projected that 2,416 new federal wells will be developed on federal mineral estate in mapped occupied GRSG habitat in the next 15 years. Approximately 99 percent of these wells are projected to be within the Uintah, Carbon, Emery, and Rich Population Areas. The Carbon and Uintah population areas are expected to see particularly high levels of development in some areas, while less development is expected in the Emery and Rich Population Areas.

Implementing management for the following resources to protect GRSG would have negligible or no impact on fluid minerals and is therefore not discussed in detail: Vegetation Management, Integrated Invasive Species Management, Wild Horses and Burros, Wildland Fire Management, Livestock Grazing/Range Management, Recreation, Comprehensive Travel and Transportation Management, and ACECs.

### **Alternative A**

#### *Special Status Species – GRSG*

Under Alternative A, no disturbance cap would be applied to anthropogenic disturbance in GRSG habitat. Therefore, fluid mineral development could continue to occur subject to stipulations and other restrictions applied specifically to fluid mineral activities.

#### *Infrastructure Development (including all ROWs and utility corridors)*

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

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

#### *Mineral Development (including geothermal)*

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

### Mineral Materials

Approximately 3,932,200 acres (98 percent) of federal mineral estate within the decision area would remain open to mineral material disposal under Alternative A, including 1,273,500 acres (98 percent) of federal mineral estate with mineral material occurrence in the decision area. Approximately 73,500 acres (2 percent) of federal mineral estate within the decision area would remain closed to mineral material disposal. This would include 21,800 acres (2 percent) of federal mineral estate with mineral material occurrence in the decision area. Closing these areas to mineral material disposal could indirectly impact fluid minerals in the areas by reducing the amount of readily available material for road and pipeline construction. This could limit the available means for accessing fluid mineral resources and transporting those resources to processing facilities and markets and could ultimately decrease the amount of development of federal fluid minerals in the planning area.

### Fluid Minerals

*Utah Sub-region (Total Decision Area).* **Table 4.30** breaks down the acres within the decision area by whether they would be open or closed to new leasing and what stipulations would be applied to new leases. This breakdown is done by oil and gas occurrence potential (high, moderate, and low or no known potential).

Under Alternative A, 31,600 acres with high development potential (5 percent of the federal mineral estate with high development potential) would remain closed to new oil and gas leasing. Acres closed in this category would have the greatest impact on the fluid minerals program by prohibiting oil and gas development on portions of federal mineral estate with high potential for such development. An additional 42,200 acres with moderate development potential and 64,700 acres with low or no known development potential would also remain closed to new oil and gas leasing. In areas closed to new leasing (totaling 138,500 acres of federal mineral estate for this alternative), oil and gas operations would be restricted 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 new leasing. This could raise the cost of fluid mineral development in the planning area. In some cases, where resources, geology, and topography allow for access to unleased resources, these closures could result in operators moving to nearby private or state minerals that are open to leasing and thereby draining the unleased federal mineral estate. When such movement occurred, the federal treasury would receive less in royalties

Approximately 15,400 acres of federal mineral estate with high development potential (2 percent of the federal mineral estate with high potential) would remain open to leasing subject to NSO stipulations. Acres subject to NSO stipulations in areas with high development potential for oil and gas would have a greater impact on the fluid minerals program in comparison to acres subject to NSO stipulations in areas with moderate (82,000 acres) or low (386,000 acres) development potential because the likelihood of developing acres in areas with high development potential is greater. In areas where NSO stipulations are applied (totaling 483,400 acres of federal mineral estate for this alternative), federal fluid minerals could be leased, but the leaseholder/operator would have to use offsite methods such as directional or horizontal drilling

**Table 4.30**  
**Oil and Gas Leasing Categories in the Decision Area, Alternative A<sup>1</sup>**

<b>Oil and Gas Development Potential</b>	<b>Closed to New Leasing (acres)</b>	<b>Open Subject to NSO Stipulations (acres)</b>	<b>Open Subject to CSU/TL Stipulations (acres)</b>	<b>Open Subject to Standard Terms and Conditions (acres)</b>
<b>Total Decision Area</b>				
High	31,600	15,400	446,400	134,500
Moderate	42,200	82,000	105,200	532,500
Low/No Known	64,700	386,000	726,400	661,900
<b>Total</b>	<b>138,500</b>	<b>483,400</b>	<b>1,278,000</b>	<b>1,328,900</b>
<b>Uintah Population Area</b>				
High	14,000	7,000	236,500	113,300
Moderate	1,300	500	12,400	1,000
Low/No Known	53,500	6,500	117,100	34,000
<b>Total</b>	<b>68,800</b>	<b>14,000</b>	<b>366,000</b>	<b>148,200</b>
<b>Carbon Population Area</b>				
High	35,100	34,400	88,500	64,400
Moderate	27,600	75,000	78,900	77,100
Low/No Known	0	31,100	23,700	13,100
<b>Total</b>	<b>62,700</b>	<b>140,500</b>	<b>191,000</b>	<b>154,700</b>
<b>Emery Population Area</b>				
High	0	7,900	30	19,200
Moderate	0	40,700	13,500	51,800
Low/No Known	100	67,300	57,200	54,800
<b>Total</b>	<b>100</b>	<b>115,800</b>	<b>70,700</b>	<b>125,800</b>
<b>Rich Population Area</b>				
High	0	0	165,700	0
Moderate	0	200	4,700	0
Low/No Known	0	0	3,300	0
<b>Total</b>	<b>0</b>	<b>200</b>	<b>173,700</b>	<b>0</b>

Source: BLM 2012d

<sup>1</sup>Does not include 800,300 acres in the decision area for which the planning decision is not mapped. These areas may be in various leasing categories, but the acreage in each category is unknown.

to access mineral resources that have high potential for oil and gas development. The area where directional and horizontal 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. Currently, 2 percent of federal wells in the planning area are drilled horizontally, and 55 percent are drilled directionally. The low percentage of existing horizontal wells in the planning area demonstrates the economical, technological, and geological limitations of horizontal drilling as a way to extract oil and gas resources in Utah. For example, horizontal drilling is feasible only when developing a horizontal play such as the Paradox member in Cane Creek field north of Moab.

Of the federal mineral estate in the decision area, approximately 446,400 acres with high, 105,200 acres with moderate, and 726,400 acres with low development potential would remain

open subject to CSU or TL stipulations, totaling 1,278,000 acres for this alternative. Applying CSU and TL stipulations on surface-disturbing and disruptive activities in portions of GRSG breeding, nesting, and winter habitat would directly impact development of oil and gas resources by limiting the siting, design, and operations of oil and gas development projects. This, in turn, could force operators to use more costly development methods (such as directional or horizontal drilling or delaying operations) than they otherwise might have used. Equipment shortages could result from application of TL stipulations because a bottleneck could be created during the time period in which activity would be allowed.

The remaining 134,500 acres of federal mineral estate in high, 532,500 in moderate, and 661,900 in low development potential areas (totaling 1,328,900 acres of federal mineral estate) would be available for fluid mineral leasing and development with standard lease stipulations; these lands would not be subject to additional NSO or CSU stipulations, providing the most flexibility for oil and gas exploration and development.

A total of 187,000 acres within the decision area have no fluid minerals planning decision. If the BLM or Forest Service received an expression of interest in leasing within these areas, additional leasing-specific NEPA analysis would need to be completed before this leasing could occur.

Under this alternative, it is projected that 2,416 new oil and gas wells would be drilled on federal mineral estate on new and existing leases in the population areas in the next 15 years. This rate of development would allow oil and gas production to continue at or near current production rates.

There are 895,200 acres of existing leases in the decision area, of which 205,900 are held by production (an additional 7,200 acres of leases are pending). These existing leases could continue to be developed according to their lease terms, which may include disturbance buffers and TL stipulations in GRSG habitat. COAs could be applied, consistent with the rights granted in the lease, to mitigate or prevent impacts on public lands or other resources. BMPs could be incorporated as COAs. Where stipulations and disturbance buffers apply to existing leases, the cost of developing those leases increases. Facilities may not be able to be sited in their ideal locations for developing the resource, and project delays could occur during seasons when development is prohibited. Costs could also increase when COAs are applied to these leases due to the need to use more expensive technology to satisfy the requirements of the BMPs.

Exploration would continue to be allowed in the decision area wherever acres were open to fluid mineral leasing. However, exploration in GRSG habitat would continue to be subject to any applicable disturbance buffers or TL stipulations described above.

*Uintah Population Area.* **Table 4.30** breaks down the acres within the population areas by whether they would remain open or closed to new leasing and what stipulations would be applied to new leases. A total of 68,800 acres (11 percent of federal mineral estate within the population area) would remain closed to new leasing under this alternative. Most of these acres (53,500 acres, or 78 percent of federal mineral estate closed to new leasing in this population area) have low or no known oil and gas development potential, minimizing impacts on the fluid minerals program. As described above under *Utah Sub-region (Total Decision Area)*, the greatest impact on the fluid minerals program would result from areas closed to new leasing that have

high oil and gas development potential (14,000 acres, or 20 percent of federal mineral estate with high development potential in this population area). In these areas, the development of oil and gas would continue to be prohibited on portions of federal mineral estate with high development potential for oil and gas.

The majority of the Uintah Population Area would remain open to leasing subject to CSU/TL stipulations (366,000 acres, or 61 percent of federal mineral estate within the population area) or open to leasing subject to standard terms and conditions (148,200 acres, or 25 percent), both of which provide flexibility for development within the population area. Under this alternative, it is projected that 1,370 new oil and gas wells would be drilled on new and existing leases on federal mineral estate in the Uintah Population Area in the next 15 years, allowing the Uintah Population Area to continue as a primary location of oil and gas development in Utah as described in the Minerals section of **Chapter 3**.

*Carbon Population Area.* **Table 4.30** breaks down the acres within the population areas by whether they would be open or closed to new leasing and what stipulations would be applied to new leases. A total of 62,700 acres (11 percent of federal mineral estate within the population area) would remain closed to new leasing under this alternative. Most of these acres (35,100 acres, or 56 percent of federal mineral estate closed to new leasing in this population area) have high oil and gas development potential. As described above under *Utah Sub-region (Total Decision Area)*, closure of these areas would continue to have the greatest impact on the fluid minerals program by prohibiting the development of oil and gas on portions of federal mineral estate with high development potential for oil and gas.

The majority of the Carbon Population Area would remain open to leasing subject to CSU/TL stipulations (191,000 acres, or 35 percent of federal mineral estate within the population area) or open to leasing subject to standard terms and conditions (154,700 acres, or 28 percent), both of which provide flexibility for development within the population area. Under this alternative, it is projected that 960 new oil and gas wells would be drilled on new and existing leases on federal mineral estate in the Carbon Population Area to continue as a primary location of oil and gas development in Utah as described in the Minerals section of **Chapter 3**.

*Emery Population Area.* **Table 4.30** breaks down the acres within the population areas by whether they would be open or closed to new leasing and what stipulations would be applied to new leases. Under Alternative A, the majority of the Emery Population Area would remain open to leasing subject to standard terms and conditions (125,800 acres, or 40 percent of federal mineral estate within the population area), providing the most flexibility for development within the population area.

A total of 100 acres (less than 1 percent of federal mineral estate within the population area) would remain closed to new leasing under this alternative, all of which is within areas with low or no known development potential for oil and gas. Impacts on the fluid minerals program from these closures would be the same type as those described for Alternative A, *Utah Sub-region (Total Decision Area)*; however, because so little of the population area would be closed to new leasing and there is little projected future development in the population area, these impacts would be minimal. Under this alternative, it is projected that 40 new oil and gas wells would be drilled on new and existing leases on federal mineral estate in the Emery Population Area in the

next 15 years. This low projection is because, as described in the Minerals section of **Chapter 3**, challenging topography and access issues have limited the development potential of the resources contained in the population area.

*Rich Population Area.* **Table 4.30** breaks down the acres within the population areas by whether they would be open or closed to new leasing and what stipulations would be applied to new leases. Under Alternative A, nearly the entire Rich population area would remain open to leasing subject to CSU/TL stipulations (173,700 acres, or 99.9 percent of federal mineral estate within the population area), minimizing impacts on oil and gas development within the population area. Under this alternative, it is projected that 13 new oil and gas wells would be drilled on new and existing leases on federal mineral estate in the Rich Population Area in the next 15 years. This low projection is because, as described in the Minerals section of **Chapter 3**, much of the oil and gas resources in the population area have already been developed and little future development is expected in the population area.

### **Alternative B**

#### *Special Status Species – GRSG*

Under Alternative B, a disturbance cap of 3 percent of PHMA within a population area would be applied to all anthropogenic disturbances, including fluid mineral development. In PHMA where the 3 percent cap is already exceeded, no new fluid mineral leases would be issued until habitat within the PHMA was restored to a point that acreage of anthropogenic disturbance was below the 3 percent cap. While no population area contains anthropogenic disturbance of more than 3 percent of PHMA, PHMA in sub-areas within the Uintah and Carbon Population Areas would exceed the 3 percent cap. However, because all federal mineral estate in PHMA would be closed to new fluid mineral leasing, new fluid mineral leases would not be impacted by the disturbance cap. Valid existing lease rights would be honored, but mitigation measures may be required for development in the sub-areas that exceed the 3 percent disturbance cap.

#### *Infrastructure Development (including all ROWs and utility corridors)*

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

Under Alternative B, all BLM-administered and National Forest System surface in PHMA (totaling 2,784,200 acres, or approximately 84 percent of BLM-administered and National Forest System surface in the decision area) would be managed as ROW exclusion areas. However, because all PHMA would be closed to new fluid mineral leasing under Alternative B, managing areas as ROW exclusion in PHMA would only impact existing fluid mineral leases. Managing areas as ROW exclusion could restrict construction of new roads or pipelines to access existing leases in those areas.

All BLM-administered and National Forest System surface in GHMA (totaling 532,100 acres, or 16 percent of BLM-administered and National Forest System surface in the decision area) would be managed as ROW avoidance under Alternative B. Fluid minerals beneath those 532,100 acres of BLM-administered and National Forest System surface in GHMA would be impacted by the ROW avoidance area, as described under Alternative A.

### *Mineral Development*

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

### Mineral Materials

Under Alternative B, approximately 3,340,000 acres of federal mineral estate in PHMA (83 percent of the federal mineral estate decision area) would be closed to mineral material disposal. This includes 1,140,000 acres with mineral material occurrence (87 percent of federal mineral estate with mineral material occurrence in the decision area). However, because all PHMA would be closed to fluid mineral leasing under this alternative, closing PHMA to mineral material disposal would only impact existing fluid mineral leases. Closing areas to mineral material disposal could prevent construction of new roads due to a lack of available road material and could therefore decrease overall development of federal fluid minerals in the planning area. However, operators could purchase gravel from elsewhere and transport it where needed.

### Fluid Minerals

*Utah Sub-region (Total Decision Area)*. Under Alternative B, all federal mineral estate within PHMA (3,328,800 acres, or 83 percent of the federal mineral estate decision area) would be closed to new oil and gas leasing. These closures would include 407,100 acres with high oil and gas potential (32 percent of the high potential acres in the decision area). Closure of these acres would directly impact the fluid minerals program in the manner described under Alternative A. Existing leases would remain valid through their term, or as long as they are held by production; they could not be renewed. Existing leases that are isolated and exploratory in nature may not be developed if operators are unable to lease additional areas surrounding those leases. Operators may not consider development of the existing lease to be cost-effective if the surrounding area is closed to leasing and total production from the area would be limited. Impacts on isolated leases would be limited because of the small number of leases in this situation in the planning area. **Table 4.31** breaks down the acres within the decision area by whether they would be open or closed to new leasing and what stipulations would be applied to new leases. This breakdown is done by oil and gas occurrence potential (high, moderate, and low or no known potential).

The 679,800 acres of federal mineral estate within GHMA (17 percent of the decision area) would be subject to the same stipulations and management as under Alternative A.

A total of 43,400 acres within the decision area would have no fluid minerals planning decision. If the BLM or Forest Service received an expression of interest in leasing within these areas, additional leasing-specific NEPA analysis would need to be completed before this leasing could occur.

Under Alternative B, it is projected that 2,137 new oil and gas wells would be drilled on new and existing leases on federal mineral estate in the population areas in the next 15 years. This represents a 12-percent decrease in projected wells on federal mineral estate compared with Alternative A.

**Table 4.31**  
**Oil and Gas Leasing Categories in the Decision Area, Alternative B<sup>1</sup>**

<b>Oil and Gas Potential</b>	<b>Closed to New Leasing (acres)</b>	<b>Open Subject to NSO Stipulations (acres)</b>	<b>Open Subject to CSU/TL Stipulations (acres)</b>	<b>Open Subject to Standard Terms and Conditions (acres)</b>
<b>Total Decision Area</b>				
High	407,100	7,000	209,400	113,400
Moderate	766,300	9,900	29,300	47,600
Low/No Known	2,142,200	7,500	17,600	81,800
<b>Total</b>	<b>3,315,500</b>	<b>24,400</b>	<b>256,400</b>	<b>242,800</b>
<b>Uintah Population Area</b>				
High	84,800	5,800	194,700	95,400
Moderate	6,500	400	11,700	300
Low/No Known	333,200	0	3,700	3,800
<b>Total</b>	<b>424,600</b>	<b>6,200</b>	<b>210,200</b>	<b>99,500</b>
<b>Carbon Population Area</b>				
High	75,500	700	12,100	15,900
Moderate	124,800	900	6,100	6,600
Low/No Known	44,600	300	2,300	1,900
<b>Total</b>	<b>244,900</b>	<b>1,900</b>	<b>20,500</b>	<b>24,400</b>
<b>Emery Population Area</b>				
High	3,100	400	20	1,500
Moderate	29,800	900	10	2,500
Low/No Known	51,200	100	130	3,200
<b>Total</b>	<b>84,100</b>	<b>1,400</b>	<b>160</b>	<b>7,300</b>
<b>Rich Population Area</b>				
High	227,200	0	0	0
Moderate	8,700	200	200	0
Low/No Known	68,800	0	100	0
<b>Total</b>	<b>304,700</b>	<b>200</b>	<b>300</b>	<b>0</b>

Source: BLM 2012d

<sup>1</sup>Does not include 331,400 acres in the decision area for which the planning decision would not be mapped. These areas may be in various leasing categories, but the acreage in each category is unknown.

Under Alternative B, conservation measures in addition to RDFs would be applied as COAs to existing federal leases on 540,600 acres of PHMA overlying federal mineral estate, 213,000 acres of which are held by production. These RDFs and conservation measures would include requirements such as surface disturbance limitations, TL stipulations, noise restrictions, structure height limitations, 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 and/or use of more expensive technology (such as remote monitoring systems) than would otherwise have been used by operators. To avoid these costs, operators could move to nearby state or private minerals, though these opportunities are limited.

In addition to the requirements described above, the COAs would require unitization when necessary to minimize harm to GRSG and would call for completion of Master Development Plans for developing fluid mineral resources prior to processing individual APDs to help with analysis and application of appropriate RDFs and COAs to individual APDs. Requiring Master Development Plans and unitization could cause direct impacts on fluid minerals through increased costs of oil and gas extraction by delaying the permit approval process until such additional site-specific planning efforts are completed.

The BLM and Forest Service could not apply COAs that would eliminate reasonable opportunities to develop the lease. Therefore, although costs of development would increase where COAs were applied, oil and gas development would still be able to occur.

Exploration would be allowed on the 3,328,800 acres of federal mineral estate within PHMA but would be subject to TL stipulations and other restrictions. Most notably, exploration would be allowed only for gathering information about fluid mineral resources outside PHMA (e.g., evaluating source areas, potential migration paths, and structure of the area). Because of these limitations and the fact that PHMA would be closed to new fluid mineral leasing, exploration in PHMA would decrease under this alternative. Decreases in exploration in PHMA could reduce the availability of data on fluid mineral resources and could increase costs of fluid mineral development if the limitations required use of more expensive exploration technology (such as helicopter portable drilling). TL stipulations on exploration would delay development activities and could cause equipment shortages because all exploration would be occurring during the same period.

*Uintah Population Area.* **Table 4.31** breaks down the acres within the population areas by whether they would be open or closed to new leasing and what stipulations would be applied to new leases. Under Alternative B, 84,800 acres (22 percent) of federal mineral estate in the Uintah Population Area with high potential would be closed to new oil and gas leasing. Impacts of this closure would be the same types as those described under Alternative A; however, because 6 times more acres with high potential would be closed to new leasing under Alternative B, the magnitude of those impacts would increase.

Under this alternative, it is projected that 1,308 new oil and gas wells would be drilled on new and existing leases on federal mineral estate in the Uintah Population Area in the next 15 years. This represents a 5 percent decrease in projected wells on federal mineral estate compared with Alternative A. As described under Alternative A, this population area is expected to be a primary area for future oil and gas development in the Utah Sub-region.

*Carbon Population Area.* **Table 4.31** breaks down the acres within the population areas by whether they would be open or closed to new leasing and what stipulations would be applied to new leases. Under Alternative B, 75,500 acres (72 percent) of federal mineral estate in the Carbon Population Area with high potential would be closed to new oil and gas leasing. Impacts of this closure would be the same type as those described under Alternative A; however, because twice as many acres with high potential would be closed under Alternative B, the magnitude of those impacts would increase. Another 124,800 acres with moderate potential would be closed under this alternative—5 times more acres with moderate potential than would be closed under Alternative A.

Under this alternative, it is projected that 751 new oil and gas wells would be drilled on new and existing leases on federal mineral estate in the Carbon Population Area in the next 15 years. This represents a 22-percent decrease in projected wells on federal mineral estate compared with Alternative A. As described under Alternative A, this population area is expected to be a primary area for future oil and gas development in the Utah Sub-region.

*Emery Population Area.* **Table 4.31** breaks down the acres within the population areas by whether they would be open or closed to new leasing and what stipulations would be applied to new leases. Under Alternative B, 3,100 acres (62 percent) of federal mineral estate in the Emery Population Area with high potential would be closed to new oil and gas leasing, compared with zero acres with high potential closed under Alternative A. The types of impacts of this closure would be the same as those described for the *Utah Sub-region (Total Decision Area)* under Alternative A; however, the magnitude of those impacts would increase.

Under this alternative, the number of new wells projected to be drilled on the difficult-to-access resources in the Emery Population Area in the next 15 years is the same as that under Alternative A.

*Rich Population Area.* **Table 4.31** breaks down the acres within the population areas by whether they would be open or closed to new leasing and what stipulations would be applied to new leases. Under Alternative B, 227,200 acres (100 percent) of federal mineral estate in the Rich Population Area with high potential would be closed to new oil and gas leasing compared to zero acres with high potential closed under Alternative A. Approximately 96 percent of acres with moderate potential in the population area would be closed, and over 99 percent of acres with low or no known potential in the population area would be closed. The Rich Population Area contains the highest number of isolated leases in the planning area (less than two percent of the leased acreage in the population area). These leases may not be developed if the surrounding acres cannot be leased. However, as described under Alternative A, much of the oil and gas resources in the population area have already been developed and little future development is expected.

Under this alternative, it is projected that six new oil and gas wells would be drilled on new and existing leases on federal mineral estate in the Rich Population Area in the next 15 years. This represents a 54-percent decrease in projected wells on federal mineral estate compared with Alternative A.

### **Alternative C**

#### *Special Status Species – GRSG*

Under Alternative C, a disturbance cap of 3 percent of PHMA within a population area would be applied to all surface disturbances, including fluid mineral development. In PHMA where the 3 percent cap is already exceeded, no new fluid mineral leases would be issued until habitat within the PHMA was restored to a point that acreage of disturbance was below the 3 percent cap. Because non-anthropogenic disturbances such as severe wildfire and heavy grazing would be counted under this alternative, more areas may exceed the disturbance cap under Alternative C than under Alternative B. The Uintah Population Area would exceed the 3 percent disturbance cap under this alternative, and the Carbon population area would be close to exceeding the

disturbance cap. Additionally, PHMA in sub-areas within the Uintah and Carbon Population Areas would exceed the 3 percent cap. The Hamlin Valley and Box Elder Population Areas would also exceed the 3 percent cap under this alternative, but these population areas do not have significant fluid mineral activity. Because all federal mineral estate in PHMA would be closed to new fluid mineral leasing under Alternative C, new fluid mineral leases would not be impacted by the disturbance cap. Valid existing lease rights would be honored, but mitigation measures may be required for development in the population areas or sub-areas that exceed the 3 percent disturbance cap.

*Infrastructure Development (including all ROWs and utility corridors)*

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

Under Alternative C, all BLM-administered and National Forest System surface within mapped occupied habitat (3,313,800 acres, or 100 percent of BLM-administered and National Forest System surface in the decision area) would be managed as ROW exclusion areas. However, because the entire decision area would be closed to new fluid mineral leasing under Alternative C, managing areas as ROW exclusion in the decision area would only impact existing leases.

*Mineral Development*

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

Mineral Materials

Under Alternative C, approximately 4,008,600 acres of federal mineral estate (the entire federal mineral estate decision area) would be closed to mineral material disposal. This includes all acres with mineral material occurrence in the decision area. However, because the entire federal mineral estate decision area would be closed to fluid mineral leasing under Alternative C, closing the decision area to mineral material disposal would only impact existing fluid mineral leases. Closing areas to mineral material disposal could deter existing leases in those areas from constructing new roads due to a lack of available road material and could therefore decrease overall development of federal fluid minerals in the planning area. However, operators could purchase gravel from elsewhere and transport it where needed.

Fluid Minerals

*Utah Sub-region (Total Decision Area).* Under Alternative C, all federal mineral estate in the decision area (4,008,600 acres) would be closed to new oil and gas leasing. Closure of the federal mineral estate would directly impact the fluid minerals program in the manner described under Alternative A; however, because 29 times more acres would be closed under Alternative C, the magnitude of those impacts would increase. This alternative would prohibit any new oil and gas leases from being issued within the decision area but would not prevent continued reasonable development of existing mineral leases. **Table 4.32** breaks down the acres closed to new oil and gas leases within the decision area by oil and gas occurrence potential (high,

moderate, and low or no known potential). Approximately 18 percent of the acres closed to new leasing would have high potential.

**Table 4.32**  
**Oil and Gas Leasing Categories in the Decision Area, Alternative C<sup>1</sup>**

<b>Oil and Gas Potential</b>	<b>Closed to New Leasing (acres)</b>	<b>Open Subject to NSO Stipulations (acres)</b>	<b>Open Subject to CSU/TL Stipulations (acres)</b>	<b>Open Subject to Standard Terms and Conditions (acres)</b>
<b>Total Decision Area</b>				
High	738,800	0	0	0
Moderate	863,600	0	0	0
Low/No Known	2,219,200	0	0	0
<b>Total</b>	<b>3,821,600</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Uintah Population Area</b>				
High	398,700	0	0	0
Moderate	19,500	0	0	0
Low/No Known	273,000	0	0	0
<b>Total</b>	<b>691,200</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Carbon Population Area</b>				
High	112,900	0	0	0
Moderate	140,700	0	0	0
Low/No Known	54,300	0	0	0
<b>Total</b>	<b>307,900</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Emery Population Area</b>				
High	5,000	0	0	0
Moderate	33,300	0	0	0
Low/No Known	54,700	0	0	0
<b>Total</b>	<b>93,000</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Rich Population Area</b>				
High	217,200	0	0	0
Moderate	16,700	0	0	0
Low/No Known	47,100	0	0	0
<b>Total</b>	<b>281,000</b>	<b>0</b>	<b>0</b>	<b>0</b>

Source: BLM 2012d

<sup>1</sup>Does not include 234,500 acres in the decision area for which the planning decision would not be mapped. These areas may be in various leasing categories, but the acreage in each category is unknown.

Management actions applicable to existing leases under Alternative C would be similar to those under Alternative B, but they would apply to 895,200 acres of existing leases on federal mineral estate (all existing federal leases in the decision area). In addition to applying the restrictive management under Alternative B to more acres, Alternative C would also 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 3 percent per section, with some exceptions. Impacts of these operating and siting restrictions would be the same type as those described under Alternative B, although the magnitude of the impacts would increase.

Under this alternative, it is projected that 1,654 new oil and gas wells would be drilled on existing leases on federal mineral estate in the decision area in the next 15 years. This represents a 32-percent decrease in projected wells on federal mineral estate compared with Alternative A, the greatest projected decrease of all the alternatives.

A total of 187,000 acres within the decision area would have no fluid minerals planning decision. If the BLM or Forest Service received an expression of interest in leasing within these areas, additional leasing-specific NEPA analysis would need to be completed before this leasing could occur.

Under Alternative C, exploration for leasable minerals would be prohibited on all 4,008,600 acres of federal mineral estate within the decision area. Closing the decision area to exploration for leasable minerals could reduce the availability of data on fluid mineral resources outside the decision area and could increase costs of fluid mineral development if it resulted in the need to conduct exploration for resources outside the decision area via less easily accessible locations than the locations within the decision area from which exploration might otherwise occur. Because the right to conduct exploration is not part of a lease right, prohibiting exploration in the decision area could reduce development of oil and gas resources in the decision area, even on existing leases. Operators with existing leases would not be able to conduct new exploration on those leases.

*Uintah Population Area.* **Table 4.32** breaks down the acres within the population area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. As described above under Alternative C, *Utah Sub-region (Total Decision Area)*, all federal mineral estate under this alternative would be closed to new oil and gas leasing, including 691,200 acres within the Uintah Population Area, of which 398,700 acres (58 percent) have high development potential for oil and gas. Impacts of this closure would be the same type as those described under Alternative A; however, because 14 times more acres with high potential would be closed to new leasing, as would the entire decision area, the magnitude of those impacts would increase.

Under this alternative, it is projected that 960 new oil and gas wells would be drilled on existing leases on federal mineral estate in the Uintah Population Area in the next 15 years. This represents a 30-percent decrease in projected wells on federal mineral estate compared with Alternative A, the greatest decrease in projected wells of all the alternatives. As described under Alternative A, this population area is expected to be a primary area for future oil and gas development in the Utah Sub-region.

*Carbon Population Area.* **Table 4.32** breaks down the acres within the population area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. As described above under Alternative C, *Utah Sub-region (Total Decision Area)*, all federal mineral estate under this alternative would be closed to new oil and gas leasing, including 307,900 acres within the Carbon Population Area, of which 112,900 acres (37 percent) have high development potential for oil and gas. Impacts of this closure would be the same type as those described under Alternative A; however, because 3 times more acres with high potential would be closed to new leasing, as would the entire decision area, the magnitude of those impacts would increase.

Under this alternative, it is projected that 636 new oil and gas wells would be drilled on existing leases on federal mineral estate in the Carbon Population Area in the next 15 years. This represents a 34-percent decrease in projected wells on federal mineral estate in the population area compared with Alternative A, the greatest decrease in projected wells of all the alternatives. As described under Alternative A, this population area is expected to be a primary area for future oil and gas development in the Utah Sub-region.

*Emery Population Area.* **Table 4.32** breaks down the acres within the population area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. As described above under Alternative C, *Utah Sub-region (Total Decision Area)*, all federal mineral estate under this alternative would be closed to all new oil and gas leasing, including 93,000 acres within the Emery Population Area. A total of 5,000 acres (5 percent of the federal mineral estate that would be closed within the population area) of federal mineral estate with high development potential would be closed, compared with zero acres under Alternative A. The types of impacts of this closure would be the same as those described for the *Utah Sub-region (Total Decision Area)* under Alternative A; however, the magnitude of those impacts would increase. As described under Alternative A, little future development is expected in this population area.

Under this alternative, it is projected that 23 new oil and gas wells would be drilled on existing leases on federal mineral estate in the Emery Population Area in the next 15 years. This represents a 43 percent decrease in projected wells on federal mineral estate in the population area compared with Alternative A.

*Rich Population Area.* **Table 4.32** breaks down the acres within the population area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. As described above under Alternative C, *Utah Sub-region (Total Decision Area)*, all federal mineral estate under this alternative would be closed to all new oil and gas leasing, including 281,000 acres within the Rich Population Area. A total of 217,200 acres (77 percent of the federal mineral estate that would be closed within the population area) of federal mineral estate with high development potential would be closed, compared with zero acres under Alternative A. The types of impacts of this closure would be the same as those described for the *Utah Sub-region (Total Decision Area)* under Alternative A; however, the magnitude of those impacts would increase. As described under Alternative A, much of the oil and gas resources in the population area have already been developed, and little future development is expected.

Under this alternative, the number of new wells projected in the Rich Population Area is the same as that under Alternative B.

#### **Alternative D**

##### *Special Status Species – GRSG*

Under Alternative D, a disturbance cap of 5 percent of PHMA within a population area would be applied to all anthropogenic surface disturbance, including fluid mineral development. In PHMA where the 5 percent cap is already exceeded, no new fluid mineral leases would be issued until habitat within the PHMA was restored to a point that acreage of anthropogenic

disturbance was below the 5 percent cap. Major disturbances not directly related to land uses managed by the BLM or Forest Service, such as towns, airports, reservoirs, large burn areas, and agricultural areas, would not count toward the disturbance cap but would be excluded from the PHMA and therefore could reduce the area within which additional disturbance would be permitted by the BLM or Forest Service. While no population area contains anthropogenic disturbance of more than 5 percent of PHMA, PHMA in sub-areas within the Uintah and Carbon Population Areas would exceed the 5 percent cap. Issuance of new leases in these areas could be prohibited until sufficient habitat restoration had occurred. Valid existing lease rights would be honored, but mitigation measures may be required for development in the population areas or sub-areas that exceed the 5 percent disturbance cap.

*Infrastructure Development (including all ROWs and utility corridors)*

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

Under Alternative D, all BLM-administered and National Forest System surface within PHMA not already managed as ROW exclusion would be managed as ROW avoidance for surface and underground linear ROWs (including pipelines and roads). As a result, 2,754,200 acres (83 percent) of BLM-administered and National Forest System surface in the decision area would be managed as ROW avoidance for these types of ROWs, and 27,600 acres (less than 1 percent) would be managed as ROW exclusion. Oil and gas, oil shale, and tar sands leases beneath BLM-administered and National Forest System surface in PHMA would be indirectly impacted in the manner described under Alternatives A and B; however, because all BLM-administered and National Forest System surface would be managed as either ROW avoidance or ROW exclusion under Alternative D, the magnitude of impacts would increase. Impacts would be mitigated by the allowance of new ROWs with limitations on noise and disturbance. Impacts would also be mitigated for existing leases in PHMA because collocation of new ROWs close to existing ROWs and minimal construction of new roads would be allowed.

Under this alternative, areas of GHMA within 1 mile of an occupied lek would also be managed as ROW avoidance with exceptions for limited development with noise, structure height, and timing restrictions. Oil and gas, oil shale, and tar sands leases beneath BLM-administered and National Forest System National Forest System surface within 1 mile of an occupied lek would be impacted in the manner described under Alternative A. Impacts would be mitigated where the ROW avoidance requirement was waived in exchange for off-site mitigation activities. However, the expense of these mitigation activities would increase the costs of oil and gas development.

*Mineral Development*

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

Mineral Materials

Under Alternative D, the BLM and Forest Service would close all PHMA to commercial mineral material disposal. Under this alternative, 2,967,500 acres (74 percent) of federal mineral estate

within the decision area would be closed to commercial mineral material disposal but open to noncommercial mineral material disposal. This includes 1,030,900 acres with mineral material occurrence (79 percent of federal mineral estate with mineral material occurrence in the decision area). Additionally, 352,800 acres of federal mineral estate within PHMA (9 percent of the decision area) would be closed to both commercial and noncommercial mineral material disposal, 103,200 acres of which have mineral material occurrence (8 percent of federal mineral estate with mineral material occurrence in the decision area). Impacts on fluid minerals of these closures (including closures to commercial mineral material disposal) would be the same type as those described for closure to overall mineral material disposal under Alternative A; however, because more acres of federal mineral estate would be closed to commercial mineral materials disposal under Alternative D, the magnitude of those impacts would increase.

### Fluid Minerals

*Utah Sub-region (Total Decision Area).* Under Alternative D, the BLM and Forest Service would apply a buffer system to manage oil and gas development in and adjacent to occupied habitat. Under this system, leks would be surrounded by buffers of varying sizes in which NSO and/or CSU/TL stipulations would apply. In addition, CSU and/or TL stipulations would apply to all areas within occupied habitat that are outside a lek buffer. The CSU stipulations would include noise and tall structure limitations and, at times, a site-specific plan of development to limit habitat fragmentation. The TL stipulations would prohibit oil and gas development and maintenance activities disruptive to GRSG in breeding and nesting, brood-rearing, and winter habitats during certain times of year. In areas containing all three of these habitats, the TL stipulations could overlap such that oil and gas development activities would only be permitted in those areas from July 15 to November 15. Limiting oil and gas development activities to 4 months of the year could essentially close an area to oil and gas development. The buffer system would result in application of NSO and CSU/TL restrictions to some areas outside but adjacent to occupied habitat. Application of these surface-disturbance restrictions, TL stipulations, and other operating standards would limit the siting, design, and operations of oil and gas development projects in the manner described under Alternative A; however, because these restrictions and standards would be applied throughout the decision area under Alternative D and because the TL stipulations could be much more stringent if they overlapped in an area, the magnitude of the impacts would increase. These impacts would be mitigated in GHMA where off-site mitigation could allow operators to waive the applicable stipulations.

**Table 4.33** breaks down the acres within the decision area by whether they would be open or closed to new leasing and what stipulations may be applied. This breakdown is done by oil and gas occurrence potential (high, moderate, and low or no known potential).

Under Alternative D, the number of acres closed to all new fluid mineral leasing would be the same as that under Alternative A, with the same impacts. Four times more acres would be subject to NSO stipulations under Alternative D than Alternative A. However, of these acres, 1,270,200 (69 percent) would have low or no known potential. The number of high potential acres subject to NSO stipulations under Alternative D would be 18 times higher than the high potential acres subject to NSO stipulations under Alternative A and would equal 35 percent of

**Table 4.33**  
**Oil and Gas Leasing Categories in the Decision Area, Alternative D<sup>1</sup>**

<b>Oil and Gas Potential</b>	<b>Closed to New Leasing (acres)</b>	<b>Open Subject to NSO Stipulations (acres)</b>	<b>Open Subject to CSU/TL Stipulations (acres)</b>	<b>Open Subject to Standard Terms and Conditions (acres)</b>
<b>Total Decision Area</b>				
High	31,600	278,500	431,500	0
Moderate	42,200	304,000	517,400	0
Low/No Known	64,700	1,270,200	879,800	0
<b>Total</b>	<b>138,500</b>	<b>1,852,700</b>	<b>1,828,700</b>	<b>0</b>
<b>Uintah Population Area</b>				
High	14,000	66,800	320,600	0
Moderate	1,300	1,800	16,400	0
Low/No Known	53,500	134,300	85,200	0
<b>Total</b>	<b>68,800</b>	<b>202,900</b>	<b>421,200</b>	<b>0</b>
<b>Carbon Population Area</b>				
High	17,500	40,700	54,700	0
Moderate	9,900	85,500	45,200	0
Low/No Known	0	17,000	8,800	0
<b>Total</b>	<b>27,400</b>	<b>143,200</b>	<b>108,700</b>	<b>0</b>
<b>Emery Population Area</b>				
High	0	570	4,400	0
Moderate	0	15,500	17,800	0
Low/No Known	0	36,800	17,800	0
<b>Total</b>	<b>0</b>	<b>52,870</b>	<b>40,000</b>	<b>0</b>
<b>Rich Population Area</b>				
High	0	170,200	47,000	0
Moderate	0	4,090	12,600	0
Low/No Known	0	6,690	40,400	0
<b>Total</b>	<b>0</b>	<b>180,980</b>	<b>100,000</b>	<b>0</b>

Source: BLM 2012d

<sup>1</sup>Does not include 177,200 acres in the decision area for which the planning decision would not be mapped. These areas may be in various leasing categories, but the acreage in each category is unknown.

all federal mineral estate with high potential in the decision area. As noted under Alternative A, restrictive management of high potential acres has the greatest impact on fluid minerals. There would be a 39-percent increase in acres subject to CSU and/or TL stipulations under Alternative D compared with Alternative A. Overall, the impact of these types of stipulations would increase from Alternative A, increasing the restrictions on fluid mineral development in the decision area and reducing the amount of that development.

Under this alternative, it is projected that 2,213 new oil and gas wells would be drilled on new and existing leases on federal mineral estate in the population areas in the next 15 years. This represents an 8-percent decrease in projected wells on federal mineral estate compared with Alternative A.

A total of 187,000 acres within the decision area would have no fluid minerals planning decision. If the BLM or Forest Service received an expression of interest in leasing within these areas, additional leasing-specific NEPA analysis would need to be completed before this leasing could occur.

Design features similar to those described under Alternative B would be applied in PHMA to new leases as stipulations and to existing leases as COAs (subject to valid existing rights) under Alternative D. However, exceptions to application of RDFs could mitigate impacts. Exceptions would occur where a design feature was not applicable (e.g., a resource is not present on a given site) or where the design feature would not actually provide additional protection for GRSG or its habitat. See **Table 2.4** for more information on when these exceptions to RDFs would apply.

The conservation measures applied under Alternative D would also differ from Alternative B. A 5 percent disturbance limit would apply instead of a 3 percent limit, and surface occupancy buffers and TL stipulations would not apply to surface disturbance; rather, surface disturbance would minimize habitat loss, fragmentation, and direct and indirect effects on GRSG and its habitat. The impacts of applying these RDFs and conservation measures would be the same type as those described under Alternative B, but the magnitude of the impacts would be reduced under Alternative D because the conservation measures would be less restrictive than those under Alternative B. On- or off-site mitigation would be used to minimize impacts on GRSG. Where operators used such mitigation to protect GRSG, oil and gas development costs would increase compared with Alternative A due to the additional expense of mitigation activities.

Under Alternative D, unitization would be encouraged but would not be required. Impacts would be the same as those under Alternative A.

Exploration would be allowed in the decision area under Alternative D, but seasonal restrictions would apply in nesting, brood-rearing, and winter habitat. While these restrictions would continue to apply to exploration in some areas under Alternative A, more consistent application under Alternative D would increase impacts on fluid minerals due to a potential decrease in exploration compared with Alternative A. Impacts of this decrease would be the same type as those described under Alternative B.

*Uintah Population Area.* **Table 4.33** breaks down the acres within the population area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. Under Alternative D, the same number of acres of federal mineral estate in the Uintah Population Area with high potential would be closed to all new oil and gas leasing as under Alternative A. However, 66,800 acres with high potential would be subject to NSO stipulations, 10 times more than the acres of high potential subject to the same stipulations under Alternative A. In addition, 320,600 acres with high potential would be subject to CSU and/or TL stipulations, a 36-percent increase from Alternative A.

Under this alternative, it is projected that 1,320 new oil and gas wells would be drilled on new and existing leases on federal mineral estate in the Uintah Population Area in the next 15 years. This represents a 4-percent decrease in projected wells on federal mineral estate from

Alternative A. As described under Alternative A, this population area is expected to be a primary area for future oil and gas development in the Utah Sub-region.

*Carbon Population Area.* **Table 4.33** breaks down the acres within the population area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. Under Alternative D, 17,500 acres of federal mineral estate in the Carbon Population Area with high potential would be closed to all new oil and gas leasing, a 44-percent decrease from Alternative A. A total of 40,700 acres of federal mineral estate with high potential in the population area would be subject to NSO stipulations under Alternative D, an 18-percent increase from Alternative A.

Under this alternative, it is projected that 811 new oil and gas wells would be developed on federal mineral estate in the Carbon Population Area in the next 15 years. This represents a 16-percent decrease in projected wells on federal mineral estate compared with Alternative A. As described under Alternative A, this population area is expected to be a primary area for future oil and gas development in the Utah Sub-region.

*Emery Population Area.* **Table 4.33** breaks down the acres within the population area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. Like Alternative A, under Alternative D, no federal mineral estate in the Emery Population Area with high potential would be closed to all new oil and gas leasing. Acres subject to NSO stipulations would decrease from 7,900 acres under Alternative A to 570 acres under Alternative D. However, acres subject to CSU and/or TL stipulations would increase under Alternative D to 4,400 acres (147 times the acres with high potential subject to those stipulations under Alternative A). As described under Alternative A, little future development is expected in this population area.

Under this alternative, the number of new wells projected to be drilled on new and existing leases in the Emery Population Area in the next 15 years is the same as under Alternative A.

*Rich Population Area.* **Table 4.33** breaks down the acres within the population area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. Like Alternative A, under Alternative D, all federal mineral estate in the Rich Population Area would be open to oil and gas leasing. However, 170,200 acres with high oil and gas potential would be subject to NSO stipulations under Alternative D, compared with zero acres under Alternative A. Impacts of these NSO stipulations would be the same type as those described for the *Utah Sub-region (Total Decision Area)* under Alternative A; however, the magnitude of those impacts within the Rich Population Area would greatly increase under Alternative D. Acres of federal mineral estate with high oil and gas potential subject to CSU and/or TL stipulations would decrease by 72 percent from Alternative A, to 47,000 acres under Alternative D.

Under this alternative, it is projected that nine new oil and gas wells would be developed on federal mineral estate in the Rich Population Area in the next 15 years. This represents a 31-percent decrease in projected wells on federal mineral estate compared with Alternative A. However, as described under Alternative A, much of the oil and gas resources in the population area have already been developed, and little future development is expected.

## **Alternative E**

### *Special Status Species – GRSG*

Under Alternative E, a disturbance cap of 5 percent of state or federally managed lands in SGMAs/core areas would be applied to all anthropogenic surface disturbances, including fluid mineral development. In SGMAs/core areas where the 5 percent cap is already exceeded, no new fluid mineral leases would be issued until habitat within the SGMA/core area was restored to a point that acreage of anthropogenic disturbance on state or federally managed lands was below the 5 percent cap. Although baseline disturbance acreages for this alternative have not been calculated for this high-level plan due to uncertainty in actual habitat areas, issuance of new leases in some areas could be prohibited. Valid existing lease rights would be honored, but mitigation measures may be required at the implementation level for development in areas that exceed the 5 percent disturbance cap.

### *Infrastructure Development (including all ROWs and utility corridors)*

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

Under Alternative E, all BLM-administered and National Forest System surface within mapped GRSG habitat in SGMAs/core areas not already managed as ROW exclusion would be managed as ROW avoidance. As a result, 2,654,000 acres (80 percent) of BLM-administered and National Forest System surface in the decision area would be managed as ROW avoidance, and 27,600 acres (1 percent) would be managed as ROW exclusion. Oil and gas leases beneath BLM-administered and National Forest System surface in mapped GRSG habitat in SGMAs/core areas would be indirectly impacted in the manner described under Alternative A; however, because the acres managed as ROW avoidance would increase from Alternative A, the magnitude of these impacts would increase. Impacts would be mitigated by the allowance of new ROWs with limitations on noise, timing, and disturbance or where avoidance was not possible. However, mitigation would be required and would increase the costs of oil and gas development.

Under Alternative E, no management actions from this LUPA would apply to the 650,700 acres of BLM-administered and National Forest System surface outside of mapped GRSG habitat in SGMAs/noncore areas (20 percent of the decision area). Management of these areas and impacts on fluid minerals of that management would be the same as Alternative A.

### *Mineral Development*

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

### Mineral Materials

Under Alternative E, all federal mineral estate not closed to mineral material disposal under Alternative A would remain open (3,932,200 acres, or 98 percent of the decision area), including 1,325,600 acres with mineral material occurrence. Additional restrictions would apply to the 3,262,500 acres of federal mineral estate within mapped GRSG habitat in SGMAs/core areas (81 percent of the decision area), including maximum cumulative new permanent disturbance from

mineral materials development of no more than 5 percent of mapped GRSG habitat in SGMAs/core areas in each population area. Noise, structure height, and TL stipulations would also apply. These restrictions could decrease the amount of mineral material development on federal mineral estate in mapped GRSG habitat in SGMAs/core areas, which would impact fluid minerals as described under Alternative A. Because additional restrictions would be applied under Alternative E, impacts on fluid minerals could increase compared with Alternative A.

#### Fluid Minerals

*Utah Sub-region (Total Decision Area).* Under Alternative E, 687,500 acres (17 percent) of federal mineral estate in the decision area, including all areas within 1 mile of a lek located in mapped GRSG habitat in SGMAs/core areas, would be subject to NSO stipulations and 2,620,100 acres, or 65 percent of the decision area) would be subject to CSU and TL stipulations. The CSU stipulations would include limitations on disturbance, siting, and noise. Impacts of these NSO stipulations would be the same as those described under Alternative A and impacts of CSU stipulations and TL stipulations would be the same type as those described under Alternative D. **Table 4.34** breaks down the acres within the decision area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. This breakdown is done by oil and gas occurrence potential (high, moderate, and low or no known potential).

Like Alternative A, under Alternative E, 31,600 acres of federal mineral estate with high oil and gas occurrence potential would be closed to new fluid mineral leasing. Approximately 49,900 acres with high potential would be subject to NSO stipulations (3 times that under Alternative A), and 493,000 acres with high potential would be subject to CSU and/or TL stipulations (a 10-percent increase compared with Alternative A). Therefore, overall restrictions imposed by stipulations on oil and gas development would increase under Alternative E.

A total of 187,000 acres within the decision area would have no fluid minerals planning decision. If the BLM or Forest Service received an expression of interest in leasing within these areas, additional leasing-specific NEPA analysis would need to be completed before this leasing could occur.

The number of new wells projected to be drilled on new and existing leases in the Utah Sub-region under Alternative E is the same as that under Alternative A.

CSU and TL stipulations would apply to exploration within mapped GRSG habitat in SGMAs/core areas, potentially causing a decrease in exploration from Alternative A. Impacts of this decrease in exploration would be the same type as those described under Alternative B.

Under Alternative E, no management actions from this LUPA would apply to the 805,900 acres of federal mineral estate in mapped GRSG habitat outside SGMAs/noncore areas (20 percent of the decision area). Management of these areas and impacts of that management would be the same as described under Alternative A.

Management of the 445,900 acres of existing leases in mapped GRSG habitat in SGMAs/core areas would be the same as under Alternative A.

**Table 4.34**  
**Oil and Gas Leasing Categories in the Decision Area, Alternative E<sup>1</sup>**

<b>Oil and Gas Development Potential</b>	<b>Closed to New Leasing (acres)</b>	<b>Open Subject to NSO Stipulations (acres)</b>	<b>Open Subject to CSU/TL Stipulations (acres)</b>	<b>Open Subject to Standard Terms and Conditions (acres)</b>
<b>Total Decision Area</b>				
High	31,600	49,900	493,000	119,500
Moderate	42,200	106,100	614,200	65,900
Low/No Known	64,700	531,500	1,512,900	61,700
<b>Total</b>	<b>138,500</b>	<b>687,500</b>	<b>2,620,100</b>	<b>247,100</b>
<b>Uintah Population Area</b>				
High	14,000	12,700	245,700	100,300
Moderate	1,280	630	12,800	330
Low/No Known	53,500	36,300	177,000	3,820
<b>Total</b>	<b>68,780</b>	<b>49,600</b>	<b>435,500</b>	<b>104,450</b>
<b>Carbon Population Area</b>				
High	17,500	10,100	57,000	16,200
Moderate	9,900	27,300	79,300	7,900
Low/No Known	0	2,320	51,700	0
<b>Total</b>	<b>27,400</b>	<b>39,700</b>	<b>187,900</b>	<b>24,100</b>
<b>Emery Population Area</b>				
High	0	550	2,110	2,350
Moderate	0	10,900	19,800	2,540
Low/No Known	0	13,400	38,062	3,250
<b>Total</b>	<b>0</b>	<b>24,800</b>	<b>60,000</b>	<b>8,140</b>
<b>Rich Population Area</b>				
High	0	26,400	185,700	0
Moderate	0	1,040	7,300	0
Low/No Known	0	210	44,200	0
<b>Total</b>	<b>0</b>	<b>27,600</b>	<b>237,200</b>	<b>0</b>

Source: BLM 2012d

<sup>1</sup>Does not include 329,800 acres in the decision area for which the planning decision would not be mapped. These areas may be in various leasing categories, but the acreage in each category is unknown.

*Uintah Population Area.* **Table 4.34** breaks down the acres within the population area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. Like Alternative A, under Alternative E, 14,000 acres of federal mineral estate in the Uintah Population Area with high potential would be closed to all new oil and gas leasing. Acres with high potential subject to NSO stipulations would increase by 81 percent to 12,700 acres compared with Alternative A. Under Alternative E, acres with high oil and gas potential subject to CSU and/or TL stipulations would increase 4 percent from Alternative A to 245,700 acres. Types of impacts are described under Alternative A; however, these cost impacts would increase under Alternative D because CSU and/or TL stipulations would be applied to more acres.

Under this alternative, the number of new wells projected to be drilled on new and existing leases in the Uintah Population Area is the same as under Alternative A. As described under

Alternative A, this population area is expected to be a primary area for future oil and gas development in the Utah Sub-region.

*Carbon Population Area.* **Table 4.34** breaks down the acres within the population area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. Like Alternative D, under Alternative E, 17,500 acres of federal mineral estate in the Carbon Population Area with high potential would be closed to all new oil and gas leasing. Acres with high potential subject to NSO stipulations would decrease 71 percent from Alternative A to 10,100. Acres with high potential subject to CSU and/or TL stipulations would decrease 36 percent from Alternative A to 57,000. Impacts of these stipulations would be the same type as those described under Alternative A; however, the cost impacts would decrease under Alternative E because CSU and/or TL stipulations would apply to fewer acres with high potential.

Under this alternative, the number of new wells projected to be drilled on new and existing leases in the Carbon Population Area is the same as under Alternative A. As described under Alternative A, this population area is expected to be a primary area for future oil and gas development in the Utah Sub-region.

*Emery Population Area.* **Table 4.34** breaks down the acres within the population area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. Like Alternative A, under Alternative E, all federal mineral estate in the Emery Population Area with high potential would be open to oil and gas leasing. Acres with high potential subject to NSO stipulations would decrease 93 percent from Alternative A to 550 acres. Acres with high potential subject to CSU and/or TL stipulations would increase 70 times from Alternative A to 2,110 acres. Because fewer acres would be subject to NSO stipulations and more acres would be subject to CSU and/or TL stipulations under this alternative, resource availability impacts would decrease from Alternative A, but costs of development could increase. The types of cost and resource availability impacts would be the same as those described under Alternative A. As described under Alternative A, little future development is expected in this population area.

Under this alternative, the number of new wells projected to be drilled on new and existing leases in the Emery Population Area in the next 15 years is the same as that under Alternative A.

*Rich Population Area.* **Table 4.34** breaks down the acres within the population area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. Like Alternative A, under Alternative E, all federal mineral estate in the Rich Population Area with high potential would be open to oil and gas leasing. However, acres with high potential subject to NSO stipulations would increase to 26,400 acres, compared with 0 acres under Alternative A. The acres with high potential subject to CSU and/or TL stipulations would increase 12 percent from Alternative A to 185,700 acres. The types of impacts from these stipulations would be the same as those described under Alternative A; however, because more acres would be subject to CSU and/or TL stipulations under Alternative E, the cost impacts of those stipulations would increase. As described under Alternative A,

much of the oil and gas resources in the population area have already been developed, and little future development is expected.

Under this alternative, the number of new wells projected to be drilled on new and existing leases in the Rich Population Area is the same as that under Alternative A.

### **Proposed Plans**

#### *Special Status Species – GRSG*

Application of the 3 percent disturbance cap (5 percent on National Forest System lands in Wyoming) in PHMA could impact both new and existing fluid mineral activities by preventing or restricting new surface development. New fluid mineral activities could be precluded if the cap were exceeded in a BSU or a proposed project analysis area. New surface development on existing leases could be restricted if the cap were exceeded. However, the BLM would not apply the disturbance cap in a manner that would eliminate reasonable opportunities to develop an existing lease. Currently there are no population areas where the density of disturbance exceeds the disturbance cap. However, there are areas within 4 miles of a lek in population areas that are near or exceeding the disturbance cap, including in the Carbon and Uintah Population Areas where there is higher potential for oil and gas.

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

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

RDFs would be applied as under the action alternatives in PHMA and GHMA, and impacts would be similar in nature and magnitude to Alternative D. In addition to the RDFs, disturbance cap, lek buffers, and density restrictions, additional conservation measures in PHMA would include net conservation gain requirements (also a requirement in GHMA), restrictions on noise and tall structures, and seasonal restrictions. All of these combined would further restrict oil and gas development compared with Alternative A. In the Carbon and Uintah Population Areas, where oil and gas potential is relatively high and some areas are at or exceeding the disturbance cap, the cumulative effect of all of the restrictions would likely reduce opportunities for oil and gas development on public lands.

Exploration would be allowed on federal mineral estate within GRSG habitat but would be subject to seasonal restrictions. Because of these limitations, exploration in GRSG habitat would decrease under this alternative compared with Alternative A.

*Infrastructure Development (including all ROWs and utility corridors)*

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

Under the Proposed Plans, all BLM-administered and National Forest System surface within PHMA not already managed as ROW exclusion would be managed as ROW avoidance for new linear and site-type ROWs (including transmission lines, pipelines, and roads), except for within ROW corridors designated for aboveground use. As a result, 2,764,800 acres (80 percent) of BLM-administered and National Forest System surface in the decision area would be managed as ROW avoidance for these types of ROWs, and 10,500 acres (less than 1 percent) would be managed as ROW exclusion. However, because all acres in PHMA would be either closed to leasing or open subject to NSO stipulations, no oil and gas activities on future leases within these areas would require new ROWs. Existing oil and gas leases beneath BLM-administered and National Forest System surface in PHMA would be indirectly impacted in the manner described under Alternatives A and B; however, because all BLM-administered and National Forest System surface would be managed as either ROW avoidance or ROW exclusion under the Proposed Plans, the magnitude of impacts would increase. Impacts would be mitigated for existing leases in PHMA because collocation of new ROWs close to existing ROWs and minimal construction of new roads would be allowed. In PHMA, ROW development that was able to occur would be subject to RDFs, lek buffers, the disturbance cap, and limitations for tall structures, and net conservation gain requirements, which could impact fluid minerals development as discussed under *Special Status Species – GRSG*. The expense of these mitigation activities would increase the costs of oil and gas development.

Under the Proposed Plans, GHMA would be available for the types of ROW location that would impact fluid minerals development, except for 17,600 acres already managed as exclusion. While fluid minerals development would not be directly impacted because of ROW avoidance or exclusion areas, ROW development in GHMA would be subject to RDFs, lek buffers, and net conservation gain requirements, which could impact fluid minerals development as discussed under *Special Status Species – GRSG*. The expense of these mitigation activities would increase the costs of oil and gas, oil shale, and tar sands development.

*Mineral Development*

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

Mineral Materials

Under the Proposed Plans, National Forest System lands in the Wyoming portion of the planning area would remain open to mineral material disposal while PHMA on lands managed according to the BLM and the Forest Service-Utah Proposed Plans would be closed to commercial mineral material disposal. Under the Proposed Plans, 3,340,200 acres (83 percent) of federal mineral estate within the decision area would be closed to most mineral material disposal but open to free use permits and expansion of existing activity pits. This includes 1,196,900 acres with mineral material occurrence (92 percent of federal mineral estate with

mineral material occurrence in the decision area). Impacts on fluid minerals of these closures (including closures to commercial mineral material disposal) would be the same type as those described for closure to overall mineral material disposal under Alternative A; however, because more acres of federal mineral estate would be closed to commercial mineral materials disposal under Proposed Plans, the magnitude of those impacts would increase.

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

#### Fluid Minerals

*Utah Sub-region (Total Decision Area).* Under the Proposed Plans, nearly the same acres would be closed to new fluid minerals leases as under Alternative A. The differences in acreage between Alternative A and the Proposed Plans account for modified boundaries of mapped occupied GRSG habitat in the Proposed Plans; no additional areas would be closed from decisions in the Proposed Plans. Therefore, there would be no additional impacts from implementing the Proposed Plans from those in Alternative A.

Approximately 30,000 acres in GHMA would also be closed to fluid mineral leasing but this is made up of areas currently closed under Alternative A; management decisions in the Proposed Plans would not further impact oil and gas leasing from Alternative A in these areas.

Outside of the areas closed to new fluid mineral leasing, the remaining PHMA would be open to new oil and gas leasing subject to an NSO stipulation. Of this area, NSO stipulations on approximately 7 percent of federal mineral estate would not be available with waivers, exceptions, or modifications. These areas are in the Rich and Box Elder Population Areas. The Box Elder Population Area does not have high potential for oil and gas, so impacts would be minimal. Potential in the Rich Population Area is high but, as discussed in **Chapter 3**, most federal mineral estate in the Rich Population Area is already under lease, and many oil and gas fields have already been depleted. Therefore, impacts of the 233,400 acres subject to NSO with no waivers, exceptions, or modifications would be minimal.

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

In GHMA, the areas closed to new fluid minerals leases and subject to NSO, CSU, and TL stipulations would be nearly the same as those under Alternative A. Any differences in acreages

account for modified boundaries of PHMA and GHMA in the Proposed Plans. While the stipulations would be the same as those already identified in Alternative A, there would be additional restrictions if development were to occur. In GHMA, development would be subject to the disturbance cap, mitigation, lek buffers, and RDFs. Impacts of which are discussed under *Special Status Species – GRSG*.

Overall, acres open to fluid minerals leasing subject to NSO stipulations would be six times more than under Alternative A. However, of these acres, 2,171,700 (67 percent) would have low or no known potential. The number of high potential acres subject to NSO stipulations under the Proposed Plans would be 22 times higher than the high potential acres subject to NSO stipulations under Alternative A and would equal 44 percent of all federal mineral estate with high potential in the decision area. As noted under Alternative A, restrictive management of high potential acres has the greatest impact on fluid minerals. There would be a 78 percent decrease in acres subject to CSU and/or TL stipulations under the Proposed Plans compared with Alternative A, though the acres of high potential subject to CSU and/or TL would decrease by only about 48 percent. Overall, the impact of these types of stipulations would increase from Alternative A, increasing the restrictions on fluid mineral development in the decision area and reducing the amount of that development.

**Table 4.35** breaks down the acres within the decision area by whether they would be open or closed to new leasing and what stipulations may be applied. This breakdown is done by oil and gas occurrence potential (high, moderate, and low or no known potential).

Under the Proposed Plans, it is projected that 2,210 new oil and gas wells would be drilled on new and existing leases on federal mineral estate in the population areas in the next 15 years. This represents a 9-percent decrease in projected wells on federal mineral estate compared with Alternative A.

*Uintah Population Area.* **Table 4.35** breaks down the acres within the population area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. Under the Proposed Plans, the same number of acres of federal mineral estate in the Uintah Population Area with high potential would be closed to all new oil and gas leasing as under Alternative A. However, 67,400 acres with high potential would be subject to NSO stipulations, 10 times more than the acres of high potential subject to the same stipulations under Alternative A. In addition, 213,900 acres with high potential would be subject to CSU and/or TL stipulations, a 42 percent decrease from Alternative A.

*Carbon Population Area.* **Table 4.35** breaks down the acres within the population area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. Under the Proposed Plans, 17,900 acres of federal mineral estate in the Carbon Population Area with high potential would be closed to all new oil and gas leasing, a 49-percent decrease from Alternative A. A total of 39,100 acres of federal mineral estate with high potential in the population area would be subject to NSO stipulations under the Proposed Plans, a 14-percent increase from Alternative A.

**Table 4.35**  
**Oil and Gas Leasing Categories in the Decision Area, Proposed Plans<sup>1</sup>**

<b>Oil and Gas Potential</b>	<b>Closed to New Leasing (acres)</b>	<b>Open Subject to NSO Stipulations (acres)</b>	<b>Open Subject to CSU/TL Stipulations (acres)</b>	<b>Open Subject to Standard Terms and Conditions (acres)</b>
<b>Total Decision Area</b>				
High	32,000	347,800	232,100	118,500
Moderate	42,400	707,200	27,200	60,100
Low/No Known	65,300	2,171,700	26,000	55,300
<b>Total</b>	<b>139,700</b>	<b>3,226,800</b>	<b>285,300</b>	<b>233,800</b>
<b>Uintah Population Area</b>				
High	14,000	67,400	198,400	100,300
Moderate	1,300	5,600	11,700	300
Low/No Known	53,600	280,700	3,800	3,900
<b>Total</b>	<b>68,900</b>	<b>353,700</b>	<b>213,900</b>	<b>104,500</b>
<b>Carbon Population Area</b>				
High	17,900	39,100	32,700	15,900
Moderate	10,300	108,600	15,200	6,700
Low/No Known	0	53,200	1,000	0
<b>Total</b>	<b>28,200</b>	<b>201,000</b>	<b>48,900</b>	<b>22,600</b>
<b>Emery Population Area</b>				
High	0	2,700	15	2,300
Moderate	0	31,300	9	2,500
Low/No Known	0	51,700	52	3,200
<b>Total</b>	<b>0</b>	<b>85,600</b>	<b>76</b>	<b>8,000</b>
<b>Rich Population Area</b>				
High	0	238,500	41	0
Moderate	0	17,200	155	0
Low/No Known	0	89,900	113	0
<b>Total</b>	<b>0</b>	<b>345,600</b>	<b>309</b>	<b>0</b>

Source: BLM 2015

<sup>1</sup>Does not include 102,300 acres in the decision area for which the planning decision would not be mapped. These areas may be in various leasing categories, but the acreage in each category is unknown.

*Emery Population Area.* **Table 4.35** breaks down the acres within the population area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. Like Alternative A, under the Proposed Plans, no federal mineral estate in the Emery Population Area with high potential would be closed to all new oil and gas leasing. Acres subject to NSO stipulations would decrease from 7,900 acres under Alternative A to 2,700 acres under the Proposed Plans, a 66 percent decrease.

*Rich Population Area.* **Table 4.35** breaks down the acres within the population area by whether they would be open or closed to new oil and gas leasing and what stipulations would be applied to new oil and gas leases. Like Alternative A, under the Proposed Plans, all federal mineral estate in the Rich Population Area would be open to oil and gas leasing. However, 238,500 acres with high oil and gas potential would be subject to NSO stipulations under the Proposed Plans,

compared with zero acres under Alternative A. Impacts of these NSO stipulations would be the same type as those described for the *Utah Sub-region (Total Decision Area)* under Alternative A; however, the magnitude of those impacts within the Rich Population Area would greatly increase under the Proposed Plans. Acres of federal mineral estate with high oil and gas potential subject to CSU and/or TL stipulations would decrease to almost zero acres under the Proposed Plans.

#### 4.21.2 Nonenergy Leasable Minerals

##### ***Methods and Assumptions***

Analysis of impacts on nonenergy leasable 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 nonenergy leasables would result from closing an area to leasing. 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 nonenergy leasables are described under *Indicators*, below.

##### *Indicators*

Indicators of impacts on nonenergy leasables are as follows:

- The amount of land closed to new nonenergy solid mineral leasing
- The amount of land closed to new nonenergy leasable surface mining
- The restrictions on surface use or timing placed on nonenergy solid mineral leasing
- The restrictions on surface use or timing placed on prospecting and exploration
- Application of RDFs to nonenergy leasable development for the protection of GRSG
- The amount of land closed to fluid mineral development
- The amount of land subject to an NSO stipulation on fluid mineral development

##### *Assumptions*

The analysis includes the following assumptions:

- Nonenergy leasable mineral operations on existing federal leases, regardless of surface ownership, could be subject to RDFs by the BLM Authorized Officer and the authorized officer of the surface management agency. Under these circumstances, existing leases would be developed consistent with applicable laws and valid existing rights, using as many of the RDFs and conservation measures as possible while still allowing reasonable access.
- Management actions apply to nonenergy leasable activity on all surface lands overlying federal mineral estate, which includes federal mineral estate underlying BLM-administered and National Forest System surface and non-BLM-administered and non-National Forest System surface. There are 4,008,600 acres of federal mineral estate within the decision area (3,313,800 acres of BLM-administered and National Forest System surface with federal minerals and 694,800 acres of non-BLM-administered and non-National Forest System surface with federal minerals).

- As discussed in the Minerals section of **Chapter 3**, production rates for gilsonite and phosphate are expected to remain steady for the life of the LUPs covered by this LUPA. However, total phosphate production in the Utah Sub-region may increase with the possible opening of a new phosphate mine in Utah.

Implementing management for the following resources to protect GRSG would have negligible or no impact on nonenergy leasable minerals and are therefore not discussed in detail: Vegetation Management, Integrated Invasive Species Management, Wild Horses and Burros, Wildland Fire Management, Livestock Grazing/Range Management, Recreation, Comprehensive Travel and Transportation Management, Lands and Realty, and ACECs.

### **Alternative A**

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

#### *Fluid Minerals*

Under Alternative A, 138,500 acres (3 percent) of federal mineral estate in the decision area would remain closed to new fluid mineral leasing, and 483,500 acres (12 percent) would remain subject to NSO stipulations. Closing areas to leasing would preclude oil and gas development in those areas, which could reduce demand for gilsonite in drilling muds. Application of NSO stipulations could have the same effect if the stipulations prevented oil and gas development. NSO stipulations prohibit surface disturbance in areas, so the oil and gas resources in those areas could only be accessed by directional drilling. If directional drilling was not feasible in an area, the minerals subject to the NSO stipulation would effectively be closed to new development.

#### *Nonenergy Leasables*

Under Alternative A, 3,870,080 acres (97 percent) of federal mineral estate in the decision area would remain open to leasing consideration, and 138,500 acres (3 percent) would remain closed to new prospecting and exploration and leasing. This allocation decision would impact gilsonite, phosphate, and sodium, for which the individual analyses are provided below.

Management actions that close areas to nonenergy leasable mineral prospecting and exploration and leasing would directly impact nonenergy leasable minerals by reducing the area available for prospecting and exploration and leasing. If the most lucrative resources were closed to new prospecting and exploration and leasing, developers could have to prospect and extract resources that are not as lucrative, thus decreasing profit. Nonenergy leasable mineral development operations could also move to nearby private or state minerals containing nonenergy leasable mineral resources within GRSG habitat. However, state, county, and private mineral resources are often fragmented and limited in extent. If federal closed nonenergy leasable mineral resources are surrounded by private or state resources that are developed, the federal closed resources could be wasted or isolated and unable to be developed in the future. This change would also result in lost royalties for the federal and state governments.

**Table 4.36** breaks down the acres within the decision area by whether they would be open or closed to new nonenergy leasable mineral prospecting and exploration and leasing. This

breakdown is done by occurrence and potential (high, moderate, and low potential) to highlight acres of gilsonite, phosphate, and sodium where closures would be most likely to impact mineral development.

**Table 4.36**  
**Nonenergy Leasable Minerals, Alternatives A and E**

<b>Mineral Potential and Occurrence</b>	<b>Closed to All New Leasing (acres)</b>	<b>Closed to New Surface Mining/ Open to New Underground Mining (acres)<sup>1</sup></b>	<b>Open to All Mining (acres)</b>
<b>Gilsonite Potential</b>	<b>0</b>	<b>N/A</b>	<b>74,000</b>
High	0	N/A	12,400
Moderate	0	N/A	54,800
Low	0	N/A	6,800
<b>Phosphate Potential</b>	<b>13,400</b>	<b>N/A</b>	<b>198,200</b>
High	0	N/A	42,700
Moderate	0	N/A	19,300
Low	13,400	N/A	136,200
<b>Sodium Occurrence</b>	<b>0</b>	<b>N/A</b>	<b>161,400</b>

Source: BLM 2012d

<sup>1</sup> Underground mining includes surface-disturbing activities such as exploration, structures, roads, shafts, and power lines.

Existing federal nonenergy leasable mineral leases in the decision area would continue to be subject to any stipulations or BMPs contained in those leases. Application of BMPs would increase costs of nonenergy leasable development if it delayed resource development or resulted in the use of more expensive technology than would otherwise have been used. If costs increased to the extent that it was no longer economical to develop the resources, nonenergy leasable development on federal mineral estate could be reduced.

*Gilsonite.* Under Alternative A, the 74,000 acres of federal mineral estate with gilsonite potential in the decision area would remain open to nonenergy leasable mineral prospecting and exploration and leasing. The 2,700 acres of authorized gilsonite leases in mapped occupied habitat would continue to be subject to any surface-disturbance limitations included in those leases.

*Phosphate.* Under Alternative A, 13,400 acres of federal mineral estate with low phosphate potential in the decision area would remain closed to new nonenergy leasable mineral prospecting and exploration and leasing. The impacts of closing these areas to prospecting and exploration and leasing would be the same type as those described for all nonenergy leasables under Alternative A. The remaining 198,200 acres (94 percent) of federal mineral estate with phosphate potential in the decision area would remain open to nonenergy leasable mineral prospecting and exploration and leasing. This would include the 42,700 acres of federal mineral estate with high phosphate potential in the decision area.

The 9,100 acres of authorized and pending phosphate leases in the decision area would continue to be subject to any surface-disturbance limitations and/or BMPs included in those leases. Impacts of these BMPs would be the same type as described for all nonenergy leasables under Alternative A.

*Sodium.* Under Alternative A, the 161,400 acres of federal mineral estate with sodium occurrence in the decision area would remain open to nonenergy leasable mineral prospecting and exploration and leasing. There are no federal sodium leases in the decision area. Therefore, no existing sodium leases would be impacted by BMPs.

### **Alternative B**

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

#### *Fluid Minerals*

Under Alternative B, 3,341,300 acres (83 percent) of federal mineral estate in the decision area would be closed to new fluid mineral leasing, and 24,400 acres (1 percent) would be subject to NSO stipulations. The types of impacts on gilsonite demand from these management actions would be the same as those described under Alternative A; however, because more acres would be closed under Alternative B, the magnitude of those impacts would increase.

#### *Nonenergy Leasables*

Under Alternative B, 3,341,300 acres, or 83 percent of the federal mineral estate decision area (including all federal mineral estate in PHMA), would be closed to new prospecting and exploration and leasing. Management under this alternative would close 24 times more federal mineral estate to nonenergy leasable mineral prospecting and exploration and leasing than management under Alternative A. This allocation decision would impact gilsonite, phosphate, and sodium, for which the individual analyses are provided below. New leases to expand existing mines for these minerals also would not be permitted. Approximately 667,300 acres (17 percent) of federal mineral estate in the decision area would be open to leasing consideration. Closing areas to nonenergy mineral prospecting and exploration and leasing would result in the same type of impacts as described under Alternative A.

**Table 4.37** breaks down the acres within the decision area by whether they would be open or closed to new nonenergy leasable mineral prospecting and exploration and leasing.

Exploration would be allowed on the 3,328,800 acres of federal mineral estate within PHMA but would be subject to TL stipulations and other restrictions. Most notably, exploration would be allowed only for gathering information about nonenergy leasable mineral resources outside PHMA (e.g., structure of the area). Because of these limitations and the fact that PHMA would be closed to new prospecting and exploration and leasing, exploration in PHMA would decrease under this alternative. Decreases in exploration in PHMA could reduce the availability of data on nonenergy leasable mineral resources and could increase costs of nonenergy leasable mineral development if the limitations required use of more expensive exploration technology (such as helicopter portable drilling). TL stipulations on exploration would delay development activities

**Table 4.37**  
**Nonenergy Leasable Minerals, Alternative B**

<b>Mineral Potential and Occurrence</b>	<b>Closed to All New Leasing (acres)</b>	<b>Closed to New Surface Mining/ Open to New Underground Mining (acres)<sup>1</sup></b>	<b>Open to All Mining (acres)</b>
<b>Gilsonite Potential</b>	<b>0</b>	<b>N/A</b>	<b>74,000</b>
High	0	N/A	12,400
Moderate	0	N/A	54,800
Low	0	N/A	6,800
<b>Phosphate Potential</b>	<b>185,900</b>	<b>N/A</b>	<b>25,700</b>
High	42,700	N/A	0
Moderate	18,700	N/A	700
Low	124,500	N/A	25,100
<b>Sodium Occurrence</b>	<b>158,900</b>	<b>N/A</b>	<b>2,800</b>

Source: BLM 2012d

<sup>1</sup> Underground mining includes surface-disturbing activities such as exploration, structures, roads, shafts, and power lines.

and could cause equipment shortages because all exploration would be occurring during the same time period.

Existing federal nonenergy leasable mineral leases in the 3,328,800 acres of federal mineral estate in PHMA would be subject to RDFs, which would limit surface disturbance, vehicle use, siting, and design of mineral development operations, in addition to imposing reclamation requirements. Application of RDFs would increase costs of nonenergy leasable development if it delayed resource development or resulted in the use of more expensive technology or less efficient development than would otherwise have been used. If costs increased to the extent that it was no longer economical to develop the resources, nonenergy leasable development on federal mineral estate could be reduced.

*Gilsonite.* Like Alternative A, under Alternative B, all federal mineral estate with gilsonite potential in the decision area would be open to nonenergy leasable mineral prospecting and exploration and leasing. The 2,700 acres of authorized gilsonite leases in mapped occupied habitat would lie within GHMA and would be subject to any surface-disturbance limitations and/or BMPs included in those leases. Impacts of these BMPs would be the same type as described under Alternative A.

*Phosphate.* Under Alternative B, 185,900 acres (88 percent) of federal mineral estate in the decision area with phosphate potential would be closed to new nonenergy leasable mineral prospecting and exploration and leasing. This closure would include the 42,700 acres of federal mineral estate with high phosphate potential in the decision area, all of which are within the Uintah Population Area. The impacts of closing these areas to leasing would be the same type as described under Alternative A. The remaining 25,700 acres (12 percent) of federal mineral estate with phosphate potential in the decision area would be open to nonenergy leasable mineral prospecting and exploration and leasing.

The 9,100 acres of authorized and pending phosphate leases in the decision area would lie within PHMA under this alternative and would be subject to RDFs. The RDFs and the nature of their impacts are described under the section for all nonenergy leasables under Alternative B.

*Sodium.* Under Alternative B, approximately 158,900 acres (98 percent) of federal mineral estate with sodium occurrence in the decision area (all in PHMA) would be closed to new nonenergy leasable mineral prospecting, exploration, and leasing. These closures would affect the Rich Population Area, which contains 98 percent of the sodium occurrence on federal mineral estate in the decision area. The remaining 2,800 acres (2 percent) of federal mineral estate with sodium occurrence in the decision area, all in the Box Elder Population Area, would be open to nonenergy leasable mineral prospecting and exploration and leasing. There are no federal sodium leases in the decision area; therefore, no existing sodium leases would be impacted by RDFs.

### **Alternative C**

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

#### *Fluid Minerals*

Under Alternative C, all federal mineral estate in the decision area would be closed to new fluid mineral leasing. The types of impacts on gilsonite demand from these management actions would be the same as those described under Alternative A, but the magnitude would increase due to the increase in acres closed. However, because all federal mineral estate in the decision area would be closed to new gilsonite development under this alternative, development of gilsonite in the decision area would not be impacted by fluid minerals management actions.

#### *Nonenergy Leasables*

Under Alternative C, all federal mineral estate in the federal mineral estate decision area (4,008,600 acres) would be closed to new prospecting and exploration and leasing. Management under this alternative would close 29 times more federal mineral estate to nonenergy leasable mineral prospecting and exploration and leasing than management under Alternative A. This allocation decision would impact gilsonite, phosphate, and sodium, for which the individual analyses are provided below. New leases to expand existing mines for these minerals also would not be permitted. Closing areas to nonenergy mineral leasing would result in the same type of impacts as those described under Alternative A.

**Table 4.38** breaks down the acres within the decision area by whether they would be open or closed to new nonenergy leasable mineral prospecting and exploration and leasing.

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

**Table 4.38**  
**Nonenergy Leasable Minerals, Alternative C**

<b>Mineral Potential and Occurrence</b>	<b>Closed to All New Leasing (acres)</b>	<b>Closed to New Surface Mining/ Open to New Underground Mining (acres)<sup>1</sup></b>	<b>Open to All Mining (acres)</b>
<b>Gilsonite Potential</b>	<b>74,000</b>	<b>N/A</b>	<b>19,700</b>
High	12,400	N/A	1,700
Moderate	54,800	N/A	17,500
Low	6,800	N/A	500
<b>Phosphate Potential</b>	<b>211,700</b>	<b>N/A</b>	<b>0</b>
High	42,700	N/A	0
Moderate	19,300	N/A	0
Low	149,600	N/A	0
<b>Sodium Occurrence</b>	<b>161,700</b>	<b>N/A</b>	<b>0</b>

Source: BLM 2012d

<sup>1</sup> Underground mining includes surface-disturbing activities such as exploration, structures, roads, shafts, and power lines.

Existing nonenergy leasable mineral leases in the 4,008,600 acres of federal mineral estate in PHMA (the entire decision area) would be subject to the same RDFs described under Alternative B, with the same type of impacts.

*Gilsonite.* Under Alternative C, approximately 74,000 acres (79 percent) of federal mineral estate with gilsonite potential in the decision area would be closed to new nonenergy leasable mineral prospecting and exploration and leasing. This closure would include 12,400 acres (88 percent) of federal mineral estate with high gilsonite potential in the decision area. The majority of the acres with gilsonite potential in the decision area would be closed to new prospecting, exploration, and leasing under Alternative C, which would greatly decrease extraction of gilsonite from federal mineral estate in the decision area compared with Alternative A. The remaining 19,700 acres (21 percent) of federal mineral estate with gilsonite potential in the decision area would be open to nonenergy leasable mineral prospecting and exploration and leasing. The 2,700 acres of authorized gilsonite leases in mapped occupied habitat would be within PHMA and would be subject to RDFs. The RDFs and the nature of their impacts are described under Alternative B.

*Phosphate.* Under Alternative C, all federal mineral estate in the decision area with phosphate potential would be closed to new nonenergy leasable mineral prospecting and exploration and leasing. The impacts of closing these areas to leasing would be the same type as those described under Alternative A; however, because all acres with phosphate potential in the decision area would be closed to new prospecting and exploration and leasing under Alternative C, the magnitude of the impacts would increase from Alternative A. Management of the 9,100 acres of authorized and pending phosphate leases in PHMA would be the same as under Alternative B.

*Sodium.* Under Alternative C, all federal mineral estate with sodium occurrence in the decision area (all in PHMA) would be closed to new nonenergy leasable mineral prospecting and exploration and leasing. The types of impacts would be as described under Alternative B;

however, because more acres would be closed under Alternative C, the impacts would be greater. There are no federal sodium leases in the decision area. Therefore, no existing sodium leases would be impacted by RDFs.

#### **Alternative D**

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

##### *Fluid Minerals*

Under Alternative D, the same acreage would be closed to new fluid mineral leasing as that under Alternative A. Another 1,853,100 acres (46 percent) of federal mineral estate would be subject to NSO stipulations. The types of impacts on gilsonite demand from these management actions would be the same as those described under Alternative A; however, because more acres would be subject to NSO stipulations under Alternative D, the magnitude of those impacts would increase.

##### *Nonenergy Leasables*

Like Alternative A, under Alternative D, 138,500 acres (3 percent) of federal mineral estate in the decision area would be closed to new nonenergy leasable mineral prospecting and exploration and leasing. Another 2,905,100 acres (73 percent) of federal mineral estate within PHMA and within 1 mile of leks in GHMA would be closed to new leasing for development by surface mining but would be open to leasing for development by underground mining. These allocation decisions would impact gilsonite, phosphate, and sodium, for which the individual analyses are provided below. Approximately 965,000 acres (24 percent) of federal mineral estate in the decision area would be open to leasing consideration for both surface and underground mining. Closing areas to nonenergy leasable mineral prospecting and exploration and leasing would result in the same type of impacts as those described under Alternative A.

Closing areas to nonenergy mineral leasing for development by surface mining could increase costs of development by requiring developers to use more expensive or less-efficient underground mining methods or waste mineral resources if underground mining is not feasible. While some surface disturbance associated with underground mining would be allowed, the allowable disturbance would be minimal compared to that from surface mining. If these closures to surface mining precluded development of nonenergy leasable mineral resources, developers could move to nearby private or state minerals. However, state, county, and private mineral resources are often fragmented and limited in extent. Precluding development of nonenergy leasable minerals would also result in loss of bonus bids and royalty revenues to the federal and state governments (see **Section 4.23**). Impacts of closing areas to surface mining in GHMA within 1 mile of leks would be mitigated where developers completed off-site mitigation in exchange for waiver of the closure. While off-site mitigation would mitigate the impacts of closure and be the most cost-effective option for developers, it would still increase costs of development compared with Alternative A.

**Table 4.39** breaks down the acres within the decision area by whether they would be open or closed to new nonenergy mineral prospecting and exploration and leasing.

**Table 4.39**  
**Nonenergy Leasable Minerals, Alternative D**

<b>Mineral Potential and Occurrence</b>	<b>Closed to All New Leasing (acres)</b>	<b>Closed to New Surface Mining/ Open to New Underground Mining (acres)<sup>1</sup></b>	<b>Open to All Mining (acres)</b>
<b>Gilsonite Potential</b>	<b>0</b>	<b>0</b>	<b>74,000</b>
High	0	0	12,400
Moderate	0	0	54,800
Low	0	0	6,800
<b>Phosphate Potential</b>	<b>34,700</b>	<b>151,200</b>	<b>25,700</b>
High	9,700	33,100	0
Moderate	0	18,700	700
Low	25,000	99,500	25,100
<b>Sodium Occurrence</b>	<b>24,300</b>	<b>137,500</b>	<b>0</b>

Source: BLM 2012d

<sup>1</sup> Underground mining includes surface-disturbing activities such as exploration, structures, roads, shafts, and power lines.

In addition to the allocations described above, new or modified leases for underground mining in PHMA would be required to avoid placement of appurtenant facilities in PHMA or, if avoidance was not technically feasible, facilities placed in PHMA would be subject to limitations on siting, noise, tall structures, and timing, in addition to mitigation requirements. Under no circumstances could new appurtenant facilities be placed within 1 mile of a lek in PHMA. Impacts of these limitations and mitigation requirements would be the same type as those described for RDFs under Alternative B.

Nonenergy leasable mineral development and maintenance activities would be prohibited in breeding and nesting, brood-rearing, and winter habitats during certain times of year in both PHMA and GHMA. In areas containing all three of these habitats, these restrictions could overlap such that nonenergy leasable mineral development activities would only be permitted in those areas from July 15 to November 15. Limiting nonenergy leasable mineral development activities to 4 months of the year could essentially close an area to nonenergy leasable mineral development.

New leases for underground mining in GHMA would be required to minimize surface disturbance and disruption as needed to protect GRSG. Costs of development could increase under this alternative if developers were required to use more expensive technology than they might otherwise have used in order to minimize surface disturbance. These costs may be prohibitive, and the mineral may not be able to be extracted.

These leases could be subject to the limitations described above for PHMA on a case-by-case basis. If the limitations were applied to leases, impacts would be the same type as those described for RDFs under Alternative B. Impacts would be mitigated where developers performed off-site mitigation in exchange for waiver of limitations in GHMA.

While new leases for surface mining could not be issued within PHMA, prospecting and exploration would still be allowed on the surface to gather information on the viability of underground mining. However, existing and future prospecting and exploration operations within PHMA would be subject to additional limitations on siting of facilities and timing of activities. In addition, cumulative surface disturbance associated with prospecting and exploration within PHMA in a population area could not exceed 5 percent. Impacts of these limitations would be similar to the impacts of RDFs described under Alternative B. However, because management under Alternative D would apply limitations and stipulations to nonenergy leasable prospecting and exploration instead of closing additional areas to prospecting and exploration, these siting limitations and TL stipulations would be applied to more acres. The magnitude of impacts from siting limitations and TL stipulations would increase, but the overall impact of management applicable to prospecting and exploration would decrease.

Limitations on noise and tall structures would also apply to areas outside occupied habitat but within 4 miles of an occupied lek within PHMA. Impacts of these limitations would be the same type as those described for RDFs under Alternative B.

Exploration would be allowed in the decision area under Alternative D, but seasonal restrictions would apply in nesting, brood-rearing, and winter habitat. While these restrictions would continue to apply to exploration in some areas under Alternative A, more consistent application under Alternative D would increase impacts on nonenergy leasable minerals due to a potential decrease in exploration compared with Alternative A. Impacts of this decrease would be the same type as those described under Alternative B.

Existing nonenergy leasable mineral leases on the 3,283,900 acres of federal mineral estate in PHMA would be subject to the same RDFs described under Alternative B. Exceptions would occur where a design feature was not applicable (e.g., a resource is not present on a given site) or where the design feature would not actually provide additional protection for GRSG or its habitat. See **Table 2.4** for more information on when these exceptions to RDFs would apply.

*Gilsonite.* Like Alternative A, under Alternative D, all federal mineral estate with gilsonite potential in the decision area would be within GHMA and would be open to nonenergy leasable mineral prospecting and exploration and leasing. However, all federal gilsonite leases within 1 mile of a lek would be subject to no surface disturbance stipulations. The impacts of these stipulations would be the same type as the impacts of closing an area to surface mining described above for all nonenergy leasables under Alternative D. The 2,700 acres of authorized gilsonite leases in mapped occupied habitat would lie within GHMA and would be subject to any surface-disturbance limitations and/or BMPs included in those leases. Impacts of these BMPs would be the same type as those described under Alternative A. Any of these leases that are within 4 miles of a lek lying within PHMA would be subject to limitations on noise and tall structures if the lease were modified.

*Phosphate.* Under Alternative D, 34,700 acres (16 percent) of federal mineral estate with phosphate potential in the decision area would be closed to new nonenergy leasable mineral prospecting and exploration and leasing, including 9,700 acres of federal mineral estate with high phosphate potential in the decision area. The impacts of closing these areas to leasing would be the same type as those described under Alternative A, but to a greater extent. Another 151,200

acres (71 percent) of federal mineral estate with phosphate potential would be open to leasing for development by underground mining only, including 33,077 acres (78 percent) of federal mineral estate with high phosphate potential in the decision area. Impacts of closures to surface mining would be the same type as those described under *Utah Sub-region (Total Decision Area)*, above. The remaining 25,700 acres (12 percent) of federal mineral estate with phosphate potential in the decision area would be open to nonenergy mineral leasing for development by both surface and underground mining. Management of the 9,100 acres of authorized and pending phosphate leases in PHMA would be similar to Alternative B, except that RDFs would not be required where exceptions applied.

*Sodium.* Like Alternative C, under Alternative D, none of the federal mineral estate with sodium occurrence in the decision area would be open to nonenergy leasable mineral prospecting and exploration and leasing. However, 137,500 acres (85 percent) of federal mineral estate with sodium occurrence in the decision area would be open to leasing for development by underground mining only. The remaining 24,300 acres (15 percent) of federal mineral estate with sodium occurrence in the decision area would be closed to nonenergy mineral leasing for development by both surface and underground mining. There are no federal sodium leases in the decision area. Therefore, no existing sodium leases would be impacted by RDFs.

#### **Alternative E**

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

#### *Fluid Minerals*

Under Alternative E, the same acreage would be closed to new fluid mineral leasing as under Alternative A. Another 690,100 acres (17 percent) of federal mineral estate would be subject to NSO stipulations. The types of impacts on gilsonite demand from these management actions would be the same as those described under Alternative A; however, because more acres would be subject to NSO stipulations under Alternative E, the magnitude of those impacts would increase.

#### *Nonenergy Leasables*

Nonenergy leasable mineral allocations under Alternative E would be the same as those under Alternative A (refer to **Table 4.36**). These allocation decisions would impact gilsonite, phosphate, and sodium, for which the individual analyses are provided below.

New leases in mapped GRSG habitat in SGMAs/core areas, including leases for commercial prospecting and exploration, would be subject to limitations on siting, disturbance (including a 5 percent disturbance cap), tall structures, noise, and timing of development activities. Impacts of these limitations would be the same type as those described for RDFs under Alternative B. Mitigation may also be required.

CSU and TL stipulations would apply to exploration within PHMA, potentially causing a decrease in exploration from Alternative A. Impacts of this decrease in exploration would be the same type as those described under Alternative B.

Management of existing leases in PHMA would be the same as under Alternative A.

Management of nonenergy leasable minerals in mapped GRSG habitat outside SGMAs/noncore areas would be the same as under Alternative A.

*Gilsonite.* Like Alternative A, under Alternative E, all federal mineral estate with gilsonite potential in the decision area would be open to nonenergy leasable mineral prospecting and exploration and leasing. However, the limitations on siting, disturbance, tall structures, noise, and timing of development activities described above would apply. This would increase impacts compared with Alternative A. The 2,700 acres of authorized gilsonite leases in the decision area would lie within mapped GRSG habitat outside SGMAs/noncore areas and would be subject to the same management as under Alternative A.

*Phosphate.* Like Alternative A, under Alternative E, 4,090 acres of federal mineral estate with low phosphate potential in the decision area would remain closed to new nonenergy leasable mineral prospecting and exploration and leasing. The impacts of closing these areas to leasing would be the same type as those described under Alternative A. All other acres with phosphate potential in the decision area would be open to nonenergy leasable mineral prospecting and exploration and leasing. The 9,100 acres of authorized and pending phosphate leases in the decision area would be subject to the same management as under Alternative A.

*Sodium.* Like Alternative A, under Alternative E, the 175,200 acres of federal mineral estate with sodium occurrence in the decision area would remain open to nonenergy leasable mineral prospecting and exploration and leasing. There are no federal sodium leases in the decision area. Therefore, no existing sodium leases would be impacted by BMPs.

### **Proposed Plans**

#### *Special Status Species – GRSG*

Application of the 3 percent disturbance cap (5 percent on National Forest System lands in Wyoming) in PHMA and lek buffers in PHMA and GHMA could impact both new and existing nonenergy leasable minerals activities by preventing or restricting new surface development. New nonenergy leasable minerals activities could be precluded if the cap were exceeded in a BSU or a proposed project analysis area. New surface development on existing leases could be restricted if the cap were exceeded. However, the BLM would not apply the disturbance cap in a manner that would eliminate all reasonable opportunities to develop an existing lease. Currently there are no population areas where the density of disturbance exceeds the 3 percent cap. However, there are areas within 4 miles of a lek in population areas that are near or exceeding the disturbance cap, including in the Uintah Population Area where there is high occurrence and existing development of phosphate.

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

RDFs would be applied as under the action alternatives in PHMA and GHMA and impacts would be similar in nature and magnitude as Alternative D. In addition to the RDFs, disturbance cap,

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

Occurrence of sodium is limited to the Rich and Box Elder Population Areas where the total disturbance and disturbance within 4 miles of leks is lower and there are no existing leases. However, all sodium occurrence in the decision area is in PHMA and, under the Proposed Plans, PHMA would be closed to new nonenergy minerals leases. However, the occurrence of sodium is largely present outside of population areas, though, so the overall impact on sodium development in the Utah Sub-region would be minimal.

#### *Mineral Development*

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

#### Fluid Minerals

Under the Proposed Plans, the number of acres closed to all new fluid mineral leasing would be the same as under Alternative A. Another 3,258,300 acres (79 percent) of federal mineral estate would be subject to NSO stipulations. The types of impacts on gilsonite demand from these management actions would be the same as those described under Alternative A; however, because more acres would be subject to NSO stipulations under the Proposed Plans, the magnitude of those impacts would increase.

#### Nonenergy Leasables

Under the Proposed Plans, PHMA would be closed to nonenergy mineral leasing (3,310,600 acres of federal mineral estate). An additional 59,400 acres of federal mineral estate in GHMA would be closed to nonenergy mineral leasing. These allocation decisions would impact gilsonite, phosphate, and sodium, for which the individual analyses are provided below. Closing areas to nonenergy mineral leasing would result in the same type of impacts as those described under Alternative A. However, the magnitude of these impacts would increase because more acres would be closed. Impacts of this closure would be mitigated because new leases adjacent to existing operations would be allowed, but these new leases would be subject to the restrictive management described under *Special Status Species – GRSG*.

Approximately 673,600 acres (16 percent) of federal mineral estate in the decision area would be open to leasing consideration for both surface and underground mining, all of which would be in GHMA. In GHMA, development would be subject to mitigation and lek buffers. Impacts of which are discussed under *Special Status Species – GRSG*.

**Table 4.40** breaks down the acres within the decision area by whether they would be open or closed to new nonenergy mineral leasing.

**Table 4.40**  
**Nonenergy Leasable Minerals, Proposed Plans**

<b>Mineral Potential and Occurrence</b>	<b>Closed to All New Leasing (acres)</b>	<b>Open to All Mining (acres)</b>
<b>Gilsonite Potential</b>	<b>0</b>	<b>74,000</b>
High	0	12,400
Moderate	0	54,800
Low	0	6,800
<b>Phosphate Potential</b>	<b>186,700</b>	<b>24,300</b>
High	42,700	0
Moderate	19,100	700
Low	124,900	23,600
<b>Sodium Occurrence</b>	<b>161,700</b>	<b>0</b>

Source: BLM 2015

*Gilsonite.* Like Alternative A, under the Proposed Plans, all federal mineral estate with gilsonite potential in the decision area would be within GHMA and would be open to nonenergy leasable mineral leasing. However, new leases in GHMA would be subject to mitigation and lek buffers. Impacts of which are discussed under *Special Status Species – GRSG*. The 2,700 acres of authorized gilsonite leases in mapped occupied habitat would lie within GHMA and would be subject to current lease-specific surface disturbance limitations and/or BMPs included in those leases or approved plans governing the leases. Impacts of these BMPs would be the same type as those described under Alternative A.

*Phosphate.* Under the Proposed Plans, 186,700 acres (88 percent) of federal mineral estate with phosphate potential in the decision area (including all federal mineral estate in PHMA) would be closed to new nonenergy leasable mineral prospecting and exploration and leasing, including all of federal mineral estate with high phosphate potential in the decision area (42,700 acres). The impacts of closing these areas to leasing would be the same type as those described under Alternative B. Impacts of this closure would be mitigated because new leases adjacent to existing operations would be allowed, but these new leases would be subject to the restrictive management described under *Special Status Species – GRSG*. This management would likely preclude new surface development associated with new and existing phosphate leases, including new surface development of the prospecting permit applications, expression of interest, and fringe acreage lease application on federal mineral estate in the decision area.

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

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

In addition, there are seven existing Prospecting Permit Applications, one Expression of Interest, and two Fringe Acreage Lease Applications. The management restrictions for the Proposed Plans described above would apply to any new projects on federal mineral estate in PHMA. As described above, this management would likely preclude new surface development associated with these actions. If the actions were rendered noneconomical because of these surface disturbance restrictions, they might not occur at all. As a result, development of nonenergy solid leasables in the decision area could be reduced.

The remaining 24,300 acres (12 percent) of federal mineral estate with phosphate potential (all moderate and low potential) in the decision area would be in GHMA and open to nonenergy mineral leasing. However, the restrictions to protect GRSG and their habitat described under *Special Status Species – GRSG* could limit new surface development associated with new nonenergy minerals leasing. Areas where development occurred would require increased costs associated with mitigation necessary to meet a net conservation gain for GRSG habitat.

*Sodium.* Like Alternative C, under the Proposed Plans, none of the federal mineral estate with sodium occurrence in the decision area would be open to nonenergy leasable mineral leasing.

### 4.21.3 Coal

#### ***Methods and Assumptions***

##### *Indicators*

Indicators of impacts on coal are as follows:

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

Where information is available, consideration is given to the potential for coal resources on lands identified as unacceptable for leasing. For example, an indicator of an impact on coal is if

there were substantial reductions in federal leasing and development of coal resources in high potential areas.

#### *Assumptions*

The analysis includes the following assumptions:

- If an area is leased, it could be developed. Not all leases would be developed within the life of this LUPA; however, pursuant to 43 CFR 3483, coal leases may be terminated if they are not diligently developed.
- Coal operations on existing federal leases, regardless of surface ownership, could be subject to restrictions on surface disturbance. Under these circumstances, existing leases would be developed consistent with applicable laws and valid existing rights, using as many of the restrictions and conservation measures as possible while still allowing reasonable access.
- As the demand for energy increases worldwide, so will the demand for extracting energy resources in areas with potential.
- In accordance with 43 CFR 3461.5, all National Forest System lands in the decision area are unsuitable for surface mining with the exception that surface operations and impacts that are incident to an underground coal mine may be allowed.
- Management actions to protect GRSG apply to coal leasing on all surface lands overlying federal mineral estate, which includes federal mineral estate underlying BLM-administered and National Forest System surface and underlying non-BLM-administered or non-National Forest System surface. There are 4,008,600 acres of federal mineral estate within the decision area (3,313,800 acres of BLM-administered and National Forest System surface with federal minerals and 694,800 acres of non-BLM-administered and non-National Forest System surface with federal minerals).
- As discussed in the Minerals section of **Chapter 3**, much of the coal in central Utah has already been extracted, and the remaining coal in this area is generally more difficult to access or extract and some is of lower quality. As the coal reserves in central Utah are depleted, mining could expand to other coal fields in Utah, including additional mining in southern Utah including the Alton Coal Field. All mining in the decision area is currently underground, though there is one surface mine in on private lands in the Panguitch Population Area. While there is little potential for surface mining in most of the decision area, there are federal lands adjacent to the exiting surface mine within the Panguitch Population Area where environmental studies are ongoing considering a lease-by-application for surface coal mining.

Implementing management for the following resources to protect GRSG would have negligible or no impact on coal and are therefore not discussed in detail: Vegetation Management, Integrated Invasive Species Management, Wild Horses and Burros, Wildland Fire Management, Livestock Grazing/Range Management, Recreation, Comprehensive Travel and Transportation Management, Lands and Realty, and ACECs.

**Alternative A**

Management actions for mineral programs other than coal would generally not impact coal. Therefore, only the impacts from coal management actions are discussed in the paragraphs below.

*Utah Sub-region (Total Decision Area)*

Under Alternative A, 22,900 acres of federal mineral estate with coal occurrence in the decision area (1 percent of the federal mineral estate decision area) are within WSAs and the Grand Staircase Escalante National Monument, administered by the BLM, and would remain unacceptable for coal leasing consideration. The strategic or nonstrategic nature of the lands for mine access or production on adjacent lands has not been assessed. Although no RMP decision has specified that these areas are unacceptable, they are required to be managed as such by the BLM Manual 6330, Management of Wilderness Study Areas, and the presidential proclamation establishing the Grand Staircase Escalante National Monument (Proclamation No. 6920).

All other acres in the decision area (3,982,800 acres, or 99 percent of the decision area) are acceptable for further consideration for leasing. However, 271,300 acres (7 percent) of federal mineral estate beneath National Forest System land in the decision area is unsuitable for surface mining with the exception of surface operations incident to underground mines. Management of areas as unsuitable for surface mining precludes development of some near-surface coal resources. The inability to have surface access on portions of leases could also effectively permanently preclude development of underground coal resources. Where possible depending on coal resources and geology, coal operations could relocate to nearby state, county, or private minerals. However, state, county, and private mineral resources are often fragmented and limited in extent. Additionally, blocks of coal could become isolated and therefore uneconomical to mine in the future.

The remaining 3,711,500 acres (93 percent) of federal mineral estate in the decision area is suitable for surface mining. **Table 4.41** breaks down the acres suitable or unsuitable for surface mining by coal development potential (high, moderate, or low). The Alton mine (located on private minerals in the Panguitch Population Area) is the only surface coal mining operation in the planning area at this time. All other coal operations in the planning area are underground mines.

Additional areas may be determined to be unsuitable for surface mining after site-specific review associated with coal lease applications if these areas were found to contain GRSG habitat that is of high interest to the state and is essential to maintaining the species.

Continuing to apply disturbance buffers and seasonal TL stipulations on surface-disturbing and disruptive activities in portions of GRSG breeding, nesting, and winter habitat would directly impact development of coal resources by limiting the siting, design, timing, and operations of coal-development projects. This, in turn, could delay resource development and require operators to use more costly development methods than they otherwise might have used.

The 30,300 acres of authorized and pending coal leases on federal mineral estate in mapped occupied habitat would continue to exist subject to the terms and conditions included in those leases.

**Table 4.41**  
**Coal Leasing Categories in the Decision Area,**  
**Alternative A, D, and E, and Proposed Plans**

<b>Coal Development Potential</b>	<b>Unsuitable for Surface Mining</b>	<b>Suitable for Surface Mining</b>
<b>Total Decision Area</b>		
High	98,400	87,100
Moderate	90,000	156,600
Low	82,900	620,500
<b>Total (All Potentials)<sup>1</sup></b>	<b>271,300</b>	<b>864,200</b>
<b>Carbon Population Area</b>		
High	640	13,460
Moderate	5,120	8,780
Low	43,700	81,200
<b>Total (All Potentials)<sup>1</sup></b>	<b>49,400</b>	<b>103,440</b>
<b>Emery Population Area</b>		
High	66,400	100
Moderate	5,300	0
Low	0	0
<b>Total (All Potentials)<sup>1</sup></b>	<b>71,700</b>	<b>100</b>
<b>Panguitch Population Area</b>		
High	0	4,000
Moderate	1,800	200
Low	0	0
<b>Total (All Potentials)<sup>1</sup></b>	<b>1,800</b>	<b>4,200</b>

Source: BLM 2012d, 2015

<sup>1</sup>Does not include management of acres with no coal development potential.

#### *Carbon Population Area*

Under Alternative A, some federal mineral estate with coal occurrence in the population area would remain unacceptable for coal leasing consideration because it is within a WSA. Coal leasing and development would continue to be prohibited in these areas; therefore, the coal resources in these areas would remain inaccessible. Approximately 640 acres (5 percent) of federal mineral estate with high development potential in the population area would remain unsuitable for surface mining because it would lie beneath National Forest System surface. The remaining federal mineral estate with coal development potential in the population area would remain suitable for surface mining. Four new coal mines in the Carbon Population Area are projected to be potentially developed under this alternative.

#### *Emery Population Area*

Under Alternative A, 66,400 acres (over 99 percent) of federal mineral estate with high development potential and all federal mineral estate with moderate potential in the Emery Population Area would remain unacceptable for surface mining because it would lie beneath National Forest System surface. Two new coal operations in the Emery Population Area are projected to be potentially developed under this alternative.

*Panguitch Population Area*

Under Alternative A, all federal mineral estate with high development potential within the Panguitch Population Area would remain suitable for surface mining. However, approximately 1,800 acres (90 percent) of federal mineral estate with moderate development potential in the population area would lie beneath National Forest System surface and would remain unsuitable for surface mining. At least two new coal mines in the Panguitch Population Area are projected to be potentially developed under this alternative.

**Alternative B**

Management actions for mineral programs other than coal would generally not impact coal. Therefore, only the impacts from coal management actions are discussed in the paragraphs below.

*Utah Sub-region (Total Decision Area)*

Management of the 22,900 acres with coal occurrence in the decision area within WSAs and the Grand Staircase Escalante National Monument would be the same as described under Alternative A. The strategic or nonstrategic nature of the lands for mine access or production on adjacent lands has not been assessed. No additional areas would be unacceptable for consideration for coal leasing under this alternative.

Under Alternative B, 3,328,800 acres (83 percent of the decision area), including all federal mineral estate in PHMA, would be managed as unsuitable for surface mining. This closure to surface mining would include 167,700 acres with high coal development potential (30 percent of federal mineral estate with high coal potential in the decision area). **Table 4.42** breaks down the acres within the decision area by whether they would be suitable or unsuitable for surface mining.

Approximately 710,500 acres (62 percent) of federal mineral estate with coal development potential in the decision area would be unsuitable for surface mining under this alternative. However, all existing federal leases in the decision area are available for underground mining. The Alton coal mine on private minerals in the Panguitch Population Area is the only surface mine in the planning area at this time.

New leases for underground mining would require all surface disturbances to be placed outside the 3,328,760 acres of BLM-administered and National Forest System surface and split-estate in PHMA. This requirement would increase costs of coal production by limiting siting options and increasing transport distances within the lease. Miner safety could also be a significant issue if, for example, escape ways and ventilation are limited. Due to these miner safety issues, some underground coal mines could not expand or be developed. The term of existing coal mines could be shortened, and some coal resources could be unrecoverable. Additionally, coal operations could relocate to nearby state, county, or private minerals to avoid these constraints. However, state, county, and private mineral resources are often fragmented and limited in extent.

**Table 4.42**  
**Coal Leasing Categories in the Decision Area, Alternative B**

<b>Coal Development Potential</b>	<b>Unsuitable for Surface Mining</b>	<b>Suitable for Surface Mining</b>
<b>Total Decision Area</b>		
High	167,700	17,800
Moderate	241,200	5,400
Low	301,600	402,200
<b>Total (All Potentials)<sup>1</sup></b>	<b>710,500</b>	<b>425,400</b>
<b>Carbon Population Area</b>		
High	59,400	15,100
Moderate	62,200	0
Low	105,400	42,200
<b>Total (All Potentials)<sup>1</sup></b>	<b>227,000</b>	<b>57,300</b>
<b>Emery Population Area</b>		
High	66,400	3,600
Moderate	5,300	1,400
Low	0	0
<b>Total (All Potentials)<sup>1</sup></b>	<b>71,700</b>	<b>5,000</b>
<b>Panguitch Population Area</b>		
High	0	5,300
Moderate	1,800	15,300
Low	0	0
<b>Total (All Potentials)<sup>1</sup></b>	<b>1,800</b>	<b>0</b>

Source: BLM 2012d

<sup>1</sup>Does not include management of acres with no coal development potential.

Exploration would be allowed on the 3,328,800 acres of federal mineral estate within PHMA but would be subject to TL stipulations and other restrictions. Most notably, exploration would be allowed only for gathering information about coal resources outside PHMA (e.g., evaluating structure of the area). Because of these limitations, exploration in PHMA would decrease under this alternative. Decreases in exploration in PHMA could reduce the availability of data on coal resources and would increase costs of coal development if the limitations required use of more expensive exploration technology (such as helicopter portable drilling). TL stipulations on exploration would delay development activities and could cause equipment shortages because all exploration would be occurring during the same time period.

The 24,800 acres of authorized and pending coal leases in PHMA would be required to place any new appurtenant facilities outside of PHMA under this alternative. Impacts of this siting limitation would be the same type as those described in the paragraph above. The 5,500 acres of authorized and pending coal leases in GHMA under this alternative could be required to minimize surface-disturbing and disrupting activities on a case-by-case basis.

#### *Carbon Population Area*

Like Alternative A, some federal mineral estate with coal occurrence in the population area would remain unacceptable for coal leasing consideration because it is within a WSA. The remaining federal mineral estate with coal occurrence in the population area would be

acceptable for further consideration for leasing. However, under Alternative B, the BLM and Forest Service would manage PHMA as unsuitable for surface mining.

**Table 4.42** breaks down the acres within the population area by whether they would be suitable or unsuitable for surface mining. Under Alternative B, 59,300 acres (80 percent) of federal mineral estate in the Carbon Population Area with high potential would be unsuitable for surface mining. Additionally, 62,200 acres (100 percent) of federal mineral estate in the population area with moderate potential would be unsuitable for surface mining. Impacts of managing these areas as unsuitable for surface mining would be the same type as those discussed above for Alternative B, *Utah Sub-region (Total Decision Area)* if developers wanted to extract coal via surface mining in the population area. However, no surface mines exist in the population area at this time.

New leases for underground mining, as well as existing leases for surface or underground mining, would be required to place new facilities outside PHMA, as described above for Alternative B, *Utah Sub-region (Total Decision Area)*. Impacts of these siting limitations would be the same type as those described above.

#### *Emery Population Area*

**Table 4.42** breaks down the acres of federal mineral estate within the population area by whether they would be suitable or unsuitable for surface mining. Under Alternative B, 61,200 acres (87 percent) of federal mineral estate in the Emery Population Area with high potential would be unsuitable for surface mining. Another 6,700 acres (100 percent) of federal mineral estate with moderate potential in the population area would be unsuitable for surface mining. Impacts of managing these areas as unsuitable for surface mining would be the same type as those discussed above for the Utah Sub-region under Alternative B if developers wanted to extract coal via surface mining in the population area. However, no surface mines exist in the population area at this time.

New leases for underground mining, as well as existing leases, would be required to place new facilities outside PHMA, as described above for *Utah Sub-region (Total Decision Area)*. Impacts of these siting limitations would be the same type as those described above.

#### *Panguitch Population Area*

**Table 4.42** breaks down the acres within the population area by whether they would be suitable or unsuitable for surface mining. This breakdown is done by coal development potential (high, moderate, or low potential). Under Alternative B, 4,000 acres (43 percent) of federal mineral estate in the Panguitch Population Area with high potential would be unsuitable for surface mining. Another 2,000 acres (12 percent) of federal mineral estate with moderate potential in the population area would be unsuitable for surface mining. Impacts of this unsuitability determination would be the same type as those described above for Alternative B, *Utah Sub-region (Total Decision Area)*.

The Alton mine would be within PHMA under this alternative; therefore, if the mine operators sought to expand the mine onto federal minerals, they would only be able to do so using underground mining under this alternative.

New leases for underground mining, as well as existing leases, would be required to place new facilities outside PHMA, as described above for *Utah Sub-region (Total Decision Area)*. Impacts of these siting limitations would be the same type as those described above.

### **Alternative C**

Management actions for mineral programs other than coal would generally not impact coal. Therefore, only the impacts from coal management actions are discussed in the paragraphs below.

#### *Utah Sub-region (Total Decision Area)*

Management of the 22,900 acres of federal mineral estate with coal occurrence in the decision area within WSAs and the Grand Staircase Escalante National Monument would be the same as described under Alternative A. No additional areas would be unacceptable for consideration for coal leasing under Alternative C. Under Alternative C, 4,008,600 acres of federal mineral estate (100 percent of the decision area) would be managed as unsuitable for surface mining. This closure to surface mining would include 185,500 acres with high development potential (34 percent of high potential federal mineral estate in the decision area). Management of areas as unsuitable for surface mining would have the same type of impacts as those described under Alternative B.

**Table 4.43** breaks down the acres within the decision area by whether they would be suitable or unsuitable for surface mining. All federal mineral estate with coal development potential in the decision area would be unsuitable for surface mining under this alternative. However, all existing federal leases in the decision area are for underground mining. The Alton coal mine on private minerals in the Panguitch Population Area is the only surface mine in the planning area.

Restrictions placed on new and existing leases for underground mining would be the same as those under Alternative B. However, under Alternative C, these restrictions would apply to all 4,008,600 acres of federal mineral estate in the decision area (all mapped occupied habitat).

Under Alternative C, exploration for leasable minerals would be prohibited on all 4,008,600 acres of federal mineral estate within the decision area. Closing the decision area to exploration could reduce the availability of data on coal resources outside the decision area and could increase costs of coal development if it resulted in the need to conduct exploration for resources outside the decision area via less easily accessible locations than the locations within the decision area from which exploration might otherwise occur. Because the right to conduct geophysical exploration is part of a lease right, prohibiting exploration in the decision area would not reduce development of coal resources in the decision area, even on existing leases. However, exploration on lands adjacent to existing coal leases would not be possible, restricting the data base for existing and potential adjacent coal mine operations.

#### *Carbon Population Area*

Like Alternative A, some federal mineral estate with coal occurrence in the population area would remain unacceptable for coal leasing consideration because it is within a WSA. The remaining federal mineral estate with coal occurrence in the population area would be acceptable for further consideration for leasing.

**Table 4.43**  
**Coal Leasing Categories in the Decision Area, Alternative C**

<b>Coal Development Potential</b>	<b>Unsuitable for Surface Mining</b>	<b>Suitable for Surface Mining</b>
<b>Total Decision Area</b>		
High	185,500	0
Moderate	246,800	0
Low	703,600	0
<b>Total (All Potentials)<sup>1</sup></b>	<b>1,135,900</b>	<b>0</b>
<b>Carbon Population Area</b>		
High	74,500	0
Moderate	62,200	0
Low	147,600	0
<b>Total (All Potentials)<sup>1</sup></b>	<b>284,300</b>	<b>0</b>
<b>Emery Population Area</b>		
High	70,000	0
Moderate	6,700	0
Low	0	0
<b>Total (All Potentials)<sup>1</sup></b>	<b>76,700</b>	<b>0</b>
<b>Panguitch Population Area</b>		
High	9,300	0
Moderate	17,300	0
Low	0	0
<b>Total (All Potentials)<sup>1</sup></b>	<b>26,600</b>	<b>0</b>

Source: BLM 2012d

<sup>1</sup>Does not include management of acres with no coal development potential.

Under Alternative C, the all PHMA would be managed as unsuitable for surface mining.

Under Alternative C, 74,500 acres (100 percent) of federal mineral estate in the Carbon Population Area with high potential would be unsuitable for surface mining. Additionally, 62,200 acres (100 percent) of federal mineral estate in the population area with moderate potential would be unsuitable for surface mining. Impacts of managing these areas as unsuitable for surface mining would be the same type as those discussed under Alternative B, *Utah Sub-Region (Total Decision Area)* if developers wanted to extract coal via surface mining in the population area. However, no surface mines exist in the population area at this time.

Developers of new leases for underground mining, as well as existing leases, would be required to place new facilities outside PHMA, as described for the Utah Sub-Region under Alternative C, above.

#### *Emery Population Area*

Under Alternative C, 70,000 acres (100 percent) of federal mineral estate in the Emery Population Area with high potential would be unsuitable for surface mining. Additionally, 6,700 acres (100 percent) of federal mineral estate in the population area with moderate potential would be unsuitable for surface mining. Impacts of managing these areas as unsuitable for surface mining would be the same type as those discussed under Alternative B, *Utah Sub-Region (Total*

*Decision Area*) if developers wanted to extract coal via surface mining in the population area. However, no surface mines exist in the population area at this time.

Developers of new leases for underground mining, as well as existing leases, would be required to place new facilities outside PHMA, as described for the Utah Sub-region under Alternative C, above.

#### *Panguitch Population Area*

Under Alternative C, 9,300 acres (100 percent) of federal mineral estate in the Panguitch Population Area with high potential would be unsuitable for surface mining. Additionally, 17,300 acres (100 percent) of federal mineral estate in the population area with moderate potential would be unsuitable for surface mining. Impacts of managing these areas as unsuitable for surface mining would be the same type as those discussed under Alternative B, *Utah Sub-Region (Total Decision Area)*.

Like Alternative B, under Alternative C, the Alton mine would be within PHMA; therefore, if the mine operators sought to expand the mine onto federal minerals, they would only be able to do so using underground mining under this alternative.

#### **Alternative D**

Management actions for mineral programs other than coal would generally not impact coal. Therefore, only the impacts from coal management actions are discussed in the paragraphs below.

#### *Utah Sub-region (Total Decision Area)*

Management of the 22,900 acres with coal occurrence in the decision area within WSAs and the Grand Staircase Escalante National Monument would be the same as Alternative A. Like Alternative A, all other acres in the decision area (3,982,800 acres, or 99 percent of the decision area) are acceptable for further consideration for leasing. However, 271,300 acres (7 percent) of federal mineral estate beneath National Forest System land in the decision area would be unsuitable for surface mining with the exception of surface operations incident to underground mines.

New leases for surface mining in PHMA would be subject to limitations on noise, structure height, and timing of activities, as well as mitigation requirements. New disturbance associated with these leases would be subject to the cumulative 5 percent disturbance limit for PHMA within each population area. These limitations would increase costs of coal development and could create development delays due to limits on the timing of activities. Once the 5 percent disturbance limit was reached within PHMA in a certain population area, additional disturbance would not be permitted. As a result, new surface mining could be prohibited in some population areas.

New leases for underground mining in PHMA in addition to the 24,600 acres of authorized and pending underground leases in PHMA would be required to avoid surface disturbance or, if such avoidance is not technically feasible, limit predator perching opportunities, noise, and timing of activities such as construction and vehicle noise. Additional mitigation would also be required. These limitations would increase costs of coal development and could create development

delays due to limits on the timing of activities. Management of authorized and pending leases in PHMA and GHMA would otherwise be the same as Alternative B.

Under Alternative D, exploration activities on 3,283,900 acres of federal mineral estate in PHMA (82 percent of the decision area) would be subject to limitations on surface disturbance and timing of activities. These surface-disturbance limitations and TL stipulations would have the same type of cost and delay impacts as the impacts of limitations on new leases described above under this alternative.

Coal development and maintenance activities would be prohibited in breeding and nesting, brood-rearing, and winter habitats during certain times of year in both PHMA and GHMA. In areas containing all three of these habitats, these restrictions could overlap such that coal development and maintenance activities would only be permitted in those areas from July 15 to November 15. Limiting coal development and maintenance activities to 4 months of the year could essentially close an area to coal development.

New leases for underground mining on 724,300 acres of federal mineral estate in GHMA (18 percent of the decision area) could be subject to disturbance limits and mitigation requirements as needed to protect habitat. Impacts of these requirements would be the same type as those described for similar limitations in PHMA. These impacts would be mitigated where operators conducted off-site mitigation in exchange for waiver of requirements.

Exploration would be allowed in the decision area under Alternative D, but seasonal restrictions would apply in nesting, brood-rearing, and winter habitat. While these restrictions would continue to apply to exploration in some areas under Alternative A, more consistent application under Alternative D would increase impacts on coal due to a potential decrease in exploration compared with Alternative A. Impacts of this decrease would be the same type as those described under Alternative B.

#### *Carbon Population Area*

Like Alternative A, some federal mineral estate with coal occurrence in the population area would remain unacceptable for coal leasing consideration because it is within a WSA. Also like Alternative A, approximately 640 acres (5 percent) of federal mineral estate with high development potential in the population area would remain unsuitable for surface mining because it would lie beneath National Forest System surface. The remaining federal mineral estate with coal development potential in the population area would remain suitable for surface mining. Exploration activities and new leases for underground mining in PHMA and GHMA would be subject to the limitations described above for Alternative D, *Utah Sub-Region (Total Decision Area)*, thereby increasing impacts on coal compared with Alternative A.

#### *Emery Population Area*

Like Alternative A, 66,400 acres (over 99 percent) of federal mineral estate with high development potential and all federal mineral estate with moderate potential in the Emery Population Area would remain unacceptable for surface mining because it would lie beneath National Forest System surface. Exploration activities and new leases for underground mining in PHMA and GHMA would be subject to the limitations described above under Alternative D,

*Utah Sub-Region (Total Decision Area)*, thereby increasing impacts on coal compared with Alternative A.

*Panguitch Population Area*

Like Alternative A, all federal mineral estate with high development potential within the Panguitch Population Area would remain suitable for surface mining. However, approximately 1,800 acres (90 percent) of federal mineral estate with moderate development potential in the population area would lie beneath National Forest System surface and would remain unsuitable for surface mining. Exploration activities and new leases for underground mining in PHMA and GHMA would be subject to the limitations described above for Alternative D, *Utah Sub-Region (Total Decision Area)*, thereby increasing impacts on coal compared with Alternative A.

**Alternative E**

Management actions for mineral programs other than coal would generally not impact coal. Therefore, only the impacts from coal management actions are discussed in the paragraphs below.

*Utah Sub-region (Total Decision Area)*

Management of the 22,900 acres with coal occurrence in the decision area within WSAs and the Grand Staircase Escalante National Monument would be the same as Alternative A. Like Alternative A, all other acres in the decision area (3,982,800 acres, or 99 percent of the decision area) are acceptable for further consideration for leasing. However, 271,300 acres (7 percent) of federal mineral estate beneath National Forest System land in the decision area would be unsuitable for surface mining with the exception of surface operations incident to underground mines.

All new surface and underground leases, as well as exploration activities, on the 3,262,500 acres of federal mineral estate in mapped GRSG habitat in SGMAs/core areas (81 percent of the decision area) would be subject to limitations on siting, disturbance, noise, and timing of activities. Mitigation may also be required. These limitations and requirements would have the same type of impacts as those described under Alternative D.

CSU and TL stipulations would apply to exploration within mapped GRSG habitat in SGMAs/core areas, potentially causing a decrease in exploration from Alternative A. Impacts of this decrease in exploration would be the same type as those described under Alternative B.

Management of authorized and pending leases in mapped GRSG habitat in SGMAs/core areas would be the same as under Alternative A.

Management of coal resources in mapped GRSG habitat outside SGMAs/noncore areas would be the same as under Alternative A.

*Carbon Population Area*

Like Alternative A, some federal mineral estate with coal occurrence in the population area would remain unacceptable for coal leasing consideration because it is within a WSA. Also like Alternative A, the remaining federal mineral estate with coal occurrence in the population area would be suitable for surface mining.

Exploration activities and new leases for surface and underground mining in mapped GRSG habitat in SGMAs/core areas would be subject to the limitations described above for Alternative E, *Utah Sub-Region (Total Decision Area)*, thereby increasing impacts on coal compared with Alternative A.

#### *Emery Population Area*

Like Alternative A, all federal mineral estate within the Emery Population Area would be suitable for surface mining. Exploration activities and new leases for surface and underground mining in mapped GRSG habitat in SGMAs/core areas would be subject to the limitations described under Alternative E, *Utah Sub-Region (Total Decision Area)*, thereby increasing impacts on coal compared with Alternative A.

#### *Panguitch Population Area*

Like Alternative A, all federal mineral estate within the Panguitch Population Area would be suitable for surface mining. Exploration activities and new leases for surface and underground mining in mapped GRSG habitat in SGMAs/core areas would be subject to the limitations described under Alternative E, *Utah Sub-Region (Total Decision Area)*, thereby increasing impacts on coal compared with Alternative A.

### **Proposed Plans**

#### *Utah Sub-region (Total Decision Area)*

Under the Proposed Plans, all areas with coal potential would remain open for consideration for coal leasing except those areas that are congressionally closed, as under Alternative A. On BLM surface and federal mineral estate, when considering surface mining, the determination of areas as unsuitable for all or certain stipulated methods of coal mining would be made at the time an application for a new coal lease or lease modification is submitted. Development consistent with regulations and with the Proposed Plans could occur. On federal mineral estate in National Forests, 271,300 acres (7 percent) in the decision area would be unsuitable for surface mining with the exception of surface operations incident to underground mines.

Measures to protect GRSG and its habitat (disturbance cap, lek buffers, net conservation gain requirements, and restrictions on noise and season) could affect the feasibility of new underground coal leases or the expansion of existing underground operations (e.g., increased costs and development delays due to limits on the timing of activities) but would not preclude them. As noted in **Chapter 3**, all mining is currently underground except in the Panguitch Population Area. In the Panguitch Population Area where surface mining occurs, the aforementioned measures to protect GRSG and its habitat would affect surface coal production. More specific information is included in the analysis for the Panguitch Population Area below.

#### *Carbon Population Area*

Like Alternative A, some federal mineral estate with coal occurrence in the population area would remain unacceptable for coal leasing consideration because it is within a WSA. Also like Alternative A, approximately 640 acres (5 percent) of federal mineral estate with high development potential in the population area would remain unsuitable for surface mining because it would lie beneath National Forest System surface. The remaining federal mineral estate with coal development potential in the population area would remain suitable for surface

mining. Exploration activities and new leases for underground mining in PHMA and GHMA would be subject to the limitations described above under *Utah Sub-Region (Total Decision Area)*, thereby increasing impacts on coal compared with Alternative A.

#### *Emery Population Area*

Like Alternative A, 66,400 acres (over 99 percent) of federal mineral estate with high development potential and all federal mineral estate with moderate potential in the Emery Population Area would remain unacceptable for surface mining because it would lie beneath National Forest System surface. Exploration activities and new leases for underground mining in PHMA and GHMA would be subject to the limitations described above under *Utah Sub-Region (Total Decision Area)*, thereby increasing impacts on coal compared with Alternative A.

#### *Panguitch Population Area*

Like Alternative A, all federal mineral estate with high development potential within the Panguitch Population Area would remain suitable for surface mining. However, approximately 1,800 acres (90 percent) of federal mineral estate with moderate development potential in the population area would lie beneath National Forest System surface and would remain unsuitable for surface mining. Exploration activities and new leases for underground mining in PHMA and GHMA would be subject to the limitations described above under *Utah Sub-Region (Total Decision Area)*, thereby increasing impacts on coal compared with Alternative A. Surface mining in the Panguitch Population Area would be impacted as described below.

Existing disturbance within 4 miles of a lek is approaching the 3 percent disturbance cap in some areas. Additional disturbance or project expansion would likely result in meeting or exceeding the disturbance cap at the project level unless lands within the project area could be reclaimed to below cap levels. Reclamation that resulted in the ability for previously disturbed areas to be functioning as habitat would likely be achieved over a longer period and would not result in continuous mining operations below cap levels. As such, compliance with the disturbance cap at the project level could constrain production potential unless underground methods that meet requirements in the Proposed Plans for underground methods could be developed. Given the amount of disturbance associated with the existing Alton Coal surface mining operation on private minerals, and the proximity of that operation to the Sink Valley lek, there would likely be size and locational constraints on the expansion of surface mining activity, especially in the short term. Based on current mining practices, as well as information included in the Alton Coal Draft EIS (2011), there may be opportunities for continued coal mining using other methods, including high wall and underground mining methods.

Application of the 3.1-mile lek buffer could affect mine placement, though the required buffer distance could be adjusted based on local topography. Topography in the Panguitch Population Area is such that it is possible for leks to be located in areas screened by hills, cliffs, and canyons within 3.1 miles of nearby disturbance. While some distance other than 3.1 miles could be considered, the Panguitch Population Area is in an area of high coal potential so any restriction would reduce potential production by surface methods. Restrictions on noise above 10 decibels (weighted) above ambient levels during GRSB breeding season while birds are lekking could affect the daily operation of a mine during that 2-3 month breeding season. While this would not preclude a new mine or expanded operations, it could affect production during certain times of

the year. Specific measures to minimize and meet the noise requirement could be applied, including screening, mufflers, or underground mining methods. While these restrictions would constrain surface mining in occupied habitat in the Population Area and affect development of the coal resource on federal minerals, there are limited areas of moderate and high potential in the Population Area outside of occupied habitat that could be developed without restrictions.

#### 4.21.4 Locatable Minerals

##### **Methods and Assumptions**

Analysis of impacts on locatable 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 locatable minerals would result from withdrawal of an area from locatable mineral entry. 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 locatable minerals are described under *Indicators*, below.

##### *Indicators*

Indicators of impacts on locatable minerals are as follows:

- The amount of land withdrawn from locatable mineral entry
- The amount of land recommended for withdrawal from locatable mineral entry
- Application of restrictions, such as RDFs and conservation measures, that can be placed on locatable mineral development activities to prevent unnecessary or undue degradation of GRSG habitat as the law allows

Where information is available, consideration is given to the potential for locatable minerals on lands withdrawn from locatable mineral entry. For example, an indicator of an impact on locatable minerals is if there were substantial withdrawals from locatable mineral entry in high potential areas.

##### *Assumptions*

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- Restrictions on locatable mineral development could only occur through existing legal avenues such as the BLM's mandate to prevent unnecessary or undue degradation (43 CFR 3809) and the Forest Service's requirements for environmental protection (36 CFR 228.8). The management actions analyzed for this LUPA would not interfere with valid existing rights.
- It is understood that the ability to require additional mitigation measures as described in **Chapter 2**, specifically under Alternatives D and E and the Proposed Plans, is subject to valid existing rights, the Mining Law of 1872, as amended, and its implementing regulations. Agencies would work with the operator to implement the conservation measures described in **Chapter 2** (e.g., disturbance cap, seasonal restrictions and BMPs/RDFs for locatable minerals). For the purposes of this analysis, it is assumed that operators would implement the conservation measures. If

operators do not agree to the conservation measures, the impacts under the action alternatives and the Proposed Plans would be the same as under Alternative A.

- Management actions to withdraw areas from locatable mineral entry or prevent unnecessary or undue degradation apply to locatable mineral activity on all surface lands overlying federal mineral estate, which includes federal mineral estate underlying BLM-administered and National Forest System surface and non-BLM-administered and non-National Forest System surface. There are 4,008,600 acres of federal mineral estate within the decision area (3,313,800 acres of BLM-administered and National Forest System surface with federal minerals and 694,800 acres of non-BLM-administered and non-National Forest System surface with federal minerals).
- Areas recommended for withdrawal would be withdrawn by a public land order issued by the Secretary of the Interior (5,000 acres or less) or by an act of Congress (over 5,000 acres).
- As discussed in the Minerals section of **Chapter 3**, it is reasonable to assume that development is most likely to continue in areas identified as having high potential. It is also reasonable to expect that new exploration, coupled with modern mining and milling methods, could result in new efforts to extract locatable minerals from mines in Utah.

Implementing management for the following resources to protect GRSG would have negligible or no impact on fluid minerals and are therefore not discussed in detail: Vegetation Management, Integrated Invasive Species Management, Wild Horses and Burros, Wildland Fire Management, Livestock Grazing/Range Management, Recreation, Comprehensive Travel and Transportation Management, Lands and Realty, and ACECs.

#### **Alternative A**

Under Alternative A, 498,200 acres (12 percent) of federal mineral estate in the decision area would remain withdrawn from location under the Mining Law of 1872, as amended, and an additional 560 acres (less than 1 percent) would continue to be recommended for withdrawal. If the Secretary issued a Public Land Order or Congress passed an act to formally withdraw these lands, subject to valid existing rights, the location of new mining claims under the Mining Law of 1872, as amended, would be prohibited. Exploration and mining would be allowed on prior existing, valid mining claims. Lands withdrawn from locatable mineral entry by Secretarial order are withdrawn for 20 years. After 20 years, these lands would need to be re-withdrawn.

**Table 4.44** shows the total acreage open, withdrawn, and recommended for withdrawal by locatable mineral potential (high and moderate).

Under Alternative A, 28,000 acres (8 percent) of federal mineral estate with high potential would remain withdrawn, and an additional 40 acres (less than 1 percent) with high potential would continue to be recommended for withdrawal. Approximately 334,000 acres (92 percent) of federal mineral estate with high potential in the decision area would remain open to locatable mineral entry. This alternative would be the least restrictive of locatable minerals because a

**Table 4.44**  
**Locatable Mineral Withdrawals, Alternatives A, D, and E**

<b>Locatable Mineral Potential</b>	<b>Withdrawn from Locatable Mineral Entry<sup>1</sup></b>	<b>Recommended for Withdrawal from Locatable Mineral Entry</b>	<b>Open to Locatable Mineral Entry</b>
High	28,000	40	334,000
Moderate	470,200	520	3,171,400
<b>Total</b>	<b>498,200</b>	<b>560</b>	<b>3,505,400</b>

Source: BLM 2012d, 2015

<sup>1</sup>Acreage includes all types of withdrawals; not specific to locatable mineral withdrawals.

larger percentage of the decision area would be open to locatable mineral entry, and no additional restrictions would be applied to mining operations. Of the 3,642,000 acres of federal mineral estate with moderate potential, 470,200 acres (13 percent) would remain withdrawn.

Withdrawal or closure of an area to mining development eliminates the ability to access and extract the mineral resources in that area under new claims. This represents an impact on the potential discovery, development, and use of those resources by decreasing the availability of mineral resources. As directed by 43 CFR 3809.100, existing mining claims in areas withdrawn from mineral entry would have to undergo a validity exam. Claims without an economically viable discovery on the date of withdrawal would become void. The validity exam could delay the start of locatable mineral development on valid claims. Existing Notices or Plans of Operations would also have to undergo a validity exam before review (for Notice) or approval (for Plan of Operations) of any material change to the operation. The need to perform validity exams in areas withdrawn from locatable mineral entry would also greatly increase the burden on the BLM and Forest Service associated with processing mining claims, Notices, and Plans of Operations. Because there is high and moderate locatable mineral potential in GRSG habitat, withdrawing lands is expected to impact the locatable minerals program.

There are 2,575 mining claims and 39 locatable mine operations in the decision area. The existing operations would continue to operate under their accepted or approved mitigating measures to prevent unnecessary and undue degradation.

#### **Alternative B**

Like Alternative A, under Alternative B, 498,200 acres (12 percent) of federal mineral estate in the decision area would remain withdrawn from location under the Mining Law of 1872, as amended. Acres recommended for withdrawal would increase to 3,153,700 acres (79 percent of the decision area and all PHMA) under Alternative B, compared with 560 acres under Alternative A. If the Secretary issued 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, as amended, would be prohibited. Exploration and mining would be allowed on prior existing, valid mining claims. Impacts from these actions would be the same type as those described under Alternative A; however, total withdrawals (including lands currently withdrawn) under Alternative B would increase to 7 times the acres withdrawn and recommended for withdrawal under Alternative A, thereby further limiting opportunities for locatable mineral development in

the decision area. **Table 4.45** shows the total acreage open, withdrawn, and recommended for withdrawal by locatable mineral potential (high and moderate).

**Table 4.45**  
**Locatable Mineral Withdrawals, Alternative B**

<b>Locatable Mineral Potential</b>	<b>Withdrawn from Locatable Mineral Entry<sup>1</sup></b>	<b>Recommended for Withdrawal from Locatable Mineral Entry</b>	<b>Open to Locatable Mineral Entry</b>
High	28,000	287,600	46,400
Moderate	470,200	2,866,100	305,800
<b>Total</b>	<b>498,200</b>	<b>3,153,700</b>	<b>352,200</b>

Source: BLM 2012d

<sup>1</sup>Acreage includes all types of withdrawals; not specific to locatable mineral withdrawals.

Under Alternative B, 287,600 acres (79 percent) of federal mineral estate with high potential in the decision area (including all PHMA) would be recommended for withdrawal, compared with 40 acres under Alternative A.

Of the 39 locatable mining operations in the decision area, 35 would be in PHMA under Alternative B. If the Secretary issued a Public Land Order or Congress passed an act to formally withdraw all lands in PHMA, as recommended by this alternative, the locatable mining operations in PHMA would require a validity examination for material changes, and additional constraints, such as seasonal restrictions, could be applied. Once formally withdrawn, the 2,039 existing claims in PHMA would also be subject to validity examinations in accordance with 43 CFR 3809.100 to determine whether or not the claim was valid on the date of the withdrawal and at the present time. The large increase in areas recommended for withdrawal under this alternative compared with Alternative A would increase the development delays described under Alternative A.

Exploration would be allowed on the 3,328,800 acres of federal mineral estate within PHMA but would be subject to TL stipulations and other restrictions. Most notably, exploration would be allowed only for gathering information about locatable mineral resources outside PHMA (e.g., evaluating structure of the area). Because of these limitations and the fact that PHMA would be withdrawn from locatable mineral entry, exploration in PHMA would decrease under this alternative. Decreases in exploration in PHMA could reduce the availability of data on locatable mineral resources and could increase costs of locatable mineral development if the limitations required use of more expensive exploration technology (such as helicopter portable drilling). TL stipulations on exploration would delay development activities and could cause equipment shortages because all exploration would be occurring during the same period.

Under this alternative, BMPs would be applied as appropriate and to the extent allowable by law within PHMA. Notices and Plans of Operations would not be able to be accepted (for Notices) or approved (for Plans of Operations) until operators incorporated these BMPs into their operations to avoid unnecessary and undue degradation. These BMPs could increase the costs of locatable mineral development compared with Alternative A.

**Alternative C**

Like Alternative A, under Alternative C, 498,200 acres (12 percent) of federal mineral estate in the decision area would remain withdrawn from location under the Mining Law of 1872, as amended. Under Alternative C, areas within mapped occupied habitat would be recommended for withdrawal in a manner similar to that under Alternative B; however, a larger number of acres would be recommended for withdrawal under Alternative C. Under this Alternative, 3,510,500 acres (88 percent of the decision area) would be recommended for withdrawal, compared with 560 acres under Alternative A. If the Secretary issued a Public Land Order or Congress passed an act to formally withdraw these lands, subject to valid existing rights, the location of new mining claims under the Mining Law of 1872, as amended, would be prohibited. Exploration and mining would be allowed on prior existing, valid mining claims. Impacts from these actions would be the same type as those described under Alternative A; however, total withdrawals (including lands currently withdrawn) under Alternative C would increase to 8 times the acres withdrawn and recommended for withdrawal under Alternative A, thereby further limiting opportunities for locatable mineral development in the decision area.

**Table 4.46** shows the total acreage open, withdrawn, and recommended for withdrawal by locatable mineral potential (high and moderate). Under Alternative C, 334,000 acres (92 percent) of federal mineral estate with high potential in the decision area would be recommended for withdrawal, compared with 40 acres under Alternative A. The remainder of the high potential acres in the decision area would already be withdrawn.

**Table 4.46**  
**Locatable Mineral Withdrawals, Alternative C**

<b>Locatable Mineral Potential</b>	<b>Withdrawn from Locatable Mineral Entry<sup>1</sup></b>	<b>Recommended for Withdrawal from Locatable Mineral Entry</b>	<b>Open to Locatable Mineral Entry</b>
High	28,000	334,000	0
Moderate	470,200	3,176,500	0
<b>Total</b>	<b>498,200</b>	<b>3,510,500</b>	<b>0</b>

Source: BLM 2012d

<sup>1</sup>Acreage includes all types of withdrawals; not specific to locatable mineral withdrawals.

Under Alternative C, exploration would be prohibited on all 4,008,600 acres of federal mineral estate within the decision area. Withdrawing the decision area from mineral entry under the Mining Law of 1872, as amended, would prohibit exploration and may reduce the availability of mineral resources. Prohibiting exploration in the decision area could reduce development of locatable mineral resources in the decision area, even on existing claims. Operators with existing claims with undetermined validity would not be able to conduct new exploration on those claims except to confirm or corroborate mineral exposures as per 43 CFR 3809.100(b)(1).

All 39 locatable mining operations in the decision area would be in PHMA under Alternative C. Similar to Alternative B, if the Secretary issued a Public Land Order or Congress passed an act to formally withdraw all lands in PHMA, as recommended by Alternative C, the locatable mining operations in PHMA would require a validity examination for material changes and additional

constraints, such as seasonal restrictions, could be applied. Once formally withdrawn, the 2,575 existing claims in PHMA would also be subject to validity examinations in accordance with 43 CFR 3809.100 to determine whether or not the claim was valid on the date of the withdrawal and at the present time.

Similar to Alternative B, the large increase in areas recommended for withdrawal under Alternative C compared with Alternative A would increase the need for validity exams and the resulting development delays and costs on the BLM, Forest Service, or claimant described under Alternative A. Alternative C would result in the largest impact of these validity exams because the most acres would be withdrawn or recommended for withdrawal.

In the same way as under Alternative B, under Alternative C, BMPs would be applied as appropriate and to the extent allowable by law within PHMA. Notices and Plans of Operations would not be able to be accepted (for Notices) or approved (for Plans of Operations) until operators incorporated these BMPs into their operations to avoid unnecessary and undue degradation. This requirement would increase the costs of locatable mineral development compared with Alternative A, as described under Alternative B.

#### **Alternative D**

Like Alternative A, under Alternative D, 498,200 acres (12 percent) of federal mineral estate in the decision area would remain withdrawn from location under the Mining Law of 1872, as amended, and an additional 560 acres (less than 1 percent) would be recommended for withdrawal. Impacts from these actions would be the same as Alternative A.

Like Alternative B, under Alternative D, additional restrictions and BMPs for locatable minerals could apply in PHMA and GHMA. To the extent practicable, surface disturbance could be limited to under the 5 percent disturbance limit and enhancements of PHMA through on- or off-site mitigation could be requested through volunteer cooperation on behalf of the claimant/operator. These limits and mitigation measures could increase the costs of locatable mineral development compared with Alternative A, but not to the extent that locatable mineral development subject to such limits and mitigation measures would no longer be practicable.

Exploration would be allowed in the decision area under Alternative D, but seasonal restrictions would apply in nesting, brood-rearing, and winter habitat. While these restrictions would continue to apply to exploration in some areas under Alternative A, more consistent application under Alternative D would increase impacts on locatable minerals due to a potential decrease in exploration compared with Alternative A. Impacts of this decrease would be the same type as those described under Alternative B.

#### **Alternative E**

Like Alternative A, under Alternative E, 498,200 acres (12 percent) of federal mineral estate would remain withdrawn from location under the Mining Law of 1872, as amended, and an additional 560 acres (less than 1 percent) would continue to be recommended for withdrawal. Impacts from these actions would be the same as those described under Alternative A.

Similar to Alternative D, Alternative E would propose additional restrictions for locatable minerals that could apply in mapped GRSG habitat in SGMAs/core areas. To the extent

practicable, cumulative surface disturbance could be limited to less than 5 percent of occupied habitat in each population area, and enhancements of mapped GRSG habitat in SGMAs/core areas through on- and/or off-site mitigation could be requested. Like under Alternative D, these limits and mitigation measures could increase the costs of locatable mineral development compared with Alternative A, but not to the extent that locatable mineral development subject to such limits and mitigation measures would no longer be practicable. Limitations would only be imposed to the extent the claimant or operator was willing to apply them; therefore, the impacts of these limitations would be less than impacts of the limitations imposed under Alternatives B, C, and D.

CSU and TL stipulations would apply to exploration within mapped GRSG habitat in SGMAs/core areas, potentially causing a decrease in exploration from Alternative A. Impacts of this decrease in exploration would be the same type as those described under Alternative B.

### **Proposed Plans**

Similar to Alternative A, under the Proposed Plans, 445,900 acres (11 percent) of federal mineral estate in the decision area would remain withdrawn from location under the Mining Law of 1872, as amended. Acres recommended for withdrawal would increase to 235,000 acres (6 percent of the decision area, including the SFA) under the Proposed Plans, compared with 560 acres under Alternative A. If the Secretary issued 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, as amended, would be prohibited. Mining would be allowed on prior existing, valid mining claims. Impacts from these actions would be the same type as those described under Alternative A; however, total withdrawals (including lands currently withdrawn) under the Proposed Plans would increase by 37 percent over the acres withdrawn and recommended for withdrawal under Alternative A, thereby further limiting opportunities for locatable mineral development in the decision area. **Table 4.47** shows the total acreage open, withdrawn, and recommended for withdrawal by locatable mineral potential (high and moderate).

**Table 4.47**  
**Locatable Mineral Withdrawals, Proposed Plans**

<b>Locatable Mineral Potential</b>	<b>Withdrawn from Locatable Mineral Entry<sup>1</sup></b>	<b>Recommended for Withdrawal from Locatable Mineral Entry</b>	<b>Open to Locatable Mineral Entry</b>
High	28,000	1,800	338,800
Moderate	417,900	233,200	2,996,200
<b>Total</b>	<b>445,900</b>	<b>235,000</b>	<b>3,335,100</b>

Source: BLM 2015

<sup>1</sup>Acreage includes all types of withdrawals; not specific to locatable mineral withdrawals.

Under the Proposed Plans, 1,800 acres (less than 1 percent) of federal mineral estate with high potential in the decision area would be recommended for withdrawal, compared with 40 acres under Alternative A.

Of the 39 locatable mining operations in the decision area, none would be in the SFA under the Proposed Plans. However, 11 claims would be in the SFA. If the Secretary issued a Public Land Order or Congress passed an act to formally withdraw all lands in SFA, as recommended under

the Proposed Plans, before operations can begin on any existing mining claims in SFA they would undergo a validity examination in accordance with 43 CFR 3809.100 to determine whether or not the claim was valid on the date of the withdrawal as well as on the date of the examination. The increase in areas recommended for withdrawal under this alternative compared with Alternative A would increase the development delays described under Alternative A.

Under the Proposed Plans, to the extent consistent with the rights of a mining claimant under existing laws and regulations, surface-disturbance would be limited in PHMA. The agencies would work with claimants to apply the disturbance cap, minerals/energy density, RDFs, and seasonal restrictions in PHMA and mitigation for net conservation gain and lek buffers in PHMA and GHMA. However, under the Mining Law of 1872, as amended, the agencies do not have the authority to require such mitigation measures. As such, impacts on existing locatable mineral operations from these additional mitigation measures would be minimal. Overall, impacts on the locatable mineral program would increase under the Proposed Plans because of the additional acres recommended for withdrawal.

#### **4.21.5 Mineral Materials**

##### ***Methods and Assumptions***

Analysis of impacts on mineral materials 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 mineral materials would result from closure of an area to mineral material 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 materials are described under *Indicators*, below.

##### *Indicators*

Indicators of impacts on mineral materials are as follows:

- The amount of land closed to mineral material disposal
- The amount of land closed to commercial mineral material disposal
- The amount of land managed as ROW avoidance areas
- The amount of land managed as ROW exclusion areas
- Application of disturbance, timing, and other limitations
- The amount of land closed to fluid mineral leasing
- The amount of land subject to NSO stipulations on fluid mineral leasing

Where information is available, consideration is given to the potential for mineral materials on lands closed to mineral material disposal. For example, an indicator of an impact on mineral materials is if there were substantial closures to mineral material disposal in areas with occurrence of mineral materials.

*Assumptions*

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- Management actions apply to mineral material activity on surface lands overlying federal mineral estate, which includes all federal mineral estate underlying BLM-administered and National Forest System surface and non-BLM-administered and non-National Forest System surface. There are 4,008,600 acres of federal mineral estate within the decision area (3,313,800 acres of BLM-administered and National Forest System surface with federal minerals and 694,800 acres of non-BLM-administered and non-National Forest System surface with federal minerals).
- As described in the Minerals section of **Chapter 3**, future demand for mineral materials will vary depending upon market conditions, which differ according to economic conditions and construction activity. Construction projects within approximately 50 miles of mineral materials deposits may lead to development of these deposits. It is expected that mineral materials activity will continue at roughly the same level for the life of the LUPA.

**Table 4.48** shows the number of acres open or closed to mineral materials disposal in areas of occurrence in the decision area under each alternative and the Proposed Plans.

**Table 4.48**  
**Mineral Materials in Areas of Occurrence by Alternative**

<b>Occurrence</b>	<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Proposed Plans</b>
Closed to Disposal (acres)	21,800	1,140,000	1,295,300	103,200	21,900	1,196,900 <sup>1</sup>
Open to Noncommercial Disposal but Closed to Commercial Disposal (acres)	N/A	N/A	N/A	1,030,900	N/A	N/A
Open to All Mineral Material Disposal (Commercial and Noncommercial) (acres)	1,273,500	155,300	0	161,200	1,325,600	152,400

BLM 2012d, 2015

<sup>1</sup>Under the Proposed Plans, PHMA would be open to free use permits and expansion of existing pits. There would be no new sales contracts or community pits in PHMA.

Of all federal mineral estate in the decision area, 1,884,300 acres (47 percent) have mineral material occurrence. A discussion of the impacts on mineral materials of management actions applicable to federal mineral estate in the decision area under each alternative follows.

Implementing management for the following resources to protect GRSG would have negligible or no impact on mineral materials and are therefore not discussed in detail: Vegetation Management, Integrated Invasive Species Management, Wild Horses and Burros, Wildland Fire

Management, Livestock Grazing/Range Management, Recreation, Comprehensive Travel and Transportation Management, and ACECs.

### **Alternative A**

#### *Infrastructure Development (including all ROWs and utility corridors)*

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, 3,219,000 acres (97 percent) of BLM-administered and National Forest System surface within the decision area would continue to be open to ROW location. However, construction of new roads would likely decrease on the 94,800 acres (3 percent) of BLM-administered and National Forest System surface in the decision area that would continue to be managed as ROW 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 collocated within existing ROWs to satisfy valid existing rights.

#### *Mineral Development*

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

#### Fluid Minerals

Under Alternative A, 138,500 acres (3 percent) of federal mineral estate in the decision area would remain closed to new fluid mineral leasing, and 483,500 acres (12 percent) would remain subject to NSO stipulations. Closing areas to leasing would preclude oil and gas development in those areas, which would reduce demand for mineral materials. Application of NSO stipulations could have the same effect if the stipulations prevented oil and gas development. NSO stipulations prohibit surface disturbance in areas, so the oil and gas resources in those areas could only be accessed by directional drilling. If directional drilling was not feasible in an area, the minerals subject to the NSO stipulation would effectively be closed to new development.

#### Mineral Materials

Approximately 3,932,200 acres (98 percent) of federal mineral estate within the decision area would remain open to mineral material disposal under Alternative A, including 1,273,500 acres (98 percent) of federal mineral estate with mineral material occurrence in the decision area. Approximately 73,500 acres (2 percent) of federal mineral estate within the decision area would remain closed to mineral material disposal. This would include 21,800 acres (2 percent) of federal mineral estate with mineral material occurrence in the decision area. Closing these areas to mineral material disposal would result in pits relocating nearby to meet demand for road maintenance and other needs. If demand for mineral materials could not be met by pits operated on federal lands, pits would move onto private lands. If no mineral materials occurred near closed areas, developers would have to transport them to construction sites from farther away, which would alter the location of mineral materials development and increase

transportation costs associated with that development. However, because 98 percent of the decision area would remain open to mineral material disposal, the likelihood of this is low.

Management under Alternative A would continue to require reclamation of mineral material pits in accordance with developers' pit development plans.

### **Alternative B**

#### *Infrastructure Development (including all ROWs and utility corridors)*

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 B, all BLM-administered and National Forest System surface in PHMA (totaling 2,784,200 acres, or approximately 84 percent of BLM-administered and National Forest System surface in the decision area) would be managed as ROW exclusion areas. However, because all PHMA would be closed to mineral material disposal under Alternative B, managing areas as ROW exclusion in PHMA would have no impact on demand for mineral materials in PHMA.

All BLM-administered and National Forest System surface in GHMA (totaling 529,200 acres, or 16 percent of BLM-administered and National Forest System surface in the decision area) would be managed as ROW avoidance under Alternative B. Mineral materials beneath those 529,200 acres would be impacted by the ROW avoidance area as described under Alternative A; however, because 7 times more acres would be managed as ROW avoidance or exclusion under Alternative B, the magnitude of these impacts on the level of demand for mineral materials would increase.

#### *Mineral Development*

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

#### Fluid Minerals

Under Alternative B, 3,341,300 acres (83 percent) of federal mineral estate in the decision area (including all PHMA) would be closed to new fluid mineral leasing, and 24,400 acres (1 percent) would be subject to NSO stipulations. However, because all PHMA would be closed to mineral materials disposal under Alternative B, closing PHMA to fluid mineral leasing would not impact demand for mineral materials in PHMA. Mineral materials in GHMA would be impacted by NSO stipulations as described under Alternative A.

#### Mineral Materials

Under Alternative B, approximately 3,340,000 acres of federal mineral estate in PHMA (83 percent of the federal mineral estate decision area) would be closed to mineral material disposal. This includes 1,140,000 acres with mineral material occurrence (87 percent of federal mineral estate with mineral material occurrence in the decision area). The types of impacts from these closures would be the same as those discussed under Alternative A; however, because 24

times more acres of federal mineral estate with mineral material occurrence would be closed under Alternative B, the magnitude of these impacts would increase.

Exploration would be allowed on the 3,328,800 acres of federal mineral estate within PHMA but would be subject to TL stipulations and other restrictions. Most notably, exploration would be allowed only for gathering information about mineral materials outside PHMA (e.g., evaluating structure of the area). Because of these limitations and the fact that PHMA would be closed to mineral material disposal, exploration in PHMA would decrease under this alternative. Decreases in exploration in PHMA could reduce the availability of data on mineral materials and could increase costs of mineral material development if the limitations required use of more expensive exploration technology (such as helicopter portable drilling). TL stipulations on exploration would delay development activities and could cause equipment shortages because all exploration would be occurring during the same period.

In PHMA, mineral material pits no longer in use would be restored to meet GRS habitat conservation objectives. Requiring reclamation of mineral material pits no longer in use could increase costs on developers if additional reclamation beyond that required under Alternative A were necessary to meet the specific objectives related to GRS habitat, and if the BLM and Forest Service required the developers to pay for the reclamation.

Management of mineral materials on federal mineral estate outside of PHMA would be the same as under Alternative A.

### **Alternative C**

#### *Infrastructure Development (including all ROWs and utility corridors)*

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 C, all BLM-administered and National Forest System surface within the decision area (3,313,800 acres) would be managed as ROW exclusion areas. However, because all mapped occupied habitat would be closed to mineral material disposal under Alternative C, managing areas as ROW exclusion in mapped occupied habitat would have no impact on mineral materials.

#### *Mineral Development (including geothermal)*

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

#### Fluid Minerals

Under Alternative C, all federal mineral estate in the decision area would be closed to new fluid mineral leasing. The types of impacts on mineral materials demand from these management actions would be the same as those described under Alternative A, but the magnitude would increase due to the increase in acres closed. However, because all federal mineral estate in the decision area would be closed to mineral materials disposal under this alternative, development

of mineral materials in the decision area would not be impacted by fluid minerals management actions.

#### Mineral Materials

Under Alternative C, approximately 4,008,600 acres of federal mineral estate (the entire federal mineral estate decision area) would be closed to mineral material disposal. This includes all acres with mineral material occurrence in the decision area. The types of impacts from these closures would be the same as those discussed under Alternative A; however, because 39 times more acres of federal mineral estate with mineral material occurrence would be closed under Alternative C, the magnitude of these impacts would increase.

Under Alternative C, exploration would be prohibited on all 4,008,600 acres of federal mineral estate within the decision area. Closing the decision area to exploration could reduce the availability of data on mineral materials outside the decision area and could increase costs of mineral material development if it resulted in the need to conduct exploration for resources outside the decision area via less easily accessible locations than the locations within the decision area from which exploration might otherwise occur. Because the right to conduct exploration is part of a mineral materials permit, prohibiting exploration in the decision area would not reduce development of mineral materials in the decision area, even on existing permits.

Mineral material pits no longer in use in PHMA would be restored in the same fashion as that described under Alternative B; however, because all of the decision area would be designated as PHMA under Alternative C, this management action would apply to more acres.

#### **Alternative D**

##### *Infrastructure Development (including all ROWs and utility corridors)*

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 D, all BLM-administered and National Forest System surface within PHMA not already managed as ROW exclusion would be managed as ROW avoidance for surface and underground linear ROWs (including pipelines and roads). As a result, 2,754,200 acres (83 percent) of the surface decision area would be managed as ROW avoidance for these types of ROWs, and 27,600 acres (1 percent) would be managed as ROW exclusion. Demand for mineral materials from noncommercial operations in PHMA would be indirectly impacted in the manner described under Alternative A; however, because 29 times more acres of BLM-administered and National Forest System surface would be managed as ROW avoidance or exclusion under Alternative D, the magnitude of the impacts on demand for mineral materials would increase. Impacts would be mitigated by the allowance of new ROWs with limitations on noise and disturbance. Impacts would also be mitigated for existing leases in PHMA because collocation of new ROWs close to existing ROWs and minimal construction of new roads would be allowed. Because commercial mineral material operations would be prohibited in PHMA under this alternative, ROW restrictions would have no impact on these operations.

Under this alternative, areas of GHMA within 1 mile of an occupied lek would also be managed as ROW avoidance with exceptions for limited development with noise, structure height, and timing restrictions. Mineral material operations within 1 mile of an occupied lek would be impacted by this ROW avoidance in the manner described under Alternative A. Impacts would be mitigated where the ROW avoidance requirement was waived in exchange for off-site mitigation activities. However, the expense of these mitigation activities would increase the costs associated with road construction and would decrease demand for mineral materials if road construction became prohibitively expensive.

*Mineral Development (including geothermal)*

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

Fluid Minerals

Under Alternative D, the same acreage would be closed to new fluid mineral leasing as that under Alternative A. Another 1,853,100 acres (46 percent) of federal mineral estate would be subject to NSO stipulations. The types of impacts on mineral materials demand from these management actions would be the same as those described under Alternative A; however, because more acres would be subject to NSO stipulations under Alternative D, the magnitude of those impacts would increase.

Mineral Materials

Under Alternative D, the BLM and Forest Service would prohibit mineral material disposal within 1 mile of leks and would close all PHMA to commercial mineral material disposal. Under this alternative, 2,967,500 acres (74 percent) of federal mineral estate within the decision area would be closed to commercial mineral material disposal but open to noncommercial mineral material disposal. This includes 1,030,900 acres with mineral material occurrence (79 percent of federal mineral estate with mineral material occurrence in the decision area). Noncommercial mineral material development would be allowed in these areas with restrictions on siting, disturbance, noise, structure, height, and timing. These types of restrictions would increase costs of mineral material development if they resulted in the use of more expensive technology or less-efficient development methods. Closing acres to commercial mineral material development would prevent large-scale commercial operations, while allowing county and community operations, which are generally smaller scale. Additionally, 352,800 acres of federal mineral estate within PHMA (9 percent of the decision area) would be closed to both commercial and noncommercial mineral material disposal, 103,200 acres of which have mineral material occurrence (8 percent of federal mineral estate with mineral material occurrence in the decision area). Impacts of these closures would be the same type as those described under Alternative A; however, because 3 times more acres of federal mineral estate would be closed to mineral materials disposal under Alternative D, the magnitude of those impacts would increase.

Mineral material development and maintenance activities would be prohibited in breeding and nesting, brood-rearing, and winter habitats during certain times of year in both PHMA and GHMA. In areas containing all three of these habitats, these restrictions could overlap such that

mineral material development activities would only be permitted in those areas from July 15 to November 15. Limiting mineral material development activities to 4 months of the year could essentially close an area to mineral material development.

In GHMA, mineral material disposal would be allowed outside of lek buffers with limitations on noise, structure height, and timing. These restrictions would have the same type of impact as described above. Impacts on mineral material development in GHMA would be mitigated where developers performed off-site mitigation in exchange for waiver of development restrictions.

Exploration would be allowed in the decision area under Alternative D, but seasonal restrictions would apply in nesting, brood-rearing, and winter habitat. While these restrictions would continue to apply to exploration in some areas under Alternative A, more consistent application under Alternative D would increase impacts on mineral materials due to a potential decrease in exploration compared with Alternative A. Impacts of this decrease would be the same type as those described under Alternative B.

### **Alternative E**

#### *Infrastructure Development (including all ROWs and utility corridors)*

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 E, all BLM-administered and National Forest System surface within mapped GRSG habitat in SGMAs/core areas not already managed as ROW exclusion would be managed as ROW avoidance. As a result, 2,654,000 acres (80 percent) of BLM-administered and National Forest System surface within the decision area would be managed as ROW avoidance, and 27,600 acres (1 percent) would be managed as ROW exclusion. Mineral materials in mapped GRSG habitat in SGMAs/core areas would be indirectly impacted in the manner described under Alternative A; however, because 28 times more acres of BLM-administered and National Forest System surface would be managed as ROW avoidance or exclusion under Alternative E, the magnitude of the impacts on demand for mineral materials would increase. Impacts would be mitigated by the allowance of new ROWs with limitations on noise, timing, and disturbance or where avoidance was not possible. However, mitigation would be required and could decrease demand for mineral materials, as described under Alternative D.

Under Alternative E, no management actions from this LUPA would apply to the 603,300 acres of BLM-administered and National Forest System surface outside of mapped GRSG habitat in SGMAs/core areas in the decision area (18 percent of the decision area). Management of these areas and impact of that management on mineral materials would be the same as described under Alternative A.

#### *Mineral Development (including geothermal)*

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

### Fluid Minerals

Under Alternative E, the same acreage would be closed to new fluid mineral leasing as under Alternative A. Another 690,100 acres (17 percent) of federal mineral estate would be subject to NSO stipulations. The types of impacts on mineral materials demand from these management actions would be the same as those described under Alternative A; however, because more acres would be subject to NSO stipulations under Alternative E, the magnitude of those impacts would increase.

### Mineral Materials

Under Alternative E, all federal mineral estate not closed to mineral material disposal under Alternative A would remain open (3,932,200 acres, or 98 percent of the decision area), including 1,325,600 acres with mineral material occurrence. Additional restrictions would apply to the 3,262,500 acres of federal mineral estate within mapped GRSG habitat in SGMAs/core areas (81 percent of the decision area), including maximum cumulative new permanent disturbance from mineral materials development of no more than 5 percent of mapped GRSG habitat in SGMAs/core areas in each population area. Noise, structure height, and TL stipulations would also apply. Impacts of these restrictions on mineral material development would be the same type as described under Alternative D. Mitigation might also be required, which would increase costs of mineral material development.

CSU and TL stipulations would apply to exploration within mapped GRSG habitat in SGMAs/core areas, potentially causing a decrease in exploration from Alternative A. Impacts of this decrease in exploration would be the same type as those described under Alternative B.

The 743,200 acres (19 percent) of federal mineral estate in the decision area outside mapped GRSG habitat in SGMAs/noncore areas under this alternative would be subject to the same management as under Alternative A.

### **Proposed Plans**

#### *Special Status Species – GRSG*

Under the Proposed Plans, the application of the 3 percent disturbance cap (5 percent on National Forest System lands in Wyoming) and in PHMA could impact mineral material activities by preventing new surface development. New mineral material pits or expansion of existing pits could be precluded if the cap were exceeded in a BSU or a proposed project analysis area. In cases where development was allowed, mitigation requirements would increase the cost of development.

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

RDFs would be applied as under the action alternatives and impacts would be similar in nature and magnitude as Alternative D.

*Infrastructure Development (including all ROWs and utility corridors)*

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 the Proposed Plans, all BLM-administered and National Forest System surface within PHMA not already managed as ROW exclusion would be managed as ROW avoidance for new linear and site-type ROWs, except for within ROW corridors designated for aboveground use. However, because all PHMA would be closed to mineral material disposal under the Proposed Plans, managing areas as ROW avoidance in PHMA would have no impact on demand for mineral materials in PHMA.

Under the Proposed Plans, all BLM-administered and National Forest System surface within GHMA would be available for ROW location, except for 17,600 acres already managed as exclusion. While these areas would be open, ROW development in GHMA would be subject to lek buffers and net conservation gain requirements, which could impact mineral material development as discussed under *Special Status Species – GRSG*. If disturbance is pushed to areas without restrictions then overall demand for mineral materials will not be affected. However, if the area of new disturbance decreases across the landscape, the demand for mineral materials could decrease over Alternative A.

*Mineral Development (including geothermal)*

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

Fluid Minerals

Under the Proposed Plans, the number of acres closed to all new fluid mineral leasing would be only slightly higher than under Alternative A so the magnitude of impacts would be similar. More than six times more acres would be subject to NSO stipulations under the Proposed Plans than Alternative A, including all PHMA. The types of impacts on mineral materials demand from these management actions would be the same as those described under Alternative A; however, because more acres would be subject to NSO stipulations under the Proposed Plans, the magnitude of those impacts would increase.

Mineral Materials

Under the Proposed Plans, National Forest System lands in the Wyoming portion of the planning area would remain open to mineral material disposal. Lands managed according to the BLM and the Forest Service-Utah Proposed Plans in PHMA (82 percent of the federal mineral estate decision area) would be closed to mineral material disposal. This includes 1,196,900 acres with mineral material occurrence (89 percent of federal mineral estate with mineral material occurrence in the decision area). Impacts would be somewhat mitigated because new free use permits and expansion of existing pits would be allowed, subject to restrictions. The types of impacts from these closures would be the same as those discussed under Alternative A; however, because 55 times more acres of federal mineral estate with mineral material occurrence would be closed under the Proposed Plans, the possibility for impacts would increase. It should be noted, however, that there are approximately 24,000 acres under a

mineral material permit within GRSG habitat statewide. Further, with approximately 1,100 acres of existing disturbance associated with those mineral material pits there are opportunities for existing pits to expand within their existing permitted areas. This is because less than 5 percent of the existing permitted area has been disturbed so expansion would fall under the disturbance cap at the project level, at least for most pits. Therefore, while there may be site-specific instances where a new pit in occupied GRSG habitat is denied, the potential for this is low because there is additional development opportunity at existing sites.

In GHMA, lek buffer distances to protect GRSG and their habitat, as discussed under *Special Status Species – GRSG* could restrict development in some areas, which could result in the development being placed in other locations or require compensatory mitigation, but would not prohibit such activities.

#### 4.21.6 Oil Shale and Tar Sands

##### **Methods and Assumptions**

As discussed in **Section 2.11.2**, Make GRSG Habitat Available for Oil Shale and Tar Sands Leasing, this LUPA does not include leasing allocation decisions for oil shale and tar sands in Utah. This is because the ROD for Allocation of Oil Shale and Tar Sands Resources on Lands Administered by the BLM in Colorado, Utah, and Wyoming closed all mapped occupied GRSG habitat on BLM-administered lands to oil shale and tar sands leasing and development with the exceptions of the pending lease application in the Asphalt Ridge Special Tar Sands Area and the White River Oil Shale Research, Development, and Demonstration site and Preference Lease Right Area (BLM 2013). Within these two areas, leasing and development would be allowed to occur; however, certain management actions and allocation-based decisions being considered in this LUPA could impact the feasibility, amount, and type of development. For example, depending on the alternative selected, GRSG habitat that overlaps the above-mentioned areas may be subject to surface disturbance thresholds, timing restrictions, and other GRSG protection measures. In addition, managing surrounding lands as ROW exclusion or avoidance areas could impact road and facility construction to access and develop those leases.

##### *Indicators*

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

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

##### *Assumptions*

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- The White River Oil Shale Research, Development, and Demonstration site lease would be a valid existing right under all alternatives. The White River Oil Shale Preference Right Lease Area would remain open for oil shale and tar sands development under all alternatives, subject to stipulations outlined in the Vernal RMP and site-specific leasing NEPA analyses. The lease terms for the White River

Oil Shale Research, Development, and Demonstration lease commit the BLM to granting a commercial lease covering the additional 4,960 acres of the Preference Right Lease Area, if all terms and conditions of the Research, Development, and Demonstration lease are met. Therefore, under all alternatives, the White River Oil Shale Research, Development, and Demonstration site and Preference Right Lease Area could continue to be developed.

- If the pending federal lease within the Asphalt Ridge Special Tar Sands Area were issued before the signing of the ROD for this LUPA, it, too, would be considered a valid existing right that could be developed under all alternatives. However, if it were not issued before the signing of the ROD for this LUPA, the federal tar sands lease in the Asphalt Ridge Special Tar Sands Area could still be issued subject to the conservation measures in the LUPA.
- Because ROWs are not required for construction of roads and facilities within a lease, these areas would not be impacted by ROW exclusion or avoidance areas proposed under any alternative. Road and facility construction to access existing leases from outside the lease may be impacted by restrictions described under individual alternatives.

Implementing management for the following resources to protect GRSG would have negligible or no impact on oil shale and tar sands and is therefore not discussed in detail: Vegetation Management, Integrated Invasive Species Management, Wild Horses and Burros, Wildland Fire Management, Livestock Grazing/Range Management, Recreation, Comprehensive Travel and Transportation Management, and ACECs.

### **Alternative A**

#### *Special Status Species – GRSG*

Under Alternative A, no disturbance cap would be applied to anthropogenic disturbance in GRSG habitat. Therefore, oil shale and tar sands development could continue to occur subject to stipulations and other restrictions applied in the Vernal RMP (for the White River Oil Shale Preference Right Lease Area) and site-specific NEPA analyses.

#### *Infrastructure Development (including all ROWs and utility corridors)*

Under Alternative A, 97 percent of BLM-administered and National Forest System surface within the decision area would continue to be open to ROW location. If exclusion or avoidance areas are near the White River Oil Shale Preference Right Lease Area or the pending lease in the Asphalt Ridge Special Tar Sands Area, there could be indirect impacts resulting from the limits on the available means for accessing and transporting oil shale and tar sands to processing facilities and markets. Impacts would be mitigated where new ROWs could be collocated within existing ROWs to satisfy valid existing rights.

### **Alternative B**

#### *Special Status Species – GRSG*

Under Alternative B, no disturbance cap would be applied to anthropogenic disturbance in GHMA. Because the existing and pending leases would be in GHMA under this alternative, oil

shale and tar sands development could continue to occur subject to stipulations and other restrictions applied in the Vernal RMP (for the White River Oil Shale Preference Right Lease Area) and site-specific NEPA analyses. Impacts would be the same as those under Alternative A.

*Infrastructure Development (including all ROWs and utility corridors)*

Under Alternative B, approximately 2,320 acres of the White River Oil Shale Preference Right Lease Area and all 2,120 acres of the pending federal lease within the Asphalt Ridge Special Tar Sands Area would be in GHMA. All BLM-administered and National Forest System surface in GHMA would be managed as ROW avoidance under Alternative B. There could be indirect impacts resulting from the limits on access and the available means for transporting oil shale and tar sands to processing facilities and markets. Impacts would be mitigated where new ROWs could be collocated within existing ROWs to satisfy valid existing rights.

**Alternative C**

*Special Status Species – GRSG*

Under Alternative C, disturbance in PHMA would be subject to a 3 percent cap, which would include fire. Approximately 2,320 acres of the White River Oil Shale Preference Right Lease Area and all 2,120 acres of the pending federal lease within the Asphalt Ridge Special Tar Sands Area would be in PHMA. The Uintah Population Area, where the White River Oil Shale Preference Right Lease Area is located, is currently just under the 3 percent disturbance cap. New development could push the area over the cap and reduce opportunities for new surface disturbance in this portion of the Preference Right Lease Area until areas are reclaimed to the point where disturbance is below the threshold.

*Infrastructure Development (including all ROWs and utility corridors)*

Under Alternative C, approximately 2,320 acres of the White River Oil Shale Preference Right Lease Area and all 2,120 acres of the pending federal lease within the Asphalt Ridge Special Tar Sands Area would be in PHMA. All BLM-administered and National Forest System surface in PHMA would be managed as exclusion under Alternative C. The impacts on existing leases would be the same type as those described under Alternative B; however, the magnitude of impacts could be more severe because new ROWs would not be permitted.

**Alternative D**

*Special Status Species – GRSG*

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

*Infrastructure Development (including all ROWs and utility corridors)*

Under this alternative, areas of GHMA within 1 mile of an occupied lek would be managed as ROW avoidance with exceptions for limited development with noise, structure height, and timing restrictions. Approximately 2,320 acres of the White River Oil Shale Preference Right Lease Area and all 2,120 acres of the pending federal lease within the Asphalt Ridge Special Tar

Sands Area would be in GHMA and would be impacted by this management, as described under Alternative B. Impacts would be mitigated where the ROW avoidance requirement was waived in exchange for off-site mitigation activities. However, the expense of these mitigation activities could increase the costs of oil shale and tar sands development.

### **Alternative E**

#### *Special Status Species – GRSG*

Under Alternative E, no disturbance cap would be applied to anthropogenic disturbance in mapped occupied GRSG habitat outside SGMAs/noncore areas. Because the existing and pending leases would be in mapped occupied GRSG habitat outside SGMAs/non-core areas under this alternative, oil shale and tar sands development could continue to occur subject to stipulations and other restrictions applied in the Vernal RMP (for the White River Oil Shale Preference Right Lease Area) and site-specific NEPA analyses. Impacts would be the same as those under Alternative A

#### *Infrastructure Development (including all ROWs and utility corridors)*

Under Alternative E, no management actions from this LUPA would apply to BLM-administered and National Forest System surface outside of mapped GRSG habitat in SGMAs/noncore areas. Approximately 2,320 acres of the White River Oil Shale Preference Right Lease Area and all 2,120 acres of the pending federal lease within the Asphalt Ridge Special Tar Sands Area would be outside mapped GRSG habitat in SGMAs/noncore areas and would be subject to the same management as under Alternative A.

### **Proposed Plans**

#### *Special Status Species – GRSG*

Under the Proposed Plans, no disturbance cap would be applied to anthropogenic disturbance in GHMA. Because the existing and pending leases would be in GHMA under this alternative, oil shale and tar sands development could continue to occur subject to stipulations and other restrictions applied in the Vernal RMP (for the White River Oil Shale Preference Right Lease Area) and site-specific NEPA analyses. Impacts would be the same as those under Alternative A.

However, oil shale and tar sands development in GHMA would be subject to RDFs, lek buffers, and net conservation gain requirements, which could impact oil shale and tar sands development by restricting new surface development. Applying lek buffer distances when approving actions for linear features, infrastructure related to energy development, tall structures (including transmission lines), surface disturbance, and noise could also restrict development of infrastructure related to oil shale and tar sands development.

#### *Infrastructure Development (including all ROWs and utility corridors)*

Under the Proposed Plans, GHMA would be available for the types of ROW location that would impact oil shale and tar sands development. However, ROW development in GHMA would be subject to lek buffers and net conservation gain requirements, which could impact oil shale and tar sands development as discussed under *Special Status Species – GRSG*. The expense of these mitigation activities would increase the costs of oil shale and tar sands development. Approximately 2,320 acres of the White River Oil Shale Preference Right Lease Area and all

2,120 acres of the pending federal lease within the Asphalt Ridge Special Tar Sands Area would be in GHMA and would be impacted by this management.

## 4.22 SPECIAL DESIGNATIONS

### 4.22.1 Areas of Critical Environmental Concern and Zoological Areas

#### *Methods and Assumptions*

Direct impacts on ACECs and zoological areas are considered to be those that either impair or enhance the values for which the ACEC or zoological area was proposed for designation. As such, this analysis focuses on relevance and importance criteria for each potential ACEC and zoological area and impacts on these values from either the special management derived from designation as an ACEC or zoological area or, under alternatives where an ACEC or zoological area is not proposed for designation, the management actions for other resources. All impacts discussed are direct impacts, though some may not occur immediately after implementation of management actions.

#### *Indicators*

Impacts on ACECs and zoological areas would occur from management actions that protect or impair relevant and important values, including “important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes” (BLM Manual 1613, Areas of Critical Environmental Concern). As such, indicators of impacts are allocations for surface-disturbing activities within existing or potential ACECs and zoological areas that could affect the relevant and important values for which the area was designated.

#### *Assumptions*

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- Management for existing ACECs was determined in the applicable RMPs to be adequate to support the relevant and important values at the time of their designation. Impacts on these ACECs are not further discussed because the BLM would continue to manage these ACECs to protect their relevant and important values. Management to protect GRSG under the various alternatives could provide additional protections for existing ACECs and, at a minimum, would provide complementary management.
- Although management actions for most resources and resource uses have decision area-wide application, ACEC and zoological area management prescriptions apply only to those lands within each specific ACEC or zoological area.
- Permitted activities would not be allowed to impair the relevant and important values for which the ACECs and zoological areas are designated. The exception is locatable minerals; until withdrawn from mineral entry, a mining claim can be filed, and subsequent mining could have an impact.
- ACEC and zoological area designation provides protection and focused management of relevant values beyond that provided through general management of the relevant and important value(s) elsewhere in the decision area.

- Any designated ACEC that falls within a WSA would be managed according to BLM Manual 6330, Management of Wilderness Study Areas, unless the ACEC management is more restrictive. Because activities within WSAs must meet the nonimpairment criterion, which generally restricts new surface disturbance, it is assumed that a WSA would generally protect relevant and important values and would have a beneficial effect on overlapping designated and undesignated ACECs. If Congress were to release a WSA from further consideration, the special management in designated ACECs would be designed to protect and enhance the relevant and important values.

### **Alternatives Analysis**

Sagebrush habitat is the only relevant and important value identified for the 15 potential BLM ACECs and Forest Service zoological areas proposed for designation under Alternative C. Refer to **Section 4.3** and **Section 4.8**, for detailed analyses of sagebrush management in the decision area, including the areas encompassing these 15 proposed ACECs and Zoological Areas. Different management would apply to the different areas, as described in **Chapter 2**, impacts of which are discussed in **Section 4.3** and **Section 4.8**.

The remaining impact analysis in this section is specific to the seven currently designated ACECs on BLM-administered land that overlap mapped occupied habitat. Impacts on the relevant and important values, shown in **Table 3.108**, would mainly be from surface-disturbing activities that cause direct damage to the values, introduce modifications to the landscape that affect the area's scenic quality or historical or cultural context, or that result in erosion, sedimentation, or increased runoff.

Under Alternative A, the BLM would continue to manage the seven designated ACECs within mapped occupied habitat to protect the identified relevant and important values (**Table 3.108**). GRSG is not an identified relevant and important value in any of the seven designated ACECs.

Under the action alternatives, there would be varying levels of restrictions on surface-disturbing activities in PHMA/mapped GRSG habitat in SGMAs/core areas, as well as GHMA under Alternatives B and D and the Proposed Plans<sup>1</sup>, to protect GRSG. These restrictions would apply to the seven existing ACECs within GRSG habitat and would range from precluding nearly all new surface-disturbing activities under Alternatives B and C to allowing surface-disturbing activities with stipulations, RDFs, or BMPs under Alternatives D and E and the Proposed Plans. Where current management is more restrictive than what is proposed in the action alternatives, current management would continue to apply. As a result, each action alternative and the Proposed Plans would be at least as restrictive as current management. Adopting more-restrictive management of surface-disturbing activities under the action alternatives would be complementary to the protection of the relevant and important values of the existing ACECs. Therefore, in general, the action alternatives and the Proposed Plans could enhance the relevant and important values of the existing ACECs to a greater extent than Alternative A. In all cases, the relevant and important values would be protected from irreparable damage.

<sup>1</sup> Under Alternative C, all occupied GRSG habitat would be designated as PHMA; there are no GHMA under Alternative C.

Refer to **Table 2.3** for acres of PHMA/mapped GRS habitat in SGMAs/core areas and GHMA/mapped GRS habitat outside SGMAs/noncore areas, as well as acres of various restrictions on surface-disturbing activities, by alternative and for the Proposed Plans. Where existing ACECs overlap these restrictions, managing for GRS would be complementary to managing for the relevant and important values in the existing ACECs and they would continue to be protected.

#### 4.22.2 Wilderness Study Areas

##### *Methods and Assumptions*

###### *Indicators*

Indicators of impacts on WSAs are impacts on their wilderness characteristics of natural appearance, outstanding opportunities for solitude or primitive and unconfined recreation, and unique or supplemental values.

###### *Assumptions*

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

- The WSAs in the planning area would continue to be managed according to BLM Manual 6330, Management of Wilderness Study Areas, until Congress either designates or releases all or portions of the WSAs from further consideration. Managing the WSAs according to BLM Manual 6330, Management of Wilderness Study Areas, will protect their wilderness characteristics in a manner that will not “impair the suitability of WSAs for preservation as wilderness” (FLPMA Section 603[c]). This is known as the “nonimpairment standard.”
- Actions that would “impair the suitability of WSAs for preservation as wilderness” would not be permitted unless they were to meet one of the following exception criteria described in BLM Manual 6330, Management of Wilderness Study Areas:
  - Emergencies such as suppression activities associated with wildfire or search and rescue operations
  - Restoration of impacts from violations and emergencies Uses and facilities that are considered grandfathered or valid existing rights
  - Uses and facilities that clearly protect or enhance the land’s wilderness values or that are the minimum necessary for public health and safety in the use and enjoyment of the wilderness values
- Management of WSAs is subject to valid existing rights and grandfathered uses under all alternatives, consistent with BLM Manual 6330, Management of Wilderness Study Areas.
- As a grandfathered use, grazing in WSAs is determined by the active AUMs permitted at the time of designation for any allotment that is wholly or partly within the WSAs. Maintenance of existing facilities and construction of new facilities necessary to manage and use permitted AUMs would be conducted in accordance with the nonimpairment standard. As a grandfathered use, livestock grazing managed

in accordance with BLM regulations does not impact wilderness characteristics. However, new grazing management is not a grandfathered use and in all cases may only be established if it meets the nonimpairment standard or one of the exceptions.

### ***Alternatives Analysis***

Due to the requirement that any activity in WSAs meet the nonimpairment standard described in BLM Manual 6330, Management of Wilderness Study Areas, implementing management proposed in the various alternatives and the BLM Proposed Plan would not impair wilderness characteristics. Management to protect GRSG could enhance naturalness, or, at a minimum, be complementary to management in WSAs. This would not vary greatly between the alternatives and the Proposed Plan.

#### **4.22.3 Other Special Designations**

Existing management under the proclamation and monument management plan for the Grand Staircase-Escalante National Monument is more restrictive than management actions being considered under this LUPA/EIS for that area. As discussed in **Chapter 2**, where management that is more restrictive is already in place, no changes would be made under action alternatives or the BLM Proposed Plan. As such, there would be no impact on scientific and historic monument objects.

Existing management of the Flaming Gorge National Recreation Area is also generally more restrictive than management actions being considered under this LUPA/EIS for that area. For the reasons outlined in the preceding paragraph there would be no impact on recreational uses.

### ***National Historic Trails***

#### *Methods and Assumptions*

##### Indicators

Impacts on national historic trails would occur if substantial interference to the values for which the components of the System were designated occurs. For all agency undertakings that could impact national historic trails, the BLM complies with Section 106 of the National Historic Preservation Act before the undertaking. Section 106 compliance typically includes inventory, evaluation, and consultation with the Utah State Historic Preservation Office.

##### Assumptions

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumption:

- National Historic Trails would be managed according to policy provided in BLM Manual 6250, National Scenic and Historic Trail Administration, BLM Manual 6280, Management of National Scenic and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation, and Forest Service Manual 2300, Chapter 2350, Part 2353, National Forest System Trails.

*Alternatives Analysis*

Direct impacts on national historic trails typically result from actions that impact the resources, qualities, values, and associated settings of the public land areas through which such National Trails may pass, and the primary trail use or uses, introduce visual elements out of character with the property or that alter its setting, or result in neglect of the resource to the extent that it is impaired or destroyed. For example, surface-disturbing activities that destroy or alter trail ruts for historic trails are considered a direct impact. Direct impacts also include proactive trail management, such as the preservation of buffer zones.

Management of the lands next to national historic trails could impact trail features and the visitor experience. Habitat improvement projects could indirectly provide some enhancement or preservation of national historic trails qualities. The type of impacts would be the same under all alternatives but would vary depending upon the degree of treatments.

Impacts on national trails from livestock grazing include trampling and manure impacts. The intensity of the impact would vary with the visitor's experience of recreating in areas where livestock graze. In addition, development of livestock grazing facilities impacts the naturalness attribute of the physical setting. Stock ponds and catchments contrast with the natural landscape.

Future comprehensive travel and transportation management implementation decisions for the national historic trails could directly impact trail usage. Travel restrictions would impact the types of experiences available along these trails. Impacts under all alternatives would be similar. Travel management can also impact the trail resources, qualities, values, and associated settings. Specifically, open travel under Alternative A on or near a trail could degrade the trail settings, as well as trail-related historic sites. Under the action alternatives and the Proposed Plans, limiting travel to existing or designated routes would eliminate those impacts.

Generally, development of pipelines and electricity transmission and distribution facilities next to trails could directly impact the trail during construction. Indirect impacts from development in the trail corridor could include changes to scenic resources over the long term due to the presence of transmission lines and other facilities.

Under all alternatives and the Proposed Plans, the BLM and Forest Service would continue to manage the California, Old Spanish, and Pony Express National Historic Trails in accordance with direction in approved LUPs; BLM Manual 6250, National Scenic and Historic Trail Administration; BLM Manual 6280, Management of National Scenic and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation; and the existing comprehensive plan for the California and Pony Express National Historic Trails (National Park Service 1999). A comprehensive plan for the Old Spanish National Historic Trail is being developed jointly by the BLM and National Park Service. New policy addressing the management of National Historic Trails was issued by the BLM in 2012. As RMPs are updated, the BLM will ensure requirements provided in BLM Manual 6280 are incorporated. In the interim, this policy will be adhered to during any site-specific project NEPA analyses that are conducted in the planning area. Parts of national trails on National Forest System lands would continue to be managed in accordance with Forest Service Manual 2300, Chapter 2350, Part 2353, National Forest System Trails.

Under the action alternatives, there would be restrictions of surface-disturbing activities in PHMA/mapped GRSG habitat in SGMAs/core areas, as well as GHMA under Alternatives B and D, to protect GRSG. Restrictions on surface-disturbing activities under the Proposed Plans would apply primarily in PHMA and, to a lesser extent, in GHMA. Restrictions range from precluding nearly all new surface-disturbing activities under Alternatives B and C to allowing surface-disturbing activities with stipulations, RDFs, or BMPs under Alternatives D and E and the Proposed Plans. Because management proposed under the action alternatives and the Proposed Plans would not apply in instances where current management is more restrictive, managing for GRSG under the action alternatives would, at a minimum, provide similar management to Alternative A. Under alternatives where more-stringent restrictions on surface-disturbing activities would apply than under Alternative A, implementing such restrictions would be complimentary to the protection of national historic trails.

Refer to **Table 2.3** for acres of PHMA/mapped GRSG habitat in SGMAs/core areas and GHMA/GRSG habitat outside SGMAs/noncore areas, as well as acres of various restrictions on surface-disturbing activities, by alternative and for the Proposed Plans. Where national historic trails overlap these restrictions, the trails' values would be protected.

## **4.23 SOCIAL AND ECONOMIC IMPACTS (INCLUDING ENVIRONMENTAL JUSTICE)**

### **4.23.1 General Description**

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 the Social and Economic Conditions (Including Environmental Justice) section of **Chapter 3**. This section also addresses environmental justice impacts and the differences between alternatives for the social and economic impacts identified.

### **4.23.2 Methodology and Assumptions**

For the analysis of economic impacts, quantitative estimates are provided where sufficient data or estimates are available on the potential changes in authorized uses of federal lands under each alternative. When quantitative estimates of economic impacts were not possible, a qualitative discussion of the potential economic impacts associated with management actions associated with specific authorized uses is presented. Therefore, the overall economic impacts are a combination of quantitative estimates and qualitative discussion. For quantitative estimates, IMPLAN was used to estimate impacts on output, employment, and earnings in the primary 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 inter-related sectors. This allows for a more complete picture of the economic impacts of the management alternatives. However, the IMPLAN model is a static model, and it does not capture changes in the industrial composition of a region over time, nor does it capture dynamic effects that may be associated with processes of growth or decline, such as changes in technology or labor productivity or the feasibility of economic operations that require scale. There is, therefore, a degree of uncertainty in the estimates of impacts obtained through the IMPLAN model. Data used for adjusting IMPLAN parameters in the study area were based on the best available data at the time of the study. Recent growth trends in employment and output

in certain sectors in the study area are unlikely to meaningfully affect these estimates because the study area parameters used by IMPLAN (e.g., productivity, trade data) are likely to not change as quickly as trends in absolute employment and output.

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).

To the extent that there is a degree of uncertainty regarding the changes in authorized uses of Federal lands under each management alternative, this uncertainty is carried forward to the socioeconomic impacts of management alternatives.

Alternatives B and C and the Proposed Plans include a 3 percent disturbance cap (5 percent on National Forest System lands in Wyoming) in PHMA, independent of surface ownership. The Proposed Plans also include an adaptive management strategy. If the disturbance cap is reached, economic activity on BLM and National Forest System lands could be curtailed further than what is described in this section. Under the adaptive management strategy, additional measures could be taken to protect GRSG habitat based on triggers linked to indicators monitored by BLM and the Forest Service. If triggered, these additional measures could also impose additional restrictions on economic activity. However, because the disturbance cap and adaptive management soft and hard triggers only apply to PHMA, they would not generate additional socioeconomic impacts through economic activities that are already limited in PHMA under various management alternatives.

The following are summaries of the types of social and economic impacts from management actions related to the protection of GRSG within the study area:

- Direct economic activity dependent on BLM-administered and National Forest System land and resource management
- Overall employment, earnings, output, and earnings per job associated with economic activities impacted by management alternatives
- Tax revenues and payments to states and counties
- Other (nonmarket) values, including GRSG conservation benefits
- Population
- Housing and public services
- Consistency with county LUPs
- Interest groups and communities of place
- Environmental Justice

This section is organized differently from other impact sections. Rather than grouping the analysis of impacts by alternative, the analysis of economic impacts is grouped by affected

resource followed by an overall discussion of aggregate social and economic impacts and benefits. This grouping assists with the reader's understanding of the analytical approach and assumptions used to analyze economic and social impacts associated with each resource use and facilitates interpretation of the results. Impacts are grouped by alternative in **Section 4.23.5**, Summary of Economic and Social Impacts, and in **Table 4.63**. Varying types and levels of adaptive management, habitat objectives, disturbance caps, and habitat designations under each alternative help determine the relative effectiveness of implementing measures and achieving GRSG habitat conservation under each alternative. A qualitative discussion of effectiveness and efficiency is included **Section 4.23.5**.

### **Assumptions**

In addition to the assumptions in **Section 4.2.1**, the following list presents a few basic assumptions related to social and economic impact assessment for Alternatives A through E and the Proposed Plans. Additional details of assumptions made in developing the quantitative estimates of economic impacts of management alternatives through grazing, oil and gas, coal and wind energy, are included in **Appendix W**, Economic Impact Analysis Methodology.

- The analysis of economic impacts of management alternatives on grazing assumes active AUMs represent an upper bound to impacts, while billed AUMs represent an estimate of actual annual use based on recent billing trends. 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 the BLM and Forest Service bill for annually. Forest Service uses the term "authorized" AUMs for the same concept.
- The analysis of quantitative impacts 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. To the degree that a shift to private or state lands would occur, the impact estimates would be lower for restrictions on drilling and production on federal lands.
- The analysis of quantitative impacts of management alternatives affecting coal production assumes no new subsurface leasing would occur in PHMA/mapped GRSG habitat in SGMAs/core areas under Alternatives E1 and E2 management alternatives, even though the alternatives do not necessarily preclude leasing of subsurface minerals

Implementing management actions for the following resources or activities would have negligible social or economic impacts on the targeted economic sectors and are therefore not discussed in detail: ACECs, wild horses, Emergency Stabilization and Rehabilitation, and habitat restoration.

As a landscape level planning effort, none of the alternatives prescribe project-level or site-specific activities on BLM-administered or National Forest System lands. Furthermore, the agencies' selection of an alternative does not authorize funding to any specific project or activity nor does it directly tie into the agencies' budgets as appropriated annually through the Federal budget process. Consequently, agencies' costs and differences in program costs across

alternatives have not been quantified. Information has been presented in several resource impact sections on the types of costs that might be associated with various GRSG conservation measures.

### 4.23.3 Economic Impacts

#### ***Impacts from Management Actions Affecting Grazing Allotments***

Economic impacts for grazing are quantified for Alternatives C1 and C2 where grazing would not be available in all or portions of GRSG habitat. Impacts for all alternatives are qualitatively discussed for other types of restrictions or RDFs that are contingent upon proximity to lek areas and/or meeting desired range conditions.

#### *Overall Employment, Earnings, and Output per Job Impacted by Management Alternatives*

The potential impacts of grazing closures on overall grazing employment, earnings, and output were estimated quantitatively. Under Alternatives B, D, and E, and the Proposed Plans, GRSG habitat would remain available for livestock grazing; impacts would be similar to Alternative A. Additionally, under the Proposed Plans, livestock grazing may need to be adjusted in order to meet Land Health Standards and to conserve, enhance, or restore GRSG habitat based on specific GRSG habitat objectives. This could result in local economic impacts that cannot be quantified at this time. Alternative C offers two options for management of grazing: C1 and C2. Under Alternative C1, grazing would not be allowed in GRSG habitat on federal lands. Under Alternative C2, 40 percent of the GRSG habitat on federal lands would no longer be available for grazing.

The economic impact of Alternatives C1 and C2 reflect the removal of all or some of the GRSG occupied habitat from availability for grazing. State and private lands used for grazing and surrounded by federal lands could also be affected by Alternatives C1 and C2, although the effect may differ from one property to another. In some cases, state and private land surrounded by federal lands with GRSG habitat may no longer be used for grazing as well, if livestock operators in those lands depend on the surrounding federal lands for the viability of their operations. In others, the presence of state and private lands may reduce impacts of C1 and C2 on grazing, if livestock grazing is shifted from federal to state or private lands.

Estimates for 1 year were obtained using the IMPLAN model. Billed AUMs better reflect the economic impact than active AUMs in any given year. However, billed AUMs fluctuate from one year to another and are partially dependent on operator decisions. BLM and Forest Service management directly affects active AUMs. Estimates are presented below for the impact of alternatives based on data for billed AUMs, but the range of potential impacts is discussed.

Further details are provided in **Appendix W. Table 4.49** presents the estimates for impacts by alternative, relative to Alternative A. Employment estimates do not include family labor and may, therefore, underestimate labor use differences among alternatives.

Under Alternatives B, D, and E, and the Proposed Plans, the average annual earning per job supported by livestock farming on federal lands would be estimated to be approximately \$32 thousand (**Appendix W**). A qualitative discussion of other potential impacts under Alternatives B, D, and E, and the Proposed Plans is provided below.

**Table 4.49**  
**One Year Impact of Management Actions Affecting Grazing on Output, Employment, and Earnings by Alternative, Relative to Alternative A (2011 \$)**

	<b>Alternatives B, D, and E, and Proposed Plans<sup>1</sup></b>	<b>Alternative C1</b>	<b>Alternative C2</b>
<b>Primary Study Area</b>			
Output (2011 \$)	\$0	-\$52,815,545	-\$21,126,218
Employment	0	-608	-243
Earnings (2011 \$)	\$0	-\$17,638,438	-\$7,055,375
<b>Primary and Secondary Study Area</b>			
Output (2011 \$)	\$0	-\$56,895,219	-\$22,758,087
Employment	0	-634	-254
Earnings (2011 \$)	\$0	-\$18,632,089	-\$7,452,836

Source: Calculated using the IMPLAN model as explained in the text and in **Appendix W**.

<sup>1</sup>Alternatives B, D, and E, and the Proposed Plans do not identify areas as unavailable for grazing

Under Alternative C1, GRSG occupied habitat on federal lands would no longer be available for grazing. This alternative would remove approximately 329,671 active AUMs from BLM field offices and approximately 264,229 active AUMs from National Forests in the primary study area (**Appendix W**). Assuming this removal of active AUMs would result in the loss of all billed AUMs in the allotments made unavailable for grazing; 391,687 billed cattle AUMs would be lost and 100,829 billed sheep AUMs would be lost. The resulting impact is estimated in a loss of approximately \$53 million per year in output, 608 jobs, and approximately \$18 million in labor earnings. These impacts are derived by multiplying the AUMs by alternative (shown in **Table W.1** of **Appendix W**) by the impacts per AUM shown in **Tables W.2** and **W.3**.

Under Alternative C2, approximately 40 percent of the GRSG occupied habitat on federal lands would no longer be available for grazing. **Table 4.49** illustrated these lesser reductions in AUMs when compared with Alternative C1. The resulting impact is estimated in a loss of approximately \$21 million per year in output, 243 jobs, and approximately \$7 million in labor earnings.

Under both Alternatives C1 and C2, the impact could be larger if livestock operations have no reasonable alternative to seasonal grazing on public lands. Livestock grazing on federal lands is often done during the spring and summer seasons, with other feeding alternatives (hay) being used during fall and winter. If there are no other options for grazing federal lands during spring and summer, operators may need to reduce their operations and the resulting loss of output, jobs and earnings would be larger than currently estimated. Torell et al. (2014) provides estimates of the potential impacts on model ranches in Idaho, Nevada, Oregon, and Wyoming of seasonal closures of federal lands for livestock grazing. The estimates are based on an economic model that assumes operators respond to the loss of availability of federal lands for grazing in several ways to maximize their profits (gross margins), including reducing the size of their operations. In this case, the socioeconomic impact of closures of federal lands to grazing are larger than the estimates based only on the loss of spring and summer AUMs. Although an estimate is not available for a typical farm in Utah, estimates for other states suggest the loss of AUMs may be just slightly larger than currently estimated in cases where only a small share of

federal lands are unavailable for livestock grazing, or may be several times larger in cases where livestock farms find it in their best interest to close operations. This may be more likely the case for smaller operations.

Under Alternative C2, the impact may also be lower. Billed AUMs can vary greatly as a share of active AUMs from one management area to another and from one year to another. Given the difference between active and billed AUMs, livestock operators may be able to absorb some of the loss in active AUMs by billing a greater proportion of the active AUMs remaining under Alternative C2 (i.e., the percent difference between current billed versus active AUMs can be credited toward meeting the 40 percent reduction). This is less likely the case on National Forests than on BLM-administered lands, since allotments on National Forests tend to have billed AUMs closer to active AUMs. The difference between a) current billed AUMs under Alternative A and b) billed AUMs under Alternative C2 when the operator sets billed AUMs to equal Active AUMs, would likely constitute a lower bound to impacts under Alternative C2. This response from livestock operators would not be possible under Alternative C1, because all allotments with GRSG habitat would be closed to livestock grazing.

Under the Proposed Plans, the BLM would use the assessment and monitoring data related to habitat objectives to evaluate whether rangeland health standards, are being met. The Forest Service would use Seasonal Habitat Desired Conditions for GRSG and Grazing Guidelines for GRSG seasonal habitat. If rangeland health standards are not being met, adjustments to livestock grazing would be implemented at the allotment level, and may include a variety of management approaches, such as changing rotation systems, season or timing or use, distribution of livestock use, intensity of use, type of livestock, class of livestock (e.g., yearlings vs cow-calf pairs), duration of grazing use and rest period or stocking rates. It is unknown to what extent permittees may need to change livestock management, and what economic costs those changes might entail. In general, there may be some increased costs to implement management when it is identified that livestock management is conflicting with meeting GRSG habitat objectives. Because the BLM takes a collaborative, site-specific approach to modifying livestock grazing, permittees are afforded the opportunity to work with the BLM to develop management approaches that minimize impacts on their operations, while addressing identified habitat issues. Some permittees may prefer to reduce grazing overall, while others may prefer to increase management inputs (e.g., herding or maintaining let-down fences) to prevent a reduction in their authorized use, when provided with more than one viable alternative towards meeting rangeland health standards and GRSG habitat objectives. The Proposed Plans allows for design and implementation of allotment-specific management that would meet GRSG habitat objectives appropriate for each area, while providing the flexibility to minimize economic impacts on operators, rather than implementing a blanket reduction in grazing, which may provide benefits in some areas, while unnecessarily inflicting economic impacts in areas where ongoing management is resulting in satisfactory on-the-ground habitat conditions for GRSG.

As with the Proposed Plans, the other alternatives could impose costs on livestock operators beyond the closures of federal land to grazing. In particular, management alternatives could impose the following costs:

- For Alternatives B, D, and E, and the Proposed Plans, in habitat or active lek areas during certain seasons (e.g., nesting or breeding seasons) where desired conditions for GRSG are not being met, seasonal modifications to grazing management strategies may be needed (e.g., changes in pasture rotation or fencing), implying potential for increased costs and/or reductions in AUMs for some allotments; potential for impacts is greater for Alternatives B and D and the Proposed Plans, relative to Alternative E. As an example, changes in the areas available for pasture, fencing, or interruptions of cattle paths could increase distances for cattle movement, need for alternative water sources, and associated costs. Additional Forest Service guidelines for habitat (e.g., 7-inch stubble height for nesting habitat) may increase potential for impacts for some permittees, depending on specific conditions on allotments.
- For Alternatives B, D, and E, and the Proposed Plans, location of water developments and design of structural range improvements must have a neutral or beneficial effect on GRSG, while fences may need to be removed, modified, or marked based on proximity to lek areas, implying potential for increased costs; this potential is relatively greater for Alternatives B and D and the Proposed Plans, compared to Alternative E.

These impacts could occur under Alternatives B, D, and E, and the Proposed Plans, even though the areas available for livestock grazing would be the same as those under Alternative A. Conditional reductions in forage allocated to livestock (AUMs) may occur in combination with, or as an alternative to implementing grazing management modifications or design features.

In summary, unconditional reductions in AUMs and potential increases in costs are greatest under Alternative C1, followed by Alternative C2. Reductions in AUMs under Alternatives B, D, and E, and the Proposed Plans are conditional on rangeland meeting seasonal desired conditions. Consequently, the likelihood of AUM reductions and potential for increased costs under Alternatives B, D, and E, and the Proposed Plans are substantially lower than Alternatives C1 and C2. The relative potential for increased costs from implementing conservation measures and design features could be slightly higher for the Proposed Plans, followed by Alternatives B and D, followed by Alternative E.

**Map 3.16-1** shows the location of BLM and Forest Service grazing allotments where GRGS habitat exists. Almost all counties would be impacted by the loss of grazing allotments with GRSG habitat under Alternatives C1 and C2. The areas least affected would be the northern area of Cache, Morgan, Summit and Wasatch counties (although Tooele, Box Elder, and Rich would be affected), and the center east area of Emery, Grand, and Wayne counties.

**Table 3.125** shows that farm earnings in 2010 constituted over 2 percent of total earnings in Beaver, Box Elder, Iron, Juab, Piute, Rich, Sanpete, and Wayne counties. The same table shows that in all of these counties, livestock operations are an important share of farm cash receipts. In

some cases, a considerable share of farm earnings and farm cash receipts from livestock may reflect hog and pig operations rather than grazing livestock (e.g., Beaver and Iron counties). The intersection of these counties with the set of counties where there are grazing allotments with GRSG habitat indicates counties where economic impacts of management alternatives through livestock grazing may be of particular importance. These counties are Box Elder, Juab, Piute, Rich and Sanpete and possibly Beaver and Iron counties<sup>2</sup> (see **Table 1.2** and **Map 1.1**).

#### *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 provide some value to the nonusing public (e.g., the cultural icon of the American cowboy). Some of the lifestyle value of ranching is likely to be captured in markets (e.g., property values of ranches adjacent to public lands). Other residents and visitors may perceive nonmarket opportunity costs associated with livestock grazing. The “Other Values” section in the Social and Economic Conditions (Including Environmental Justice) section of **Chapter 3** and **Appendix U**, Non-Market Valuation Methods, 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 difficult as it implies the need to consider nonmarket values and uses associated with landscapes characteristics and opportunities that would exist in absence of grazing and ranch activity (i.e., nonmarket values and benefits from alternative landscapes may help offset potential losses in nonmarket values linked to grazing and ranching). The BLM and Forest Service do 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 similar in Alternatives A, B, D, and E, and the Proposed Plans as all of these alternatives are likely to result in similar levels of livestock grazing operations in the study area (although differences among these alternatives do exist and are discussed above). If the net nonmarket value associated with livestock grazing and ranching is positive, then that value would be lower under Alternatives C1 and C2, in line with the market impacts discussed immediately above.

Under Alternatives A, B, D, and E, and the Proposed Plans, the economic viability of livestock grazing and ranching activities would continue on current trends, with some differences among these alternatives, as previously discussed. To the degree that there is a positive net nonmarket value associated with livestock grazing and ranching, and to the extent that economic viability is critical for keeping the lands in ranching, those values would be more likely to be preserved.

Under Alternative C1, the removal of AUMs on occupied habitat within federal lands would result in a substantial reduction in forage availability on federal lands, which may adversely affect ranching activity. This could, in turn, result in impacts on any nonmarket values associated with

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<sup>2</sup> A large hog and pig operation, Circle Four Farms, is located in Beaver and Iron counties. The 2012 agricultural census does not contain information on hog and pig inventory or sales in these two counties to avoid disclosure of data for individual farms.

keeping lands in ranching. These impacts, if any, would be greater in Alternative C1 than C2, in accordance with the greater reduction in AUMs in Alternative C1. Nonmarket benefits linked to alternative landscapes and land uses may help offset potential losses in nonmarket benefits associated with grazing.

### **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 models for (1) the primary social/economic study area and (2) a smaller three-county area, representing a majority of oil and gas activity. Both wells drilled on new and existing leases on GRSG habitat projected for a future 15-year horizon were considered. Existing wells would not be impacted by GRSG habitat management alternatives. Projections were based on current RFD scenarios (see **Appendix W** for more details).

Results for the primary and secondary social and economic study areas are presented in **Table 4.50** and **Table 4.51**. These results were derived by multiplying the numbers of wells drilled and completed and production by alternative (shown in **Tables W.4** and **W.5** of **Appendix W**) by impacts per well and per unit of production (shown in **Tables W.6** through **W.11**) It was assumed that new leases on state and private lands intersecting GRSG habitat would be affected similarly to federal lands, if large areas of contiguous decision area lands are closed to new oil and gas leasing. The difference between the impacts on all lands and those on federal lands is a measure of the impacts on state and private lands and includes state trust lands that could be impacted by the lack of lessee access to blocks of sufficient size for oil and gas development. Adverse impacts on oil and gas development on state lands would also affect state collections associated with royalties and severance taxes.

As noted in **Appendix W**, because IMPLAN incorporates regional trade data, it is able to separate the economic impact received by a specific region from the impact that is felt beyond the selected geographic area. In the case of oil and gas, for example, most of the production revenue does not accrue to residents of the study area and are, therefore, not included in the earnings estimates.

Under Alternative A, current management of sensitive habitats, including that of the GRSG, would continue. Compared with the action alternatives and the Proposed Plans, current management would result in the highest level of oil and gas related output, employment, and earnings. The average annual earnings per job supported by the oil and gas sector would be estimated to be approximately \$52 thousand (**Appendix W**).

Alternative B designates some mapped GRSG occupied habitat as PHMA and would no longer permit drilling and oil and gas production in PHMA. This alternative would likely affect some counties more than others. Of the counties where most of the drilling is forecast to occur in the next 15 years, Carbon and Duchesne counties would likely see a considerable reduction in wells drilled under new leases, but the reduction would be less pronounced in Uintah County. In total, Alternative B would be estimated to result in \$83 million less output per year, 271 fewer

**Table 4.50**  
**Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings by Alternative, Relative to Alternative A – Federal Fluid Minerals**

	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Proposed Plans</b>
<b>Primary Study Area</b>					
Output (2011 \$)	-\$68,561,048	-\$187,598,612	-\$29,345,540	\$0	-\$30,774,675
Employment <sup>1</sup>	-202	-508	-6	0	-14
Earnings (2011 \$)	-\$10,318,378	-\$26,005,854	-\$382,870	\$0	-\$811,820
<b>Primary and Secondary Study Area</b>					
Output (2011 \$)	-\$74,247,139	-\$202,481,630	-\$30,550,971	\$0	-\$32,163,745
Employment <sup>1</sup>	-236	-598	-13	0	-23
Earnings (2011 \$)	-\$12,080,275	-\$30,625,859	-\$773,948	\$0	-\$1,258,876

Source: Calculated using the IMPLAN model as explained in the text and in **Appendix W**.

<sup>1</sup>Employment counted as a part-time or full-time position during a 1-year period.

**Table 4.51**  
**Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings by Alternative, Relative to Alternative A - Federal, State, and Private Fluid Minerals**

	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Proposed Plans</b>
<b>Primary Study Area</b>					
Output (2011 \$)	-\$82,584,253	-\$218,801,958	-\$33,598,577	\$0	-\$31,756,853
Employment <sup>1</sup>	-271	-653	-25	0	-14
Earnings (2011 \$)	-\$13,847,839	-\$33,383,657	-\$1,399,957	\$0	-\$872,208
<b>Primary and Secondary Study Area</b>					
Output (2011 \$)	-\$89,863,721	-\$237,087,316	-\$35,270,113	\$0	-\$33,196,455
Employment <sup>1</sup>	-315	-764	-36	0	-23
Earnings (2011 \$)	-\$16,098,094	-\$39,047,236	-\$1,934,484	\$0	-\$1,337,297

Source: Calculated using the IMPLAN model as explained in the text and in **Appendix W**.

<sup>1</sup>Employment counted as a part-time or full-time position during a 1-year period.

jobs, and almost \$14 million less in annual earnings, when compared with Alternative A, in the primary study area (**Table 4.51**).

Management under Alternative C would have the most economic impacts through restriction on oil and gas drilling and production. Under Alternative C, all mapped occupied habitat on federal lands would be designated PHMA and would be unavailable for new oil and gas exploration. Additional output and employment generated by new production on state and private lands in GRSG habitat could also be affected. Alternative C would be expected to result in approximately \$219 million less output per year, 653 less jobs and \$33 million less in annual earnings, when compared with Alternative A (**Table 4.51**). Counties most affected would again be Carbon and Duchesne counties. As shown in **Table 3.127**, these are counties where an estimated 14 percent and 16 percent of total employment are in the mining sector.

As in the case of Alternative B, Alternative D would designate some mapped occupied habitat as PHMA. However, PHMA would not necessarily be made unavailable for drilling and oil and gas production, but rather an NSO stipulation would not allow development within 4 miles of an occupied lek (with waivers, exceptions, and modifications). In addition, CSU and/or TL stipulations would apply to all areas within occupied habitat that are outside a lek buffer. Alternative D would be expected to be considerably less restrictive than Alternative B. Alternative D would be estimated to result in approximately \$34 million less output per year, 25 less jobs and \$1.4 million less in annual earnings, when compared with Alternative A (**Table 4.51**).

Alternative E1 is based on the State of Utah's *Conservation Plan for Greater Sage-grouse in Utah*. This plan imposes minor constraints to use of GRSG habitat and BLM and Forest Service do not anticipate that this alternative would result in changes in oil and gas development, when compared with Alternative A.

The Proposed Plans would apply NSO stipulations to all new fluid minerals leases in PHMA. Subject to valid existing rights, future development on existing leases may be subject to additional RDFs in PHMA. Oil and gas development in GHMA would be subject to net conservation gain requirements, RDFs and buffers around leks. The Proposed Plans would be expected to have impacts similar to those of Alternative D and would be estimated to result in approximately \$32 million less output per year, 14 fewer jobs and \$0.9 million less in annual earnings, when compared with Alternative A (**Table 4.51**).

Public comments to the Draft LUPA/EIS expressed concern with potential impacts on communities within the planning area. Under all alternatives, impacts of oil and gas development are expected to be felt considerably on the counties of Duchesne, Carbon, and Uintah. These three counties have 96 percent of the new wells projected for the Utah study area and 92 percent of those expected to be affected by management alternatives. In addition, Vernal is a city with service providers to the oil and gas industry and is located in Uintah County. The BLM and Forest Service estimated the impacts on these three counties assuming all direct impacts would fall within their borders, and using IMPLAN modelling and resulting multipliers specific to this three-county area (see **Appendix W** for details). The results are shown in **Table 4.52**, Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings by Alternative, Relative to Alternative A – Three County Area.

**Table 4.52** shows that employment losses in the three counties would correspond to up to 1.5 percent of the employment in those three counties in 2010 under Alternative C (614 divided by 42,013, per **Table T.1** in **Appendix T**, Detailed Employment and Earnings Data). Employment losses under Alternatives B and D, relative to Alternative A, would correspond to less than 1 percent of the 2010 employment levels in those three counties.

**Table 4.52**  
**Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings by Alternative, Relative to Alternative A – Three County Area**

	Alternative B	Alternative C	Alternative D	Alternative E	Proposed Plans
<b>Federal Fluid Minerals</b>					
Output (2011 \$)	-\$67,562,191	-\$185,252,920	-\$29,650,802	\$0	-\$31,020,342
Employment <sup>1</sup>	-190	-480	-9	0	-17
Earnings (2011 \$)	-\$10,291,425	-\$25,934,176	-\$396,576	\$0	-\$823,681
<b>Federal, State and Private Fluid Minerals</b>					
Output (2011 \$)	-\$81,133,615	-\$215,527,170	-\$33,781,803	\$0	-\$32,029,449
Employment <sup>1</sup>	-253	-614	-27	0	-17
Earnings (2011 \$)	-\$13,813,574	-\$33,291,649	-\$1,415,413	\$0	-\$901,643

Source: Calculated using the IMPLAN model as explained in the text and in **Appendix W**.

<sup>1</sup>Employment counted as a part-time or full-time position during a 1-year period.

### **Impacts from Management of Coal Leases**

#### *Overall Employment, Earnings, Output, and Earnings per Job Impacted by Management Alternatives*

The potential economic impacts of management of coal leases were estimated quantitatively using IMPLAN. Assumptions regarding projected production of coal, share of production from federal mineral lands and price of coal are detailed in **Appendix W, Table 4.53** shows the estimated economic impacts. These estimates were obtained by multiplying coal production by alternative (shown in **Table W.11** of **Appendix W**) by impacts by unit of production (shown in **Tables W.12** and **W.13**).

**Table 4.53**  
**Average Annual Impact of Management Actions Affecting Coal Production on Output, Employment, and Earnings by Alternative, Relative to Alternative A, 2014-2028**

	Alternative B	Alternative C	Alternative D	Alternative E	Proposed Plans
<b>Primary Study Area</b>					
Output (2011 \$)	-\$151,942,680	-\$202,521,295	\$0	\$0	-\$28,922,313
Employment <sup>1</sup>	-563	-765	0	0	-91
Earnings (2011 \$)	-\$35,970,600	-\$48,707,572	\$0	\$0	-\$5,977,846
<b>Primary and Secondary Study Area</b>					
Output (2011 \$)	-\$179,903,288	-\$241,212,017	\$0	\$0	-\$32,624,281
Employment <sup>1</sup>	-715	-975	0	0	-111
Earnings (2011 \$)	-\$44,469,836	-\$60,478,647	\$0	\$0	-\$7,091,537

Source: Calculated using the IMPLAN model as explained in the text and in **Appendix W**.

<sup>1</sup>Employment counted as a part-time or full-time position during a 1-year period.

Under Alternative B, some mapped occupied habitat would be designated as PHMA and no new leases for coal production would be allowed in PHMA. It is expected that underground coal production would be up to 14 percent less under Alternative B when compared with Alternative A. In addition, the assumption was made for analysis purposes only that surface coal production from the Alton coalfield would no longer enter production. The result would be a decrease relative to Alternative A of almost \$152 million of estimated coal related output, 563

jobs and about \$36 million in coal related earnings. For both underground and surface coal production, it should be emphasized that the figures here overstate the likely reductions. They overstate likely reductions for the Alton coalfield (i.e., surface coal production) because some portion of the Alton formation could still be accessed underground. They also overstate likely reductions for underground coal production because nothing in this alternative would preclude leasing of subsurface materials. The calculations here assume that no new subsurface leasing would occur in PHMA, and thus represent a worst-case scenario for this alternative.

Under Alternative C, all mapped occupied habitat would be closed for new leases of federal coal production. It is expected that underground coal production would be up to 21 percent less under Alternative C when compared with Alternative A. As in the case of Alternative B, the assumption was made for analysis purposes only that surface coal production from the Alton coal field would not enter production under Alternative C, based on the same idea as in Alternative B (i.e., that new leases would include restrictions on surface occupancy for vents, ports, loading facilities, and other infrastructure requirements that may occur on occupied habitat). The result would be a decrease relative to Alternative A of almost \$203 million of estimated coal related output, 765 jobs and about \$49 million in coal related earnings. For both underground and surface coal production, it should be emphasized that the figures here overstate the likely reductions. They overstate likely reductions for the Alton coalfield (i.e., surface coal production) because the necessary infrastructure could be developed on state or private land. They also overstate likely reductions for underground coal production because nothing in this alternative would preclude leasing of subsurface materials. Similar to Alternative B, the calculations here assume that no new subsurface leasing would occur in occupied habitat, and thus represent a worst-case scenario for this alternative.

Under the Proposed Plans measures to protect GRSG and its habitat (disturbance cap, lek buffers, net conservation gain requirements, and restrictions on noise and season) could affect the feasibility of new underground coal leases or the expansion of existing underground operations (e.g., increased costs and development delays due to limits on the timing of activities) but would not preclude them. For analytical purposes, BLM assumed that all coal in the Alton coalfield would be accessible under the Proposed Plan, although largely by sub-surface methods due to the constraints of the conservation measures. The BLM assumed this would reduce the recovery rate from 90 percent to 45 percent and could have added costs for mining companies. The result would be a decrease relative to Alternative A of almost \$29 million of estimated coal related output, 91 jobs and about \$49 million in coal related earnings.

Utah depends largely on coal for electricity. However, because the local supply of electricity relies on an interconnected grid, reductions in coal leasing in the primary study area under management Alternatives B or C would not necessarily impact the price of electricity to state-wide and interstate local electrical energy consumers.

Public comments to the Draft LUPA/EIS expressed concern with potential impacts on communities within the planning area. Under all alternatives, impacts of coal development are expected to be felt mostly in those counties where expenditures associated to coal development and production occur. This includes expenditures with infrastructure, equipment, facilities, and operations, among others, as well as expenditures with suppliers and service

providers and expenditures by those earning income from coal related activities. Based on the location of coal fields, as described in the Social and Economic Impacts (Including Environmental Justice) section of **Chapter 3**, and information provided by BLM the socioeconomic specialists, the BLM and Forest Service defined an eight-county area where impacts from coal development would most likely be felt. This area includes the coal producing counties of Carbon, Emery, Sanpete, and Kane, as well as counties that could be expected to provide construction inputs, materials, transportation services and other supplies, and that are located within the primary or secondary study area. These include Sevier, Paiute, Garfield, and Millard (BLM 2014). Utah County was considered but not included, because it would disproportionately impact the results, given its large population and economy relative to the other counties. BLM and Forest Service estimated the impacts on these eight counties assuming all direct impacts would fall within their borders, and using IMPLAN multipliers specifically for this eight-county area. For details, see **Appendix W**. The results are shown in **Table 4.54**.

**Table 4.54** shows that employment losses in the eight counties would correspond to up to 1.2 percent of the employment in those eight counties in 2010 under Alternative C (700 divided by 56,405, per **Table T.1** in **Appendix T**).

**Table 4.54**  
**Average Annual Impact of Management Actions Affecting Coal Production on Output, Employment, and Earnings by Alternative, Relative to Alternative A, 2014 – 2018, Eight-County Area**

	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Proposed Plans</b>
Output (2011 \$)	-\$146,882,519	-\$196,335,975	\$0	\$0	-\$27,322,109
Employment <sup>1</sup>	-516	-700	0	0	-85
Earnings (2011 \$)	-\$35,264,443	-\$47,740,134	\$0	\$0	-\$5,873,288

Source: Calculated using the IMPLAN model as explained in the text and in **Appendix W**.

<sup>1</sup>Employment counted as a part-time or full-time position during a 1-year period.

#### ***Impacts from Management of Phosphate Leases***

As noted in the Minerals and the Social and Economic Conditions (Including Environmental Justice) section of **Chapter 3**, the one existing phosphate mining operation in the planning area is on nonfederal lands and would not be impacted by decisions in this LUPA. Two fringe acreage lease applications to expand operations onto federal lands have been submitted to the BLM. If leases are not issued prior to the issuance of a ROD for this LUPA, decisions in this plan could affect the feasibility of operations on federal lands. The three primary operators, JR Simplot, Utah Phosphate, and Strata Minerals, are currently producing or exploring on private lands or leases owned by the SITLA. The BLM estimates that under existing mining techniques and market volumes at the current JR Simplot operation north of Vernal, there would be sufficient reserves to keep the current operation in production through a planning horizon of 15 years.

There are also eight existing prospecting permit applications on federal minerals for phosphate. Strata Minerals, Inc. has identified 33.9 metric tons of measured and indicated resources, including areas covered by seven of the prospecting permit applications. They have also

identified another 27.1 metric tons of phosphate ore ( $P_2O_5$ ) averaging a grade of 19.67 percent. As of October of 2014, there were no feasibility studies, full market studies or economic evaluations available (Norwest Corporation 2014). Mill site mining claims have been filed by JR Simplot. In public comment to the Draft GRSG LUPA/EIS, industry representatives stated that Alternatives B, C, and D would be likely to eliminate any additional phosphate development in the Vernal area, with a loss of associated jobs and tax revenues.

No RFD scenario for phosphate was prepared that quantifies current phosphate reserves on private and public lands and forecasts production of those reserves. In the absence of this information and any proposed plans for leasing and developing federal lands for phosphate, it is not possible to quantify potential economic impacts across alternatives over the planning horizon. However, the areas available for phosphate leasing vary by alternative and could result in economic impacts if any party does pursue phosphate leasing and development of federal minerals. These impacts would be more likely under Alternative C, which would close all federal mineral estate with phosphate potential to new leases, followed closely by Alternative B, which would close approximately 83 percent of the federal mineral estate in the decision area. Alternatives A and E would close the fewest acres. Alternative D would close most areas to surface mining but mostly allow underground mining (**Section 4.21.2, Nonenergy Leasable Minerals**).

Under the Proposed Plans, although PHMA would be closed to nonenergy mineral leasing, expansion of existing operations could be considered if the new lease is contiguous with an existing operation, and the new lease applies the pertinent management for discretionary activities in PHMA identified in MA-GRSG-3 (e.g., mitigation, disturbance cap, minerals/energy density, buffers, seasonal restrictions, and RDFs). Given the current situation of phosphate surface mining operations (surface mines), the potential that expansion of an existing mining operation could meet the disturbance cap at the project level would be low. Were mined areas sufficiently reclaimed to provide GRSG habitat, leasing and development could occur. However, since new or expanded leases must be adjacent to existing operations, the disturbance associated with the existing operation would generally result in an exceedance of the project-level disturbance cap. As such, given application of the disturbance cap at the project scale, the impacts on future phosphate leasing and development would likely be similar to Alternative D, with no potential new or expanded operations.

In summary, the Proposed Plans close nonenergy mineral development to new leases that are not contiguous to existing operations, and because it applies the 3 percent disturbance cap at the project level, this would likely preclude the expansion or development of phosphate mines onto public lands in PHMA. While existing mines are currently on nonfederal lands where development would remain, the Proposed Plans' management may alter mine development scenarios as the operators avoid public lands. While there may not be a loss of employment within the planning analysis period, there could be a loss of bonus bids, mineral royalties, taxes, and community support programs.

#### ***Locatable and Salable Minerals***

The current locatable mining in GRSG habitat is relatively small compared to other mineral development as well as compared to locatable mining outside of GRSG habitat. Future

development trends of locatable minerals are expected to be similar to past development trends. For example, the vast majority of Utah's copper, gold and silver and all of the molybdenum is produced by Kennecott Utah Copper and is located outside GRSG habitat. Although, potential impacts on locatable mineral development are expected to be minimal (in terms of relative production and economic activity) across all alternatives, the potential impacts do differ across alternatives. In particular, Alternatives B and C recommend withdrawal from locatable mineral entry in PHMA and mapped occupied habitat, respectively. The Proposed Plans recommend SFA for withdrawal from locatable mineral entry and would have impacts more similar to Alternatives D and E. However, because more area would be recommended for withdrawal from locatable mineral entry, there is potential for a slightly greater impact under the Proposed Plans. The implications of these potential withdraws are explained in detail in **Section 4.21.4, Locatable Minerals**. Generally, these withdraws could affect a subset or all of the 39 locatable mining operations that occur on BLM-administered or National Forest System lands in GRSG occupied habitat as well as the claimants holding one of the over 2,500 claims. Any material changes to existing operations within a withdrawn area would require a validity examination. The claims would also be subject to a validity examination to determine if the claim is valid and prior to any development of the claim. Validity examinations typically cost at least \$50,000 per claim to complete and have the potential to delay the start of locatable mineral development on a valid claim. In all the action alternatives where GRGS habitat would remain open, the BLM and Forest Service would work with claimants, to the extent possible by law, to minimize impacts on GRSG habitat, which could increase costs to the claimant.

Areas closed to mineral materials disposal would be the most under Alternative C, where no federal mineral estate within the decision area would remain open to mineral material disposal, and the least under Alternatives A and E, under which 98 percent of the federal mineral estate within the decision area would remain open. There are 4,008,600 acres of federal mineral estate in the decision area. Under Alternative D, 74 percent of federal mineral estate would be closed to commercial disposal and an additional 9 percent would be closed to both commercial and noncommercial disposal. Under the Proposed Plans, 83 percent of BLM-administered and National Forest System lands in GRSG habitat would be closed to new mineral material sales. In PHMA, there would be no new mineral material sites with the exception that existing pits could expand and remain open to free-use permits, consistent with the disturbance cap and other conservation measures (e.g., lek buffers, net conservation gain, and RDFs). The remaining 650,900 (17 percent) acres of GHMA would be open to new mineral material sites subject to the same conservation measures. Not all the acres closed have a high potential for saleable minerals. The impact of the Proposed Plans would be more similar to Alternative C than to Alternatives B or D.

Local and state governments often use mineral materials from federal mineral estate to construct infrastructure (i.e., roads). In areas where federal sources of mineral materials are closed to noncommercial disposal and no alternative public sources are available, local and state governments would likely face increases in costs associated to transportation of mineral materials for use in the construction of infrastructure. However, review of existing mineral material sites reveal that disturbed areas are smaller than the permitted areas. This suggests that additional material is already authorized and this plan would not impact those valid existing

rights. The cost of saleable minerals will increase due to the inability to access or comply with GRSG conservation measures.

### ***Impacts from Management of Wind Energy Development***

#### *Overall Employment, Earnings, Output, and Earnings per Job Impacted by Management Alternatives*

Current projections for wind energy in the primary study area forecast the installation of approximately 210 MW<sup>3</sup> of installed capacity in the near future. Under Alternative E, the expectation would be maintained. Based on GIS analysis, it is expected that intersection with GRSG occupied habitat would reduce the installed capacity under Alternatives B, C, and D, and the Proposed Plans to 121 MW. As described in the Renewable Energy section, while acres available for wind energy development vary greatly among these alternatives, the area of good or better wind potential does not vary greatly. **Table 4.55** and **Table 4.56** show the estimated impacts on output, employment and earnings. Average annual construction and operations impacts assumed installation of windmills would occur at a constant pace throughout a 15-year period. These estimates were obtained multiplying expected MW by alternative by impacts per MW (shown in **Tables W.15** and **W.16** of **Appendix W**).

Under Alternatives A and E, the output from the installation of wind energy would be estimated to be the same. The average annual earnings per job supported by the wind energy sector would be estimated to be between \$41 thousand and \$42 thousand (**Appendix W**).

Under Alternatives B, C, and D, and the Proposed Plans, the output from the installation of wind energy would be estimated to be reduced by almost \$2.5 million per year and supporting employment would be estimated to be reduced by 15 annual jobs in the primary study area relative to Alternative A. During operations, annual output would be estimated to be reduced by an average of over \$1 million annually and employment would be estimated to be reduced by an average of 13 annual jobs in the primary study area relative to Alternative A.

Public comments to the Draft LUPA/EIS expressed concern with potential impacts on communities within the planning area. Under all alternatives, the counties where most of the wind energy development expenses occur would also experience the majority of the associated economic impacts. This includes expenditures associated with infrastructure, equipment, facilities, and operations, among others, as well as expenditures by suppliers and service providers and expenditures by those earning income from coal energy activities. The 210 MW projection used above was based on expectations for Utah's west desert, particularly Millard County. Based on this projection and additional information provided by BLM socioeconomic specialists (BLM 2014), the BLM and Forest Service defined a two county area where impacts from wind energy development would most likely be felt. This area would include the counties of Millard and Beaver. (BLM 2014). Utah County was considered but was not included because it would disproportionately impact the results, given its relatively large population and economy. BLM and Forest Service estimated the impacts on these two counties assuming all direct impacts would fall within their borders, and using IMPLAN multipliers specifically for this two-county area. For details, see **Appendix W**. The results are shown in **Table 4.57**.

<sup>3</sup> MW: megawatts = one thousand kilowatts

**Table 4.55**  
**Average Annual Impact of Management Actions Affecting Wind Energy Development on Output, Employment, and Earnings by Alternative, Relative to Alternative A, Construction**

	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Proposed Plans</b>
<b>Primary Study Area</b>					
Output (2011 \$)	-\$2,400,196	-\$2,400,196	-\$2,400,196	\$0	-\$2,400,196
Employment <sup>1</sup>	-15	-15	-15	0	-15
Earnings (2011 \$)	-\$625,808	-\$625,808	-\$625,808	\$0	-\$625,808
<b>Primary and Secondary Study Area</b>					
Output (2011 \$)	-\$2,765,778	-\$2,765,778	-\$2,765,778	\$0	-\$2,765,778
Employment <sup>1</sup>	-17	-17	-17	0	-17
Earnings (2011 \$)	-\$736,114	-\$736,114	-\$736,114	\$0	-\$736,114

Source: Calculated using the IMPLAN model as explained in the text and in **Appendix W**.

<sup>1</sup>Employment counted as a part-time or full-time position during a 1-year period.

**Table 4.56**  
**Average Annual Impact of Management Actions Affecting Wind Energy Development on Output, Employment, and Earnings by Alternative, Relative to Alternative A, Operations**

	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Proposed Plans</b>
<b>Primary Study Area</b>					
Output (2011 \$)	-\$1,029,635	-\$1,029,635	-\$1,029,635	\$0	-\$1,029,635
Employment <sup>1</sup>	-13	-13	-13	0	-13
Earnings (2011 \$)	-\$547,424	-\$547,424	-\$547,424	\$0	-\$547,424
<b>Primary and Secondary Study Area</b>					
Output (2011 \$)	-\$1,098,466	-\$1,098,466	-\$1,098,466	\$0	-\$1,098,466
Employment <sup>1</sup>	-13	-13	-13	0	-13
Earnings (2011 \$)	-\$568,425	-\$568,425	-\$568,425	\$0	-\$568,425

Source: Calculated using the IMPLAN model as explained in the text and in **Appendix W**.

<sup>1</sup>Employment counted as a part-time or full-time position during a 1-year period.

**Table 4.57**  
**Average Annual Impact of Management Actions Affecting Wind Energy Production on Output, Employment, and Earnings by Alternative, Relative to Alternative A, Construction and Operations, Two-County Area**

	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Proposed Plans</b>
<b>Construction</b>					
Output (2011 \$)	-\$2,186,134	-\$2,186,134	-\$2,186,134	\$0	-\$2,186,134
Employment <sup>1</sup>	-14	-14	-14	0	-14
Earnings (2011 \$)	-\$548,995	-\$548,995	-\$548,995	\$0	-\$548,995
<b>Operations</b>					
Output (2011 \$)	-\$954,183	-\$954,183	-\$954,183	\$0	-\$954,183
Employment <sup>1</sup>	-12	-12	-12	0	-12
Earnings (2011 \$)	-\$516,294	-\$516,294	-\$516,294	\$0	-\$516,294

Source: Calculated using the IMPLAN model as explained in the text and in **Appendix W**.

<sup>1</sup>Employment counted as a part-time or full-time position during a 1-year period.

**Table 4.57** shows that employment losses in the two counties would be negligible when compared to the employment in those two counties in 2010 under Alternative C (12 compared to 10,432, per **Table T.1** in **Appendix T**).

#### ***Lands and Realty and Travel Management***

Potential impacts from management actions affecting land and realty and travel management include increases in costs of construction of linear projects (e.g., roads and transmission lines).

To the extent that management alternatives require linear construction projects to avoid GRSG habitat or imposes additional construction requirements and constraints for projects crossing GRSG habitat, some impacts could affect the public. Alternatives B, C, and D would impose new ROW exclusions and reduction or alteration of designated corridor areas. The magnitude of this potential impact, in terms of miles of linear projects or total construction costs, could not be quantified since details of future linear projects are not known.

Under the Proposed Plans, there would be no new exclusion areas, and similar to Alternative E, the Proposed Plans would manage all PHMA as avoidance areas. Compared to Alternatives B, C, and D, this would allow ROWs to be placed within PHMA under certain conditions, which could reduce the potential cost of line construction. However, the conservation measures associated with the Proposed Plans are more restrictive than those under Alternative E, namely application of the disturbance cap, lek buffer distances, seasonal and tall structure restrictions, requirements to bury power lines if feasible, and the net conservation gain requirements. Thus, while the Proposed Plans do not designate any areas for “exclusion” to new ROWs, the avoidance criteria are sufficiently restrictive that many of the same effects as those identified under Alternatives B, C, and D would also be present, just to a potentially lesser degree (increased cost to new projects requiring placement of facilities in locations that may require additional miles of pipeline/power line to avoid lek buffers or otherwise to minimize impacts on GRSG). Additionally, applying other conservation measures that do not require full avoidance of an area could also result in spatial redesign of projects from preferred routes, or simply increase the cost of construction in a preferred location.

Public comments on the Utah Greater Sage-Grouse Draft LUPA/EIS demonstrated concern with impacts of increased cost of construction of transmission lines on energy ratepayers. Unit cost information for constructing transmission lines provides context for potential impacts on relocating or rerouting a transmission line. A 2012 Western Electricity Coordinating Council study provides information on transmission line costs per mile, ranging from \$927 thousand to \$2,967 thousand depending on voltage and whether lines are single or double circuit lines. The same study provides cost multipliers for difficult terrains, reaching up to 2.25 in the case of forested lands (Western Electricity Coordinating Council 2012). According to the Energy Information Administration, transmission costs account for approximately 11 percent of the cost of energy bills, with the remaining being formed by power generation and distribution (US Energy Information Administration 2013a). Because utility providers allocate costs on to their rate base, per customer rate impacts would be greater where the ratepayer base is smaller. Areas with smaller/local utility providers with fewer ratepayers would be required to absorb a greater proportion of the costs of relocation or rerouting compared to areas serviced by larger, multi-state providers.

### **Recreation**

Quantifying or predicting changes in recreation use is more likely to be feasible for highly developed recreation areas. Quantifying or predicting changes in recreation in GRSG habitat in Utah is more difficult because primary recreational uses in GRSG habitat are more likely to be dispersed uses, such as hunting, driving for pleasure, general OHV use, car camping, and rock hounding. Baseline information on dispersed recreation within habitat areas is not available and thus precludes the quantification of potential changes to recreation use associated with management alternatives.

Under the management actions considered by the various alternatives, areas that would be closed to recreation activities, such as OHV travel, would not meaningfully affect how the public participates in the forms of dispersed recreation mentioned above, because the majority of the potentially affected recreation and travel management areas currently do not have mapped routes. In regards to access, recreation uses that rely on traveling cross-country in or on a motorized vehicle would no longer be allowed within PHMA. Action alternatives include measures that move BLM-administered lands designated as "Open" to cross country travel, to "Limited" to existing/designated routes within PHMA. National Forest System lands are already limited to designated routes and would be unaffected by the implementation of this management action. Changing area designations from "Open" to "Limited" would allow the BLM, Forest Service, and the State of Utah to mitigate habitat destruction by more effectively prosecuting those who drive cross-country and provide a management framework to most effectively develop implementation planning level comprehensive travel management plans. Completion of route mapping, verification and evaluation efforts in GRSG habitat would provide the appropriate level of information to develop more specific ranges of alternatives for transportation system which comply with agency laws, regulations and GRSG planning parameters resulting from these land use planning level range of alternatives.

The Proposed Plans place restrictive measures on SRPs issued within BLM-administered lands. In PHMA, only SRPs that have neutral or beneficial effects on GRSG and GRSG habitat would be issued. Existing SRPs would be evaluated to determine their effect on GRSG and GRSG habitat. SRPs determined to have adverse effects would be canceled or modified to avoid or mitigate effects of habitat alteration or other physical disturbances to GRSG (e.g., breeding, brood rearing, migration patterns, or winter survival). Permit stipulations that require the permittee to implement habitat restoration activities following the SRP event would be identified, and these restoration activities must be consistent with GRSG habitat objectives. New recreation facilities (e.g., campgrounds, trails, trailheads, staging areas) would not be constructed in PHMA, unless the development would have a net conservation gain to GRSG habitat (such as concentrating recreation, diverting use away from critical habitat area, etc.) or unless the development is required for visitor health and safety or resource protection.

### **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 nonmarket values composed of "use" values as well as economic values beyond those associated with active "use" through viewing or hunting.

**Chapter 3** and **Appendix U** document current methods to estimate these “nonuse” values as a component of nonmarket values, including a description of the literature review that the BLM and Forest Service conducted to determine if there were existing nonmarket 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 U** for details). These values represent a mix of use and nonuse values, but the nonuse components of value are likely to be large shares since the studies primarily address species that are not hunted, though many of these species are “viewed”.

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 nonuse value, then the aggregate regional nonuse 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 nonmarket benefits associated with populations of GRSG would be expected to be a function of the degree of habitat protection associated with each alternative. The potential impacts associated with each alternative are documented immediately below.

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, management under Alternative A could have the greatest adverse impacts on GRSG nonmarket benefits.

Management under Alternative B provides a greater level of protection for GRSG than Alternative A but would provide a lower level of protection than Alternative C. To the degree that there are nonuse values associated with populations of GRSG, management under Alternative B would result in fewer adverse impacts on those values than Alternative A but more than in Alternative C.

Management under Alternative C would provide the most protection for GRSG. As a result, to the degree that there are nonuse values associated with populations of GRSG, management under Alternative C would have the least adverse impacts (or the most beneficial impacts) on those values.

Management under Alternative D would provide more protection for GRSG than Alternatives A or E but less protection than Alternatives B or C. To the degree that there are nonuse values associated with populations of GRSG, management under Alternative D would have greater adverse impacts on those values than Alternatives B or C, but fewer adverse impacts than Alternatives A or E.

Management under Alternative E would provide more protection for GRSG than Alternative A but less protection than Alternatives B, C, or D. To the degree that there are nonuse values associated with populations of GRSG, management under Alternative E would have greater adverse impacts on those values than Alternatives B, C, or D, but fewer adverse impacts than Alternative A.

#### **Impacts on Tax Revenues and Payments to States and Counties**

County fiscal revenues in the primary study area are described in **Chapter 3**. They include tax revenues, intergovernmental transfers (including payments in lieu of taxes), charges for services, licenses, and permits. The largest impact of management alternatives on county fiscal revenues would be through taxes paid by the oil and gas and coal sectors. Other potential impacts would be through property and sales taxes associated with the affected resources, including oil and gas, coal, grazing and wind energy. **Table 4.58** estimates federal royalty and state severance tax losses from decreased oil and gas production under each management alternative when compared with Alternative A. Although estimates are presented on an annual basis, they would accumulate over time (a 15-year period was used for the purposes of the socioeconomic analysis). For tax assessment purposes, which allow the deduction of certain production costs, production of both oil and gas was assumed to be valued at 87.5 percent of its market price.<sup>4</sup> State severance tax rates depend on production value but are 5 percent for production valued over a minimum amount (University of Utah, 2010). **Appendix W** shows the calculation details.

**Table 4.58**  
**Average Annual Federal Royalty and State Severance Taxes on Oil and Gas by Alternative Relative to Alternative A, Federal Fluid Minerals, 2011 \$**

	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Proposed Plans</b>
Federal Royalties	-\$4,687,184	-\$43,302,127	-\$3,394,550	\$0	-\$3,418,380
State Severance Tax	-\$1,874,874	-\$17,320,851	-\$1,357,820	\$0	-\$1,367,352
<b>Total</b>	<b>-\$6,562,058</b>	<b>-\$60,622,977</b>	<b>-\$4,752,369</b>	<b>\$0</b>	<b>-\$4,785,732</b>

Source: Calculated as explained in the text and in **Appendix W**.

**Table 4.59** shows estimates for federal royalty losses from coal production in the primary study area under each Alternative, relative to Alternative A. As explained in **Appendix W**, the loss estimates for coal production under each Alternative are likely an upper bound. In addition, the royalty loss estimates shown below assume coal is valued as explained in **Appendix W**. In practice, the value of coal for royalty collection may be lower.<sup>5</sup> Utah does not have a state severance tax on coal.

<sup>4</sup> This was based on information available for the State of Colorado (Colorado Oil and Gas Association 2011). Valuation for Utah may be slightly above or below this number.

<sup>5</sup> In FY2012, the Office of Natural Resources Revenue reports coal royalty payments for the State of Utah in the amount of 6.9 percent of the sales value of coal, below the established rates of 8 percent for underground coal and 12.5 percent for surface coal (Office of Natural Resources Revenue 2013).

**Table 4.59**  
**Estimated Average Annual Coal Royalties in Primary Study Area,**  
**Relative to Alternative A, 2011 \$**

	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Proposed Plans</b>
Sales Value (\$)	-\$110,121,635	-\$146,301,599	\$0	\$0	-\$21,505,292
Royalties (\$)	-\$10,509,008	-\$13,403,405	\$0	\$0	-\$2,688,161

Source: Calculated as explained in the text and in **Appendix W**.

As discussed in **Chapter 3**, federal mineral royalties and state severance tax are partially distributed to local governments. Other local revenue sources would also tend to decrease with less economic activity expected in the study area under Alternatives B and C when compared with Alternative A, with the least revenues expected under Alternative C. Real property tax revenues would be adversely impacted by less investments on federal lands related to oil and gas or coal. Municipal sales and use taxes would be adversely impacted by the decrease in sales, due to lower income being generated and spent. Fees for grazing on federal lands also partially benefit states and counties and the oil and gas and coal sectors generate additional revenues in the forms of lease bonus and rent payments. Under Alternative A, average annual federal royalty and state severance tax collections on new oil and gas leases on GRSG habitat and federal royalty collections on coal production are estimated to be highest. Other fiscal revenues are also estimated to be highest under Alternative A.

Under Alternative B, average annual federal royalty and state severance tax collections on new oil and gas leases on GRSG habitat are estimated to be approximately 68 percent of their levels under Alternative A. Federal royalty tax collections on coal production are estimated to be approximately 77 percent of their levels under Alternative A. Other fiscal revenues would be lower than under Alternative A.

Under Alternative C, no new oil and gas leases would be allowed on federal lands with GRSG habitat and some new oil and gas leases in GRSG habitat on state and private lands would also be affected, resulting in a loss of a little under \$13 million, 100 percent of the amount estimated to be generated by these leases under Alternative A. Federal royalty tax collections on coal production are estimated to be approximately 71 percent of their levels under Alternative A.

Under Alternative D, average annual federal royalty and state severance tax collections on new oil and gas leases on GRSG habitat are estimated to be approximately 75 percent of their levels under Alternative A. No federal royalty losses from coal production would occur under Alternative D.

Under Alternative E, average annual federal royalty and state severance tax collections on new oil and gas leases on GRSG habitat are estimated to be the same as under Alternative A. No federal royalty losses from coal production would occur under Alternative E.

Other potential fiscal impacts on local governments also exist from the choice of management alternative. Alternatives that restrict access to mineral materials from federal sources tend to increase the cost of public works through increased transportation costs for access to mineral

materials. Similarly, management alternatives that limit grazing may burden local wildfire departments and emergency responders if the occurrence of wildfires increases. In both these cases, impacts would be most likely under Alternative C and less likely under Alternatives A and E with Alternatives B and D in between.

#### **4.23.4 Social Impacts**

##### ***Impacts from Management Actions Affecting Migration***

###### *Population*

The decrease in employment opportunities in the primary study area that would accompany Alternative C when compared with Alternatives A, D, and E is less than 1 percent of the employment base of the primary study area. This suggests impacts from management alternatives on population trends would be expected to be imperceptible in aggregate, even if potentially meaningful for specific counties and communities.

As previously noted, grazing, coal mining, oil, and gas are expected to be the economic activities generating most employment impacts from GRSG management alternatives. As previously argued, grazing related employment impacts would likely be most felt in Box Elder, Juab, Piute, Rich, and Sanpete, and possibly Beaver and Iron counties. The main area for underground coal mining is currently Carbon County (Price Field Office). Carbon County would also receive a substantial share of the impacts on employment through oil and gas drilling and production, recognizing that population shifts linked to mineral and energy development can be temporary and not representative of long-term trends. As shown in **Chapter 3**, Carbon County was the slowest growing county in the primary study area during the 1990 to 2010 period.

Under Alternative A, current management of GRSG habitat would continue and trends in population growth would not be affected by changes in management of GRSG habitat. Compared with Alternatives B, C, and D, and the Proposed Plans, this alternative has the lowest potential for impacts on population growth.

The potential for impacts on population trends from Alternative B is greater than Alternatives A, D, and E, and the Proposed Plans, but less than Alternative C. The potential is generated by impacts on employment from PHMA closed to economic activities, mostly oil and gas and coal development. Because the difference between employment opportunities under Alternative B when compared with Alternative A is 0.4 percent of the current employment in the primary study area, impacts on population are likely to be negligible.

Management under Alternative C has the greatest potential for impacts on population growth among the alternatives considered. The impacts would be expected to be largest in those counties and communities most reliant on grazing, coal, and oil and gas employment opportunities for income. Under this alternative the potential for impacts on population trends would be driven by projected employment changes of an estimated 0.8 percent of current employment in the primary study area; population shifts may therefore be relatively small or hard to detect. Shifts in population due to coal or oil and gas development may be temporary.

The impacts of Alternatives D and E and the Proposed Plans on population trends would be smaller than Alternatives B or C, given the estimated 0.1 percent impact or less on employment as a percent of current employment. Impacts would be expected to be the same as under Alternative A.

#### *Housing and Public Services*

Because the impacts of management alternatives on population are expected to be relatively small or negligible, with the possible exception of certain areas highly dependent on grazing and coal development and surrounded by GRSG habitat, impacts on housing and public services driven by changes in population trends are expected to be negligible.

### **Impacts from Management Actions Affecting Specific Groups and Communities**

#### *Consistency with County Land Use Plans*

The decision under consideration will result in amended BLM and Forest Service management and LUPs throughout the primary study area. The BLM and Forest Service management and LUPs must be consistent with state and local LUPs to the extent possible, and amendments 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 primary study area with overlapping and divergent interests. Groups centered on grazing, mining, oil and conservation of natural resources will be impacted differently by the management alternatives. Within these interest groups, more specific ones could be particularly affected. Among the interest groups most likely to be affected by the choice of alternative are those associated with wildlife conservation, and business groups associated with mining and grazing.

Public comments on the Draft LUPA/EIS expressed concern with impacts on individual counties and towns. Several commenters stated that the Draft LUP/EIS focused its description of the socio-economic impacts on the entire planning area but did not discuss in any detail the effects on individual communities. Specific communities will not be impacted in the same way by the management alternatives. Impacts depend on the extent to which communities are dependent on some of the economic activities impacted and on the extent to which GRSG habitat intersects with their economic activities. Small communities dependent on grazing or coal mining for their livelihoods may be impacted by alternatives to the degree that community residents are involved in activities located within or adjacent to GRSG habitat.

As previously noted, the counties of Box Elder, Juab, Piute, Rich and Sanpete draw important shares of their labor earnings from farming, receive important shares of their farming income from livestock operations and have considerable federal land used for grazing that intersect GRSG habitat. This may also be the case of individual communities in other counties. In addition, as discussed in the Social and Economic Conditions (Including Environmental Justice) section of **Chapter 3**, many people value the ranching lifestyle in excess of the income generated by the ranching operations. Several public comments on the Draft LUPA/EIS expressed that various aspects of rural lifestyles in the study area have a cultural value to the local population, including grazing, and requested that these cultural aspects be detailed in the socioeconomic section. Livestock farming is important culturally for many communities in the area. A recent ordinance

by Kane County, for example, argues that in the Escalante Region “livestock grazing practices have maintained their traditional culture, values, and heritage.” (Kane County 2014). Closures and curtailed activity could result in disruptions and impacts on the economic contribution of livestock grazing in the local economy as well as the social fabric of the communities in which they operate.

It is expected that the counties of Duchesne, Carbon, and Uintah would be particularly impacted by management alternatives affecting development of oil and gas on federal lands. However, less than 1 percent of total employment in these counties is estimated to be impacted.

Based on the data presented in **Chapter 3** and **Appendix T**, Detailed Employment and Earnings Data, communities in the Alton mine area in Kane County do not appear to currently rely on mining for their livelihood.

Additional analysis will be needed during implementation of the management alternative chosen to properly assess the geographically localized impacts of management actions for which many of the public comments on the Draft LUPA/EIS expressed concern. For example, one commenter expressed concern with impacts on wind energy development, which would only be captured by a more localized analysis, including consideration of available ROWs for transmission lines. The potential impact of management alternatives on the development of wind energy and transmission line projects in specific localities would be analyzed during implementation of LUPs.

Alternative A would maintain current management and would, therefore, not change current incentives or restrictions to one or another interest group, nor would it change trends faced by individual communities.

Alternative B would limit economic activities in some areas intersecting with GRSG habitat. Management under Alternative B would have beneficial impacts on groups associated with wildlife conservation, as well as other interests indirectly affected by habitat protection.

Management under Alternative C would have adverse impacts on groups associated with grazing, oil and gas, wind development and coal mining. Alternative C would impose the greatest restrictions on business development interests and, as mentioned, could impact small communities whose livelihoods would be affected, such as small ranching communities surrounded by federally administered land that provides GRSG habitat. Management under Alternative C would have the most beneficial impacts on those groups associated with conservation interests, as well as other interests indirectly affected by habitat protection.

Impacts under Alternative D would be similar to those of Alternative A, with some added restrictions to development in GRSG occupied habitat.

Impacts under Alternative E would be similar to Alternative A.

The Proposed Plans would be more beneficial to interests associated with wildlife conservation than Alternatives A, D, or E, but more beneficial to interests associated with oil and gas and coal than Alternatives B or C and more beneficial to grazing interests than Alternative C.

#### 4.23.5 Summary of Economic and Social Impacts

As noted in the discussion of planning issues in **Chapter I**, there is concern about how this action can promote or maintain activities that provide social and economic benefit to local communities while providing protection for GRSG habitat. Alternative actions evaluated in this FEIS consist of different packages of conservation measures that include land use restrictions, management practices or design features, habitat priorities or desired conditions, and monitoring protocols. Alternatives also specify different types and levels of mechanisms, such as disturbance caps, adaptive management protocols, and desired conditions or objectives, to guide when and where conservation measures, design features, and treatments are implemented. The overall effectiveness and efficiency of the alternatives depend on the degree to which these measures are targeted and prioritized in areas where habitat gains are most beneficial. These conservation measures, in aggregate, are intended to address threats to, and provide protection for GRSG (see **Chapter 2** of this FEIS). This section has evaluated the social and economic impacts resulting from conservation measures that address threats associated with specific land and resource uses (e.g., grazing and minerals) which are easily linked to social and economic conditions (e.g., employment). There are other conservation measures included in the alternatives (to varying degrees) that address other threats such as fire, invasive plants, and vegetation (e.g., pinyon-juniper) encroachment on GRSG habitat that will have direct impacts on local economies of communities. However, the extent of these impacts is not known at this planning stage and due to uncertainty (e.g., occurrence of fire). Therefore, while the regional economic impact of these conservation measure were not evaluated in this section, they will not only play a critical and complementary role in helping meet the goal of effectively protecting GRSG from a full spectrum of threats, but also support local economic activity.

The discussion and tables below summarize the range of potential social and economic impacts that may occur as a result of the subset of conservation measures that affect land or resource uses linked to readily identifiable social or economic conditions.

**Table 4.60** and **Table 4.61** summarize the quantitative analysis of the potential effects of management alternatives on employment, earnings, and earnings per job in the primary study area. The socioeconomic impacts quantified are based on assumptions and best available data described as described in this section and in **Appendix W**. As a landscape level planning effort, a substantial amount of uncertainty exists regarding the magnitude, location, and nature of impacts on resource uses during implementation. To the extent feasible, the BLM and Forest Service provided localized information on impacts. In addition, the socioeconomic impacts quantified in this section do not exhaust all the possible socioeconomic impacts that could arise during implementation; especially, those impacts that would be associated with agency expenditures. These impacts may be of more or less importance to individual communities and will be analyze during implementation. The quantitative analysis included earnings and employment affected by management impacts on grazing, oil and gas, coal and wind energy, and these activities are expected to jointly capture the majority of the economic impact of the alternatives in the primary study area. Although estimates are presented on an annual basis, they would persist over time (a 15-year period was used for the purposes of the socioeconomic analysis). For the purpose of these tables, the numbers for grazing Alternative CI were included. The impacts of oil and gas took into consideration impacts on federal, state, and private fluid minerals. Wind impacts include both construction and operations.

**Table 4.60**  
**Average Annual Impact on Employment and Earnings by Alternative,**  
**Relative to Alternative A, Primary Study Area**

		<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Proposed Plans</b>
Employment relative to Alternative A <sup>1</sup>	Grazing	0	-608	0	0	0
	Oil and Gas	-271	-653	-25	0	-14
	Coal	-715	-975	0	0	-111
	Wind	-28	-28	-28	0	-28
	<b>Total</b>	<b>-1,012</b>	<b>-2,262</b>	<b>-51</b>	<b>0</b>	<b>-153</b>
Earnings relative to Alternative A (2011\$)	Grazing	\$0	-\$17,638,438	\$0	\$0	\$0
	Oil and Gas	-\$13,847,839	-\$33,383,657	-\$1,399,957	\$0	-\$872,208
	Coal	-\$44,469,836	-\$60,478,647	\$0	\$0	-\$7,091,537
	Wind	-\$1,173,232	-\$1,173,232	-\$1,173,232	\$0	-\$1,173,232
	<b>Total</b>	<b>-\$59,433,524</b>	<b>-\$112,616,591</b>	<b>-\$2,515,806</b>	<b>\$0</b>	<b>-\$9,136,977</b>
Average Earnings Per Job Lost (2011\$)	Grazing	NA	\$29,011	NA	NA	NA
	Oil and Gas	\$51,094	\$51,124	\$55,363	NA	\$62,301
	Coal	\$62,196	\$62,029	NA	NA	\$63,888
	Wind	\$42,917	\$42,917	\$42,917	NA	\$41,901
	<b>Total</b>	<b>\$58,727</b>	<b>\$49,786</b>	<b>\$49,054</b>	<b>NA</b>	<b>\$59,719</b>

Source: Impacts calculated using the IMPLAN model as explained in the text and **Appendix W**.

<sup>1</sup>Employment counted as a part-time or full-time position during a 1-year period.

**Table 4.61**  
**Average Annual Impact on Employment and Earnings by Alternative, Relative to Alternative A, Percent of 2010 Baseline**

	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Proposed Plans</b>
Employment relative to Alternative A	-0.4%	-0.8%	0.02% <sup>1</sup>	0.0%	-0.1%
Earnings relative to Alternative A	-0.6%	-1.1%	-0.02%	0.0%	-0.1%

Source: Impacts calculated using the IMPLAN model as explained in the text and **Appendix W**. Uses the baseline values for employment and labor earnings presented in **Table 3.120** and **Table 3.121**.

<sup>1</sup>-0.04 percent

**Table 4.60** shows that the resources potentially affected by the choice of alternative are estimated to support an annual average of 2,262 fewer jobs under Alternative C when compared with Alternative A. Under Alternative C, approximately \$113 million less in labor earnings would be generated annually, when compared with Alternative A. Alternative E would generate no changes in employment or labor earnings relative to Alternative A. Alternatives B

and D and the Proposed Plans would have an impact in between these two estimates, with the Proposed Plans supporting more jobs than Alternative D which in turn would support more jobs than Alternative B.

**Table 4.61** shows that the resources potentially affected by the choice of alternative are estimated to correspond to a reduction in approximately 0.8 percent of the current employment in the primary study area under Alternative C, when compared with Alternative A. Based on **Table 4.60**, approximately 72 percent of the employment impacts would be attributed to impacts on oil and gas development and coal development with the remaining attributed mostly to grazing. Total earnings in coal mining would be more impacted considerably more because of the higher average earnings per job in that sector. Labor earnings potentially affected by the choice of alternative are approximately 1.1 percent of the 2010 earnings in the primary study area less than they would be under Alternative A. The higher potential impact on earnings than on jobs reflects the higher average earnings per job in the affected industries, when compared to the overall average in the primary study area. In particular, average earnings in jobs supported by the coal and oil and gas sectors are considerably higher than the average earnings per job in the study area.

As noted in **Section 4.23.2, Methodology and Assumptions**, economic impacts through the management of other resources are not expected to be substantially altered by the choice of alternative. This does not mean that there would be no impacts on those resources that have economic consequences. To the extent that leasing, travel or ROW restrictions affect individual economic activities, for example, they could impose increased costs to specific operators, whether associated with mining, grazing, or other economic activity. In addition, not all impacts of management alternatives through oil and gas, coal, wind energy and livestock grazing are reflected in the quantitative analysis. As previously discussed, various measures may have additional impacts that were not possible to quantify. For example, various management alternatives could have additional impacts on grazing through restrictions on movement of cattle, seasonal restrictions, impacts on rotation and other, as previously discussed.

In addition, counties will be impacted differently. As discussed above, Millard and Beaver counties would be expected to be most impacted by restrictions on wind development, Carbon, Duchesne and Uintah counties by impacts on oil and gas development, and larger groups of counties would be expected to be most impacted by grazing restrictions (Box Elder, Juab, Piute, Rich, Sanpete, and possibly Beaver and Iron counties) and coal restrictions (Carbon, Emery, Sanpete, Kane, Sevier, Piute, Garfield, and Millard counties).

Under current management, Alternative A, tax revenues are expected to be highest. Alternative B would generate less tax revenues than Alternative A. Alternative C would provide the least tax revenues. Alternative D and the Proposed Plans would generate tax revenues between Alternatives A and B. Alternative E would provide similar tax revenues as Alternative A.

Impacts from management alternatives on population trends would be expected to be generally not noticeable, with the possible exception of smaller communities highly dependent on grazing, coal mining, or oil and gas and whose activities intersect with GRSG occupied habitat. Interest groups revolving around conservation could experience greater benefits from Alternatives B and C. Communities with strong ties to livestock grazing, oil and gas, or coal mining would likely

benefit from Alternatives A, D, or E, or the Proposed Plans. Since many communities have both types of interest groups (and many more), the overall effects on specific communities with respect to interest group interests is difficult to predict.

**Table 4.62** summarizes the social impacts of the management alternatives.

**Table 4.62  
Social Impacts**

	<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Proposed Plans</b>
Population growth; demand for housing and public services	Current trend, highest	Between A and C	Potential impacts on specific communities	Between A and B	Same as Alternative A	Between B and D
Consistency with county LUPs	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Impacts on interest groups and communities of place	Most benefit to extractive use interests	Between A and C	Most benefits to conservation groups	Between A and B	Same as Alternative A	Between B and D

Nonmarket benefits from this action will be derived from the ability of the full spectrum of conservation measures to conserve, enhance, and/or restore GRSG habitat by reducing, eliminating, or minimizing threats to GRSG habitat. Furthermore, as discussed, alternatives also specify different types and levels of mechanisms, such as disturbance caps, adaptive management protocols, and desired conditions or objectives, to guide when and where conservation measures, design features, and treatments are implemented and that will have an important influence on the overall effectiveness and efficiency of the alternatives. The magnitude of benefits associated with stabilizing or improving GRSG populations or habitat has not been monetized or quantified due to the absence of specific data on the values of nonmarket benefits of GRSG and uncertainty about quantifying projected responses of GRSG habitat and populations to conservation measures.

A qualitative evaluation of the benefits from potential changes in GRSG populations and habitat resulting from the subset of conservation measures addressing land and resource uses and extraction, as evaluated in this section, indicates alternatives have the following capability to protect or improve benefits from GRSG:

- Alternative A has the lowest capability.
- Alternative B has greater capability than A, but lower capability than Alternative C.
- Alternative C has the greatest capability.
- Alternative D has greater capability than A or E, but lower capability than B or C.

- Alternative E has greater capability than A, but less than Alternatives B, C, or D.
- The Proposed Plans have greater capability than A, D, or E but less than B or C.

In addition to the conservation measures directly associated with social or economic impacts considered in this section, other conservation measures address other threats (e.g., fire, nonnative plants, and encroachment) that also contribute to GRSG and GRSG habitat protection and corresponding benefits that are not addressed here. Consequently, for a complete description of potential improvements in GRSG habitat protection resulting from the full spectrum of conservation measures under each alternative, the reader is referred to effects summary tables provided in **Chapter 2**. Social and economic impacts cannot be considered in isolation or exclusive of other impact indicators discussed in this EIS.

#### **4.23.6 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.

The BLM and Forest Service also reviewed the scoping report to identify any comments related to environmental justice issues received in the scoping phase. No comments during the scoping period were identified raising concerns regarding potential impacts on minority and low-income populations.

#### **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 primary study area in **Chapter 3**, and based on definitions in relevant guidance, no minority populations were identified in the primary study area. Smaller communities where minority presence is “meaningfully greater” than in the state as a whole, although not identified in **Chapter 3**, may, however, exist in the primary 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, Environmental Consequences**.

Because of the following, the BLM and Forest Service concluded that there would be no disproportionately high and adverse impacts on minority population under the management alternatives considered:

- No minority populations were identified at the county level.
- Although small communities with meaningfully greater presence of minorities could exist in the primary study area, adverse impacts under any of the alternatives would not be restricted to small communities, but rather spread out in a broad region.
- No minority group is identified with the specific collection of activities that could be impacted by GRSG management (e.g., mining, oil and gas, grazing) and of these only grazing generates jobs with earnings lower than the average labor earnings in the primary study area.
- No pathways through which minority populations would be particularly vulnerable to the adverse impacts identified in **Chapter 4**.

#### ***Potential Impacts on Low-Income Populations***

The presence or absence of low-income populations in the primary study area is discussed in **Chapter 3**. Of the 22 counties in the Socioeconomic Study Area, ten have a higher percentage of residents below the poverty line than the overall Utah percentage below the poverty line and four (Iron County, Beaver County, Sanpete county and Cache County) have a higher percentage of residents below the poverty line than the national percentage. It is also possible that there are small communities that do constitute low-income populations, given the large geographic coverage of this EIS.

The BLM and Forest Service reviewed the impacts of alternatives described in the respective sections of **Chapter 4**.

Because of the following, the BLM and Forest Service concluded that there would be no disproportionately high and adverse impacts on low-income populations under the management alternatives considered:

- No adverse impacts were identified that would be disproportionately concentrated in Iron, Beaver, Sanpete, or Cache County.
- Although small communities with meaningfully greater presence of low-income groups could exist in the primary study area, adverse impacts under any of the alternatives would not be restricted to small communities, but rather spread out in a broad region.
- No low-income group is identified with the specific collection of activities that could be impacted by GRSG management (e.g., mining, oil and gas, grazing) and of these

only grazing generates jobs with earnings lower than the average labor earnings in the primary study area

- No pathways through which low-income populations would be particularly vulnerable to the adverse impacts identified in **Chapter 4**.

**Table 4.63** provides a summary of environmental justice impacts.

**Table 4.63**  
**Environmental Justice Impacts**

	Alternative					Proposed Plans
	A	B	C	D	E	
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	No Impact	No Impact	No Impact	No Impact

## 4.24 TRIBAL INTERESTS

### 4.24.1 Methods and Assumptions

#### *Indicators*

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

- **Magnitude:** The amount of physical alteration or destruction that can be expected. The resultant loss of tribal value is not measurable in quantitative terms, but is described in qualitative summary.
- **Severity:** The irreversibility of an impact. Impacts that result in an irreversible and irretrievable loss of value are of the highest severity.
- **Duration:** The length of time an impact persists. Impacts may have short-term or temporary effects, or conversely, more persistent, long-term effects on tribal values.
- **Range:** The spatial distribution, whether widespread or site-specific, of an impact.

- **Frequency:** The number of times an impact can be expected. For example, an impact of variable magnitude and severity may occur only once. An impact such as that resulting from annual activities, such as road maintenance, may be of recurring or ongoing nature.

### **Assumptions**

In addition to the assumptions in **Section 4.2.1**, this analysis includes the following assumptions:

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

### **4.24.2 Alternatives Analysis**

Types of impacts that could occur from management actions or their implementation under all alternatives include the following:

- Direct disturbance of locations or landscapes associated with trust or treaty assets, traditional beliefs, sacred sites, resource gathering areas, hunting and fishing areas, water sources, ancestral sites, human remains, and trails (similar to those described in **Section 4.12**, Cultural Resources)
- Alterations of visual and aural aspects of the cultural landscape's setting that would create changes to the landscape that make it no longer useable by tribal members
- Increased access and human presence, which could lead to increased vandalism and unauthorized collection of ancestral sites or trespass on treaty areas
- Decreased tribal member access or interference with the exercise of treaty rights or cultural uses and practices, such as resource gathering or hunting
- The potential for erosion, pollution, habitat loss, and less-tangible changes to natural features and resources that tribal members may consider sacred

Any action that would impact the integrity of an Indian Trust Asset or treaty-based right of a tribe or tribal resource in the planning area would be considered an adverse effect on that resource, asset, or interest. Impacts can be caused by development (e.g., road construction) or conservation (e.g., habitat improvement or landscape reclamation) actions or future implementation actions. The BLM and Forest Service would continue to maintain government-to-government consultation with federally recognized Native American tribes and would consult with tribes during future implementation actions to assess case-by-case or project-by-project impacts.

Depending on the extent and type of activity, the amount of physical disturbance could be from slight visual or other intrusions on a landscape to wholesale destruction of an entire location or site. Whether impacts would affect a small portion of an area or affect a larger stretch of landscape would need to be evaluated by tribal representatives before making a determination on said impact's severity. However, it is usual to assume that impacts resulting in an irreversible and irretrievable loss of tribal value are of the highest severity. On a project-by-project basis, the spatial distribution (or range) of the disturbance would be largely focused on a site-specific basis. However, over time and as more actions occur throughout the planning area, the extent would be throughout sagebrush habitat.

Under all alternatives and the Proposed Plans, the BLM would continue to manage BLM-administered lands in a manner that accommodates Native American religious traditions, practices, and beliefs as guided by directives contained in BLM Manual 8120, American Indian Religious Freedom Act (42 USC 1996), Native American Graves Protection and Repatriation Act (25 USC 3001), Executive Order 13007 (Indian Sacred Sites), and Executive Order 13084 (Tribal Consultation), and Secretarial Order 3317, DOI Policy on Consultation with Indian Tribes (December 1, 2011). National Forest System lands are guided by Forest Service Manual 1500 (External Relations) and Forest Service Handbook 1509 (American Indian and Alaska Native Relations). All alternatives allow for the appropriate tribal governments to consult on a case-by-case basis on undertakings on BLM-administered and National Forest System lands that could affect Native American concerns. The BLM and Forest Service would continue to identify, protect, and preserve tribal assets, treaty rights, sacred/religious sites, or special use areas through site- and project-specific modification or mitigation on a case-by-case or project-by-project consultation basis that could affect Native American concerns.

**Table 4.64** displays acres of tribal surface estate mapped as PHMA and GHMA under the Proposed Plans. Management actions tied to PHMA and GHMA would not be applied to tribal surface estate under any alternative because neither the BLM nor the Forest Service has discretion or authority to approve activities on these lands. However, anthropogenic disturbance on all lands (regardless of land ownership) must be taken into consideration when applying the Disturbance Cap Guidance (**Appendix E**). In cases where the BLM and Forest Service are reviewing new activities on public lands within PHMA and adjacent to tribal surface, existing disturbance on tribal lands would be taken into account if applicable.

**Table 4.64**  
**Mapped Tribal Surface Estate, Proposed Plans**

Population Area	PHMA			GHMA		
	Total Surface <sup>1</sup>	Tribal Surface	Split Estate Minerals <sup>2</sup>	Total Surface <sup>1</sup>	Tribal Surface	Split Estate Minerals <sup>2</sup>
Uintah	566,800	16,200	0	991,500	353,200	43,200
Carbon	285,800	0	0	214,200	6,900	0
lbapah	88,800	28,000	200	10,800	0	0
Strawberry	161,500	960	0	20,600	240	0
<b>Statewide</b>	<b>1,102,900</b>	<b>45,160</b>	<b>200</b>	<b>1,237,100</b>	<b>360,340</b>	<b>43,200</b>

Source: BLM 2015

<sup>1</sup>Acres associated with total PHMA/GHMA polygon, regardless of land ownership.

<sup>2</sup>Acres where the surface estate is owned by a Native American Tribe but that have a federal mineral estate.

#### 4.25 UNAVOIDABLE ADVERSE IMPACTS

Section 102(C) of the 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 because of implementing the LUPA. Others are a result of public use of BLM-administered and National Forest System 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 impacts would be ceased on discovery of a resource, and the resource would be mitigated to minimize data 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 GRSG would result in the destruction of the target species, be it annual grass, noxious weed, invasion 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.

#### **4.26 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. 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, acknowledges leasing of oil and gas resources as an irreversible commitment. As noted above, this would be most likely under Alternative A.

Additional stipulations under the draft LUPA could reduce the potential for development, but the stipulations under Alternatives B, C, and D would provide an increasingly restrictive environment for such development and so a decreasing likelihood of this impact.

#### **4.27 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 GRS habitat.

ROWs 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 EI. 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 and the short-term use of GRSG habitat, big game crucial winter range, fawning and calving areas, and migratory corridors for energy and minerals could impair the long-term productivity of GRSG populations and big game 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 because of mineral activity would be more evident under Alternative A. Alternative C would provide the most protections to reduce the long-term losses due to the 3 percent disturbance caps in all designated habitat.

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.