Northwest Colorado Greater Sage-Grouse

Draft

Land Use Plan Amendment and Environmental Impact Statement

US Department of the Interior,
Bureau of Land Management
US Department of Agriculture,
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Responsible Agencies:

- United States Department of the Interior, Bureau of Land Management
- United States Department of Agriculture, Forest Service

Type of Action: Administrative

Document Status: Draft

Abstract: This draft land use plan amendment and environmental impact statement has been prepared by the Bureau of Land Management (BLM) and United States Department of Agriculture, Forest Service (USFS) with assistance from 22 cooperating agencies. It describes and analyzes four alternatives for managing approximately 1.7 million acres of BLM-administered and National Forest System lands and approximately 2.8 million acres of BLM-administered subsurface federal mineral estate that may lie beneath other surface ownership. Surface estate and federal mineral estate is managed by five BLM field offices (Colorado River Valley, Grand Junction, Kremmling, Little Snake, and White River), which make up the BLM Colorado Northwest District, and one national forest (Routt). The analysis area spans portions of 10 northwest Colorado counties: Eagle, Garfield, Grand, Jackson, Larimer, Mesa, Moffat, Rio Blanco, Routt, and Summit. Alternative A is a continuation of current management (No Action Alternative); use of public lands and resources would continue to be managed under the current BLM RMPs and USFS land and resource management plan, as amended. Alternative B describes management actions taken directly from the Sage-Grouse National Technical Team's *A Report on National Greater Sage-Grouse Conservation Measures*. Alternative C describes management actions submitted by various citizen groups. Alternative D describes management actions developed by adapting the National Technical Team measures to Northwest Colorado and is the agencies' preferred alternative. Alternative D is not a final agency decision but instead an indication of the agencies' preliminary preference that reflects the best combination of decisions to achieve BLM and USFS goals and policies, meet the purpose and need, address the key planning issues, and consider the recommendations of cooperating agencies and BLM and USFS specialists. The alternatives present a range of management actions to achieve goal of Greater Sage-Grouse conservation for the BLM Colorado Northwest District and the Routt National Forest. Major planning issues addressed include realty actions, oil and gas, minerals, travel management, grazing, and fuels management.

Review Period: Comments on the Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement will be accepted for 90 calendar days following publication of the United States Environmental Protection Agency's Notice of Availability in the *Federal Register*.

For further information, contact:

Mrs. Erin Jones, NEPA Coordinator, Bureau of Land Management

Northwest Colorado District

2815 H Road

Grand Junction, CO 81506

(970) 244–3000

Web site: http://www.blm.gov/wo/st/en/prog/more/sagegrouse.html

Dear Reader Letter

In Reply Refer To:

1610 (COS050)

Dear Reader:

The Greater Sage-Grouse Draft Land Use Plan Amendment/Draft Environmental Impact Statement (Draft LUPA/EIS) for the Colorado Bureau of Land Management (BLM) Northwest Colorado District is available for your review and comment. The Northwest Colorado Greater Sage-Grouse Draft LUPA/EIS and supporting information is available on the project web site at: http://www.blm.gov/wo/st/en/prog/more/sagegrouse.html

The BLM and US Department of Agriculture, Forest Service (USFS) prepared this document in consultation with 22 cooperating agencies and in accordance with the National Environmental Policy Act of 1969, as amended, the Federal Land Policy and Management Act of 1976, as amended, the National Forest Management Act of 1976, implementing regulations, the BLM's Land Use Planning Handbook (H-1601-1), the Forest Service's Land Management Manual 1900, and other applicable law and policy.

The planning area consists of approximately 8.6 million acres of land, which includes approximately 1.7 million acres of BLM-administered and National Forest System lands and approximately 2.8 million acres of BLM-administered subsurface federal mineral estate that may lie beneath other surface ownership. Surface estate and federal mineral estate is managed by five BLM field offices (Colorado River Valley, Grand Junction, Kremmling, Little Snake, and White River) and one national forest (Routt) that span portions of 10 northwest Colorado counties: Eagle, Garfield, Grand, Jackson, Larimer, Mesa, Moffat, Rio Blanco, Routt, and Summit. If approved, this LUPA would amend the existing BLM RMPs in these field offices and the USFS land and resource management plan and would guide the management of Greater Sage-Grouse habitat on public lands administered by the BLM and USFS, including federal mineral estate, into the future.

The BLM and USFS encourage the public to provide information and comments regarding the analysis presented in the Draft LUPA/EIS. We are particularly interested in comments concerning the adequacy and accuracy of the proposed alternatives, the analysis of their respective management decisions, and any new information that would help the BLM and USFS as it continues to develop the LUPA.

In developing the Proposed LUPA/Final EIS, which is the next phase of the planning process, the BLM decision maker may select management decisions from each of the alternatives analyzed in the Draft LUPA/EIS for the purpose of creating a management strategy that best meets the needs of the resources and values in this area under the BLM multiple-use and sustained-yield mandate. As a member of the public, your timely comments on the Draft LUPA/EIS will help formulate the Proposed LUPA/Final EIS. Comments will be accepted for ninety (90) calendar days following the US Environmental Protection Agency's publication of its Notice of Availability in the *Federal Register*. The BLM can best utilize your comments and resource information submissions if received within the review period.

Comments may be submitted electronically by e-mail to: blm_co_nw_sage_grouse@blm.gov or at the project Web site: http://www.blm.gov/wo/st/en/prog/more/sagegrouse.html. Comments may also be submitted by mail to:

NEPA Coordinator

Bureau of Land Management, Northwest Colorado District

2815 H Road

Grand Junction, CO 81506

To facilitate analysis of comments and information submitted, we strongly encourage you to submit comments in an electronic format. There is no need to submit the same comment more than once or in more than one format.

If you wish to submit comments on the Draft LUPA/EIS, we request that you make your comments as specific as possible. Comments will be more helpful if they reference a section or page number and include suggested changes, sources, or methodologies. Comments containing only opinion or preferences will be considered and included as part of the decision-making process, although they will not receive a formal response from the BLM.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, be advised that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

Public meetings to provide an overview of the document and to respond to questions will be announced by local media, the project website, and/or public mailings at least 15 days in advance. Public meetings will be held at a time and date to be determined.

The Northwest Colorado Greater Sage-Grouse Draft LUPA/EIS has been sent to affected federal, state, and local government agencies and tribal governments. Copies are also available for public inspection at the following BLM and USFS locations:

Bureau of Land Management, Colorado State Office, 2850 Youngfield Street, Lakewood, CO 80215

Bureau of Land Management, Northwest Colorado District, 2815 H Road, Grand Junction, CO 81506

USDA Forest Service, Medicine Bow-Routt National Forests, 925 Weiss Drive, Steamboat Springs, CO 80487

USDA Forest Service, Rocky Mountain Regional Office, 740 Simms Street, Golden, CO 80401

USDA Forest Service, Medicine Bow - Routt National Forests, 2468 Jackson Street, Laramie, WY 82070

A limited number of the Northwest Colorado Greater Sage-Grouse Draft LUPA/EIS have been printed. Viewing the document electronically from the project website or from a CD is encouraged.

Thank you for your continued interest in the Northwest Colorado Greater Sage-Grouse LUPA. We appreciate the information and suggestions you contribute to the planning process. For additional information or clarification regarding this document or the planning process, please contact Ms. Erin Jones at (970) 244-3008.

Sincerely,

Helen M. Hankins

Colorado State Director

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Executive Summary

ES.1 Introduction

In March 2010, United States (US) Fish and Wildlife Service (USFWS) published its listing decision for the Greater Sage-Grouse (GRSG) *(Centrocercus urophasianus)* as "warranted but precluded" (75 *Federal Register* 13910, March 23, 2010). The BLM manages over 50 percent of GRSG habitat across 11 western states. Inadequacy of regulatory mechanisms in Land Use Plans (LUPs) was identified as a major threat in the USFWS finding on the petition to list the GRSG under the Endangered Species Act (ESA). In response to the USFWS finding and pending listing decision, the United States (US) Department of the Interior, Bureau of Land Management (BLM) and the US Department of Agriculture, Forest Service (USFS) have prepared this Draft LUP Amendment (LUPA) to analyze the addition of GRSG conservation measures to their existing resource management plans (RMPs)/land and resource management plan (Forest Plan). The Federal Land Policy and Management Act of 1976 (FLPMA) directs the BLM to develop and periodically revise or amend its RMPs, which guide management of BLM-administered lands. The National Forest Management Act of 1976 (NFMA) directs the USFS to develop and periodically revise or amend its Forest Plans, which guide management of National Forest System lands. These two agencies' plans, which would be amended by this document, are generically referred to as LUPs throughout the remainder of this document. The USFWS has identified conservation measures in LUPs as the principal regulatory mechanism for protecting GRSG on BLM-administered and National Forest System lands. Based on the identified threats to the GRSG and the USFWS timeline for making a listing decision on this species, the BLM and USFS need to incorporate objectives and adequate conservation measures into LUPs to conserve GRSG to potentially avoid the need for USFWS to list the species as threatened or endangered under the ESA. The conservation measures include both restrictions on land uses and programs that affect GRSG and measures to reduce the impacts of BLM/USFS programs or authorized uses. In response to the USFWS findings, the BLM and USFS will evaluate the adequacy of its LUPs and will address, as necessary, amendments throughout the range of the GRSG.

Consistent with national policy, the BLM and USFS are preparing several environmental impact statements (EISs), with associated LUP amendments or revisions. These documents will address a range of alternatives focused on specific conservation measures across the range of the GRSG. The amendments will be coordinated under two administrative planning regions across the entire range of the GRSG. The Rocky Mountain Region and the Great Basin Region boundaries are drawn roughly to correspond with the threats identified by USFWS in the 2010 listing decision, along with the Western Association of Fish and Wildlife Agencies management zones framework (Stiver et al. 2006).

The management zones reflect ecological and biological issues and similarities. In addition, management challenges within management zones are similar, and GRSG and their habitats are likely responding similarly to environmental factors and management actions. The Rocky Mountain Region consists of land use plans in North Dakota, South Dakota, Wyoming, and Colorado and in portions of Montana and Utah. The Great Basin Region consists of land use plans in California, Nevada, Oregon, and Idaho and in portions of Utah and Montana.

As identified above, this direction is the result of the March 2010 publication of USFWS's *12-Month Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered*. In this document, the agency concluded that the GRSG is warranted for listing as a threatened or endangered species. The USFWS reviewed the status and threats

to the GRSG in relation to the five listing factors provided in Section 4(a)(1) of the ESA. It determined that factor A, "the present or threatened destruction, modification, or curtailment of the habitat or range of the GRSG," and factor D, "the inadequacy of existing regulatory mechanisms," both posed "a significant threat to the GRSG now and in the foreseeable future" (75 *Federal Register* 13910, March 23, 2010). This LUPA, along with the other plans cited above, addresses both listing factors A and D and will provide consistency in managing GRSG habitat. BLM Instruction Memorandum 2012-044, BLM National Greater Sage-Grouse Land Use Planning Strategy (BLM 2012a) (**Appendix A**) provides direction for considering sage-grouse conservation measures in the land use planning process.

This LUPA addresses GRSG habitat within northwest Colorado. The BLM's Northwest Colorado District office has mapped this habitat preliminarily, in coordination with the Colorado Department of Natural Resources, Parks and Wildlife (CPW). GRSG habitat falls into one of the three following categories:

- **Preliminary Priority Habitat (PPH)** - Areas that have been identified as having the highest conservation value to maintaining sustainable GRSG populations; include breeding, late brood-rearing, and winter concentration areas.

- **Preliminary General Habitat (PGH)** - Areas of seasonal or year-round habitat outside of priority habitat.

- **Linkage/Connectivity Habitat** - Areas that have been identified as broader regions of connectivity important to facilitate the movement of GRSG and to maintain ecological processes.

PPH and PGH are considered preliminary until a decision on this document is made, at which point they would become Priority Habitat and General Habitat. Collectively, PPH, PGH, and linkage/connectivity habitat are referred to as all designated habitat (ADH).

Range-wide, approximately 50 percent of sagebrush habitat within GRSG management zones is on BLM-administered land, and approximately 8 percent is on National Forest System land; within the Northwest Colorado District, approximately 43 percent of sagebrush habitat is on BLM-administered and National Forest System lands. Changes in management of GRSG habitats are needed to avoid the continued decline of populations that are anticipated across the species' range. Range-wide, adaptive management strategies will focus on areas affected by threats to GRSG habitat, such as wildfire, energy development, disease, and infrastructure development, depending on the threats within each sub-region of the Rocky Mountain and Great Basin regions. The BLM and USFS administer a large portion of GRSG habitat within the affected states; because of this, changes in GRSG habitat management is anticipated to have a considerable impact on GRSG populations and could prevent the species from being listed as threatened or endangered under the ESA.

The planning area for the Northwest Colorado GRSG LUPA/EIS is composed of land administered by the BLM,), the USFS, the National Park Service, and the State of Colorado, as well as private lands (**Table ES–1**, Planning Area Land Ownership and GRSG Habitat [in Acres]). These areas are in Eagle, Garfield, Grand, Jackson, Larimer, Mesa, Moffat, Rio Blanco, Routt, and Summit Counties in northwestern Colorado. **Figure ES-1**, Northwest Colorado Greater Sage-Grouse EIS Planning Area Boundaries, depicts the planning area.

The planning area incorporates the PPH, PGH, and linkage/connectivity habitat. Though the planning area includes private lands, decisions are made only for BLM and USFS federal surface and federal minerals in this LUPA. Management direction and actions outlined in this LUPA apply only to these BLM-administered and Routt National Forest lands within the planning area and to federal mineral estate under BLM administration that may lie beneath other surface ownership; this is defined as the decision area.

GRSG habitat in the Northwest Colorado District consists of approximately 2.4 million acres of PPH, 1.5 million acres of PGH, and 295,800 acres of linkage/connectivity habitat (all acreage figures are regardless of land ownership). PPH, PGH, and linkage/connectivity habitat were mapped in cooperation with the CPW. **Table ES–1**, Planning Area Land Ownership and GRSG Habitat (in Acres), shows the acreage of PPH and PGH by landowner and by county, and **Figure ES-1**, Northwest Colorado Greater Sage-Grouse EIS Planning Area Boundaries, shows areas mapped as PPH, PGH, and linkage/connectivity habitat.

Table 1. ES-1 Planning Area Land Ownership and GRSG Habitat (in Acres)

County	GRSG Habitat Type	BLM[1]	USFS[1]	National Park Service	US-FWS	State	State, County, and City	Private	Unclassified
Eagle	PPH	20,900	0	0	0	700	0	15,100	0
	PGH	16,100	2,500	0	0	0	0	15,600	0
	Linkage	0	0	0	0	0	0	0	0
Garfield	PPH	24,800	0	0	0	0	300	123,700	0
	PGH	35,900	0	0	0	0	600	35,600	0
	Linkage	0	0	0	0	0	45	7600	0
Grand	PPH	60,700	1,000	0	0	20,300	5,200	116,500	0
	PGH	11,300	1,600	0	0	2,300	0	40,500	0
	Linkage	6,700	0	0	0	0	0	0	0
Jackson	PPH	137,600	800	0	22,800	25,200	2,600	195,100	0
	PGH	1,100	100	0	0	8,000	500	27,000	0
	Linkage	2,200	0	0	0	1,000	0	7,500	0
Larimer	PPH	0	0	0	0	0	0	0	0
	PGH	6,700	0	0	0	2,100	2,100	9,400	0
	Linkage	0	0	0	0	0	0	0	0
Mesa	PPH	0	0	0	0	0	0	0	0
	PGH	4,500	300	0	0	0	800	8,700	0
	Linkage	0	0	0	0	0	0	0	0
Moffat	PPH	623,300	0	3,600	0	116,200	13,900	540,400	200
	PGH	542,000	0	6,300	11,900	53,500	1,000	357,000	100
	Linkage	1,700	0	0	0	0	0	5,300	0
Rio Blanco	PPH	36,400	0	0	0	0	5,500	52,300	0
	PGH	108,800	200	0	0	0	1,800	83,600	0
	Linkage	69,100	0	0	0	0	6,100	147,900	0
Routt	PPH	17,100	600	0	0	25,100	1,300	151,600	0
	PGH	1,600	10,200	0	0	5,400	0	74,500	0
	Linkage	2,200	0	0	0	3,600	0	34,800	0
Summit	PPH	700	2,800	0	0	0	0	1,800	0
	PGH	0	0	0	0	0	0	0	0
	Linkage	0	0	0	0	0	0	0	0

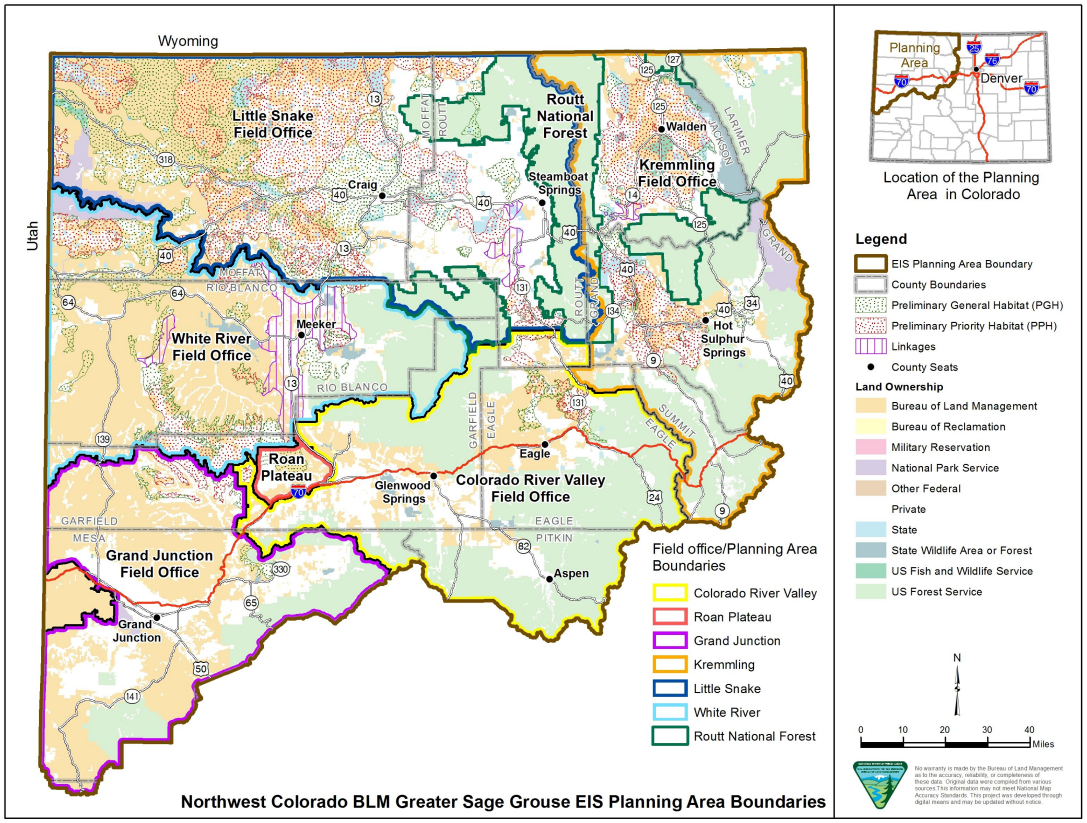
County	GRSG Habitat Type	BLM[1]	USFS[1]	National Park Service	US-FWS	State	State, County, and City	Private	Unclassified
Total[2]		**1,731,400**	**20,100**	**9,900**	**37,400**	**263,400**	**41,745**	**2,051,500**	**300**

Source: CPW 2012

[1] BLM and USFS subsurface federal mineral estate data

[2] There is no PPH or PGH on US Department of Defense lands in the planning area

Figure ES-1 - Northwest Colorado Greater Sage-Grouse EIS Planning Area Boundaries



ES.2 Purpose of and Need for the Land Use Plan Amendments

The purpose of this LUPA is to identify and incorporate appropriate GRSG conservation measures into LUPs. In compliance with BLM Instruction Memorandum 2012-044, BLM National Greater Sage-Grouse Land Use Planning Strategy (BLM 2012a) (**Appendix A**), the measures to be considered include appropriate conservation measures developed by the National Technical Team (NTT). The BLM and USFS will consider such measures in the context of their multiple-use missions and propose to incorporate measures that will help conserve, enhance, and/or restore GRSG habitat by reducing, eliminating, or minimizing threats to that habitat. For purposes of this planning effort, conservation measures include both restrictions on land uses and programs that affect GRSG and measures to reduce the impacts of BLM/USFS programs or authorized uses. This would be done in concert with the BLM and USFS's allocation of resources, in accordance with the mandates of FLPMA and NFMA.

The need for this LUPA is to establish regulatory mechanisms in BLM and USFS LUPs to respond to the recent "warranted, but precluded" ESA listing petition decision from USFWS (75 *Federal Register* 13910, March 23, 2010). In its finding on the petition to list the GRSG, USFWS identified adequacy of regulatory mechanisms as a major threat. The USFWS also identified the principal regulatory mechanism for the BLM and USFS is conservation measures embedded in LUPs.

In addition, the purpose of this LUPA is as follows:

- To reevaluate existing conditions, resources and uses

- To reconsider the mix of resource allocations and management decisions designed to conserve and enhance GRSG habitat and to eliminate, reduce, or minimize threats to GRSG PPH and PGH on BLM-administered and National Forest System lands within the Northwest Colorado District, in accordance with FLPMA, Multiple-Use Sustained-Yield Act of 1960, and applicable laws

- To resolve multiple-use conflicts or issues between other resource values and resource uses in GRSG habitat; the resulting Northwest Colorado GRSG LUPA will establish consolidated guidance and updated goals, objectives, and management actions for the BLM-administered and National Forest System lands in the GRSG habitat; it also will address issues that have been identified through agency, interagency, and public scoping efforts

- To disclose and assess the direct, indirect and cumulative impacts of the past, present, and reasonably foreseeable future actions that would result from GRSG management actions, identified in the alternatives, in accordance with the requirements of the National Environmental Policy Act (NEPA), its implementing regulations, and other applicable laws

ES.3 Scoping

Scoping is an early and open process for determining the scope, or range, of issues to be addressed and for identifying the significant issues to consider in the planning process. Scoping is designed to meet the public involvement requirements of FLPMA and NEPA. It identifies the affected public and agency concerns. It defines the relevant issues and alternatives that will be examined in detail in the LUPA. A planning issue is defined as a major controversy or dispute regarding management or uses on BLM-administered and National Forest System lands that can be addressed through a range of alternatives.

A 60-day public scoping period began on December 9, 2011, with the publication in the Federal Register of a notice of intent to begin planning. The scoping period was extended through a notice of extension, published February 10, 2012; the scoping period ended on March 23, 2012.

This cooperative process included soliciting input from interested state and local governments, tribal governments, other federal agencies and organizations, and individuals to identify the scope of issues to be addressed in the LUPA and to assist in formulating reasonable alternatives. The scoping process is a method for opening dialogue between the BLM/USFS and the public about managing GRSG and their habitats on BLM-administered and National Forest System lands. The process also identifies the concerns of those who have an interest in this subject and in the GRSG habitats. As part of the scoping process, the BLM/USFS also requested that the public submit nominations for potential areas of critical environmental concern (ACECs) for GRSG and their habitat.

Scoping included four open-house meetings in Walden, Lakewood, Silt, and Craig, Colorado, in late January and early February 2012. In addition, news releases notified the public of the scoping period and invited them to provide written comments. Public comments were used to define the relevant issues that would be addressed by a reasonable range of alternatives in the Northwest Colorado GRSG LUPA/EIS.

The National Greater Sage-Grouse Planning Strategy LUPAs and EISs Scoping Summary Report (BLM and USFS 2012) is available on the project website for the national conservation effort: http://www.blm.gov/wo/st/en/prog/more/sagegrouse.html. The discussion below provides an overview of the scoping results, both range-wide and specific to Northwest Colorado.

ES.4 Issues

Issues to be addressed in the Northwest Colorado GRSG LUPA/EIS were identified by the public and the agencies during the scoping process for range-wide planning. The issues identified in the Scoping Summary Report (BLM and USFS 2012), and other resource and use issues identified in the BLM Land Use Planning Handbook (H-1601-1) (BLM 2005a), were considered in developing the alternatives brought forward for analysis. Range-wide issues identified in the Scoping Summary Report that are applicable for Northwest Colorado are included in **Table ES.2**, Range-Wide Planning Issues for Northwest Colorado.

ES4.1 Issues Specific to Northwest Colorado

Issues discussed in the comments for Northwest Colorado included GRSG habitat, energy and mineral development, and livestock grazing. No additional unique comment themes were identified outside of the issues identified in the range-wide analysis (**Table ES.2**, Range-Wide Planning Issues).

Table ES.2 Range-Wide Planning Issues

Issue	Planning Issue Category	Planning Issue
1.	Energy and mineral development	How would energy and mineral development, including renewable energy, be managed within GRSG habitat, while recognizing valid existing rights?
2.	GRSG and its habitat	How would the BLM/USFS use the best available science to designate PPH, PGH, and no-habitat categories and accurately monitor the impact of land uses on GRSG?
3.	Special management areas	What special management areas would the BLM/USFS designate to benefit the conservation, enhancement, and restoration of GRSG and its habitat?
4.	Livestock grazing	What measures would the BLM/USFS put into place to protect and improve GRSG habitat, while maintaining grazing privileges?
5.	Social, economic, and environmental justice	How could the BLM/USFS promote or maintain activities that provide social and economic benefit to local communities, while providing protection for GRSG habitat?
6.	Lands and realty	What opportunities exist to adjust public land ownership that would increase management efficiency for GRSG and its habitat?
7.	Fish and wildlife	What measures would be put in place to manage habitat for other wildlife species and reduce conflicts with GRSG?
8.	Recreation and travel management	How would motorized, nonmotorized, and mechanized travel be managed to provide access to federal lands and a variety of recreation opportunities, while protecting GRSG habitat?
9.	Wildland Fire management	What measures should be undertaken to manage fuels and wildland fires, while protecting GRSG habitat?
10.	Vegetation management	How would the BLM/USFS conserve, enhance, or restore GRSG habitat, such as sagebrush communities, and minimize or prevent the introduction or spread of noxious weeds and invasive species?
11.	Drought and climate change	How would the BLM/USFS incorporate the impacts of a changing climate on GRSG habitat?
12.	Wild horses	What measures would the BLM/USFS put in place to reduce the impacts of wild horses and burros on GRSG habitat?
13.	Water and soil	How would the BLM/USFS protect water and soil resources in order to benefit GRSG?

ES.5 Planning Criteria

Planning criteria are the standards, rules, and factors used as the sideboards to resolve issues and develop alternatives. Planning criteria are based on appropriate laws, regulations, BLM/USFS manual sections, and policy directives. Criteria also were based on public participation and coordination with cooperating agencies, other federal agencies, state and local governments, and Indian tribes. Planning criteria are prepared to ensure that decision making is tailored to the issues and to ensure that the BLM/USFS avoids unnecessary data collection and analysis.

The planning criteria listed below were developed internally and were presented for public comments during the public scoping period.

- The BLM/USFS will use will use the Western Association of Fish and Wildlife Agencies Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats (Connelly et al. 2004) and any other appropriate resources (e.g., GRSG scientific literature) to identify GRSG habitat requirements and best management practices (BMPs).

- The approved LUP amendments will be consistent with BLM Instruction Memorandum 2012-044, BLM National Greater Sage-Grouse Land Use Planning Strategy (BLM 2012a) (**Appendix A**).

- The approved LUPAs will comply with FLPMA; NEPA; Council on Environmental Quality (CEQ) regulations at 40 Code of Federal Regulations (CFR), Parts 1500-1508; US Department of the Interior regulations at 43 CFR 46 and 43 CFR 1600; USFS regulations at 36 CFR 220, BLM Land Use Planning Handbook (H-1601-1) (BLM 2005a), Appendix C (Program-Specific and Resource-Specific Decision Guidance Requirements) for the affected resource programs; the BLM NEPA Handbook (H-1790-1) (BLM 2008a); USFS Handbook 1901.15; and all other applicable BLM and USFS policies and guidance.

- The approved Forest Plan amendments will comply with NFMA, NEPA, CEQ regulations at 40 CFR 1500–1508, Regulations of the Secretary of Agriculture at 36 CFR 219, USFS Manual 1920, and USFS Handbook 1909.12.

- The LUP amendments will be limited to making land use planning decisions specific to the conservation of GRSG habitat.

- The BLM and USFS will consider allocations and prescriptive standards (on surface and split-estate lands) to conserve GRSG habitat, as well as objectives and management actions to restore, enhance, and improve GRSG habitat.

- The LUP amendments will recognize valid existing rights.

- Lands addressed in the LUP amendments will be BLM-administered and National Forest System lands, including surface estate and split-estate lands, managed by the BLM and USFS in GRSG habitats. Any decisions in the LUP amendments will apply only to federal lands administered by either the BLM or USFS.

- The BLM and USFS will use a collaborative and multijurisdictional approach, where appropriate, to determine the desired future condition of BLM-administered and National Forest System lands for the conservation of GRSG and their habitats.

- As described by law and policy, the BLM and USFS will strive to ensure that conservation measures are as consistent as possible with other planning jurisdictions within the planning area boundaries.

- The BLM and USFS will consider a range of reasonable alternatives, including appropriate management prescriptions, that focus on the relative values of resources, while contributing to the conservation of GRSG and its habitat.
- The BLM and USFS will analyze socioeconomic impacts of the alternatives, using an accepted input-output quantitative model, such as impact analysis for planning (IMPLAN).
- The BLM and USFS will endeavor to use current scientific information, research, and technologies and the results of inventory, monitoring, and coordination to determine appropriate local and regional management strategies that will enhance or restore GRSG habitat.
- Management of GRSG habitat that intersects with Wilderness Study Areas (WSA) on BLM-administered lands will be guided by BLM Manual 6330, Management of WSAs (BLM 2012b). Land use allocations made for WSAs must be consistent with the manual and with other laws, regulations, and policies related to WSA management.
- For BLM-administered lands, all activities and uses within GRSG habitats will follow existing BLM Colorado Public Land Health Standards. Standards and guidelines for livestock grazing and other programs that have developed standards and guidelines will be applicable to all alternatives for BLM-administered and National Forest System lands.
- The BLM and USFS will consult with Native American tribes to identify sites, areas, and objects important to their cultural and religious heritage within GRSG habitats.
- The BLM and USFS will coordinate with state, local, and tribal governments to ensure that the BLM and USFS consider provisions of pertinent plans, seeks to resolve inconsistencies between state, local, and tribal plans, and provides ample opportunities for state, local, and tribal governments to comment on the development of amendments.
- The BLM and USFS will develop vegetation management objectives, including those for managing noxious weeds and invasive species, including identifying desired future conditions for specific areas, within GRSG habitat.
- The LUP amendments will be based on the principles of adaptive management.
- Reasonable foreseeable development scenarios (RFDSs) and planning for fluid minerals will follow BLM Handbook H-1624-1 (BLM 1990) and current fluid minerals manual guidance for fluid mineral (oil and gas, coal-bed methane, oil shale) and geothermal resources. For National Forest System lands, the USFS will use applicable and relevant policy and procedures.
- The LUP amendments will be developed using an interdisciplinary approach to prepare RFDSs, identify alternatives, and analyze resource impacts, including cumulative impacts on natural and cultural resources and the social and economic environment.
- The most current approved BLM and USFS corporate spatial data will be supported by current metadata and will be used to ascertain GRSG habitat extent and quality. Data will be consistent with the principles of the Information Quality Act of 2000.
- State game and fish agencies' GRSG data and expertise will be used to the fullest extent practical in making management determinations on federal lands. Analysis of impacts in the LUP amendments will address the resources and resource programs identified in the NTT

report (**Appendix B**, A Report on National Greater Sage-Grouse Conservation Measures) and alternatives, which contain specific management measures for conservation of GRSG habitat.

- Resources and resource programs that do not contain specific management direction for GRSG and that may be indirectly affected by proposed management actions will be identified and discussed only to the degree required to fully understand the range of effects of the proposed management actions.
- An additional criterion was received in public scoping comments during the scoping period (December 9, 2011, to March 23, 2012) and was added to the planning criteria. This comment was that state game and fish agencies have the responsibility and authority to manage wildlife.

ES.6 Management Alternatives

Alternatives development is the heart of the planning process. Land use planning and NEPA regulations require the BLM/USFS to formulate a reasonable range of alternatives. Alternatives development is guided by established planning criteria (as outlined in 43 CFR, Part 1610).

The basic goal of alternative development is to produce feasible, distinct, and potential management scenarios that:

- Address the identified major planning issues
- Explore opportunities to enhance management of resources and resource uses
- Resolve conflicts between resources and resource uses
- Meet the purpose of and need for the LUPA

Between May and September 2012, the planning team met to develop management goals and to identify objectives and actions to address the goals. The various groups, along with cooperating agencies, met numerous times to refine their work. Through this process, the planning team developed one no action alternative (A) and three action alternatives (B, C, and D). The action alternatives were designed to address the seven planning issues (refer to **Section 1.5.2**, Issues Identified for Consideration in the Northwest Colorado Greater Sage-Grouse Land Use Plan Amendments), to fulfill the purpose of and need for the LUPA (outlined in **Section 1.2**, Purpose of and Need for the Land Use Plan Amendments), and to meet the multiple use mandates of FLPMA (43 US Code, Section 1716).

The three resulting action alternatives offer a range of possible management approaches. Their purpose is to respond to planning issues and concerns identified through public scoping, to maintain or increase GRSG abundance and distribution in the planning area, and to provide adequate regulatory mechanisms for GRSG.

While the goal is the same across alternatives, each alternative contains a discrete set of objectives, allowable uses, and management actions constituting a separate LUP amendment. The goal is through varying approaches, with the potential for different long-range outcomes and conditions. Land use allocations and conservation measures in the alternatives are focused on mapped GRSG habitat (PPH, PGH, and linkage/connectivity habitat), depending on the alternative's objective. The CPW delineated the PPH, PGH, and linkage/connectivity habitat, in coordination with the BLM and USFS, using the best available science, including radio-telemetry data. The current delineations of GRSG habitat may be refined in collaboration with Colorado

Parks and Wildlife, USFS, and USFWS as additional information is gained and data is refined regarding GRSG habitats and habitat use.

The relative emphasis given to particular resources and resource uses differs as well, including allowable uses, restoration measures, and specific direction pertaining to individual resource programs. When resources or resource uses are mandated by law or are not tied to planning issues, there are typically few or no distinctions between alternatives.

The alternatives are also directed toward responding to USFWS-identified issues and threats to GRSG and their habitat. All of the action alternatives were developed to employ resource programs to address the USFWS-identified threats. A complete description of all decisions proposed for each alternative is in **Chapter 2**, Alternatives. Summaries of the alternatives are presented below.

ES.6.1 Alternative A: No Action

Alternative A meets the CEQ requirement that a no action alternative be considered. This alternative continues current management direction and prevailing conditions derived from existing planning documents for all five field offices involved in this planning effort, plus the Routt National Forest. Goals and objectives for resources and resource uses are based on the existing LUPs and records of decision, along with associated amendments, activity and implementation level plans, and other management decision documents. Laws, regulations, and BLM/USFS policies that supersede LUP decisions would apply.

No PPH, PGH, or linkage/connectivity habitat would be delineated under Alternative A. Goals and objectives for BLM-administered and National Forest System lands and mineral estate would not change. Appropriate and allowable uses and restrictions pertaining to such activities as mineral leasing and development, recreation, utility corridor construction, and livestock grazing would also remain the same. The BLM/USFS would not modify existing or establish additional criteria to guide the identification of site-specific use levels for implementation.

ES.6.2 Elements Common to Alternatives B, C and D

All action alternatives include two basic components: delineated PPH, PGH, and linkage/connectivity habitat and required design features.

Delineated Lands as Preliminary Priority Habitat, Preliminary General Habitat, and Linkage/Connectivity Habitat

The areas delineated as PPH, PGH, and linkage/connectivity habitat are the same under each alternative; however, the allowable uses and management actions within those areas may vary between alternatives to meet the goal of the LUPA and objectives of the alternative.

Design Features

Required design features (RDFs) are means, measures, or practices that were derived from the NTT report (Appendix B, A Report on National Greater Sage-Grouse Conservation Measures) and are intended to reduce or avoid adverse environmental impacts. This LUPA proposes a suite of design features that vary by alternative and that would establish the minimum specifications for certain activities, such as water developments, mineral development, and fire and fuels management, and would mitigate adverse impacts. These design features would be required to provide a greater level of regulatory certainty than through implementation of BMPs.

In general, the RDFs are accepted practices that are known to be effective when implemented properly at the project level. However, their applicability and overall effectiveness cannot be fully assessed, except at the project-specific level, when the project location and design are known. Because of site-specific circumstances, some features may not apply to some projects (e.g., a resource is not present on a given site) or may require slight variations from what is described in the LUPA (e.g., a larger or smaller protective area).

- RDFs are design features required for a specified proposal or project and are often necessary to prevent unnecessary or undue degradation of public land resources.

- Preferred Design Features (PDFs) are established guidelines followed by the BLM/USFS to be incorporated into management activities where necessary, appropriate, and/or technically feasible. "Necessary" refers to the need for the PDF given the specifics of a proposal (e.g., it is not "necessary" to apply dust abatement on roads when the soil is sandy and wet). "Appropriate" refers to the wisdom of apply the PDF (e.g., it may not be "appropriate" to locate man camps outside priority habitat because the additional vehicle miles required by a more distant location could be more detrimental to GRSG). A PDF is "technically feasible" when it entails proven, or in some cases, emerging technology.

- Suggested design features (SDFs) apply to locatable minerals.

All variations in design features would require appropriate analysis and disclosure as part of future project authorizations. Additional mitigation measures may be identified and required during individual project development and environmental review. The proposed RDFs/PDFs/SDFs are presented in **Appendix I**.

ES.6.3 Alternative B

GRSG conservation measures in *A Report on National Greater Sage-Grouse Conservation Measures* (NTT 2011) (**Appendix B**) were used to form BLM/USFS management direction under Alternative B. Management actions by the BLM/USFS, in concert with other state and federal agencies, and private landowners play a critical role in the future trends of GRSG populations.

To ensure BLM/USFS management actions are effective and based on the best available science, the National Policy Team created the National Technical Team Report in December 2011. The BLM and USFS's objective for chartering this planning strategy was to develop new or revised regulatory mechanisms, through LUPs, to conserve and restore the GRSG and its habitat on BLM-administered and National Forest System lands range-wide over the long term. Conservation measures under Alternative B are focused on PPH (areas that have the highest conservation value to maintaining or increasing GRSG populations). These conservation measures include such protections as right-of-way exclusion and a fluid mineral leasing closure.

ES.6.4 Alternative C

During scoping for the National GRSG Planning Strategy, individuals and conservation groups submitted management direction recommendations for protection and conservation of GRSG and habitat at the range-wide level. These recommendations, in conjunction with resource allocation opportunities and internal sub-regional BLM/USFS input, were reviewed in order to develop BLM/USFS management direction for GRSG under Alternative C. Conservation measures under Alternative C are focused on PPH or all designated habitat (ADH), which includes PPH, PGH,

and linkage/connectivity areas habitat. These conservation measures include creating an ACEC that would include all PPH and a grazing closure over all ADH in the planning area.

ES.6.5 Alternative D

Alternative D, the sub-regional alternative, seeks to allocate resources among competing human interests and land uses and the conservation of natural resource values, including GRSG habitat. At the same time, it would sustain and enhance ecological integrity across the landscape, including plant, wildlife, and fish habitat. Alternative D incorporates local adjustments made in concert with the cooperating agencies to *A Report on National Greater Sage-Grouse Conservation Measures* (NTT 2011) (**Appendix B**). The purpose is to provide a balanced level of protection, restoration, enhancement, and use of resources and services to meet ongoing programs and land uses. Conservation measures under Alternative D are focused on both PPH and ADH.

ES.7 Environmental Consequences

The purpose of the environmental consequences analysis in this LUPA/EIS is to determine the potential for significant impacts of the federal action on the human environment. CEQ regulations for implementing NEPA state that the human environment is interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment (40 CFR, Part 1508.14). The federal action is the BLM and USFS's selection of an LUPA that will provide a consistent framework for its management of the GRSG and its habitat on BLM-administered and National Forest System lands. This would be in concert with its allocation of resources, in accordance with the multiple-use and sustained yield mandates of FLPMA.

Management actions proposed in **Chapter 2**, Alternatives, are primarily planning-level decisions and typically would not result in direct on-the-ground changes. There are exceptions to this rule, such as the proposed closures to fluid mineral leasing (under Alternatives B and C) and livestock grazing (under Alternative C). Impacts for some resources or resource uses, such as livestock grazing and off-highway vehicle (OHV) use, could be confined to the BLM-administered and National Forest System surface estate.

Other impacts, such as energy and minerals and requirements to protect GRSG from such activity could apply to all BLM-administered and National Forest System federal mineral estate (including split-estate). Some BLM/USFS management actions may affect only certain resources under certain alternatives.

This impact analysis identifies impacts that may enhance or improve a resource as a result of management actions, as well as those impacts that have the potential to impair a resource. However, the evaluations are confined to the actions that have direct, immediate, and more prominent effects.

Chapter 1. Introduction

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1.1. Introduction

1.1.1. Overview

This initiative is the result of the March 2010 United States (US) Fish and Wildlife Service (USFWS) *12-Month Finding for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered* (75 *Federal Register* 13910, March 23, 2010). In that 12-Month Finding, USFWS concluded that Greater Sage-Grouse (GRSG) was "warranted, but precluded" for listing as a threatened or endangered species. The USFWS reviewed the status and threats to the GRSG in relation to the five listing factors provided in Section 4(a)(1) of the Endangered Species Act of 1973 (ESA). Of the five listing factors reviewed, USFWS determined that Factor A, "the present or threatened destruction, modification, or curtailment of the habitat or range of the GRSG," and Factor D, "the inadequacy of existing regulatory mechanisms" in land use plans (LUPs) posed "**a significant threat to the GRSG now and in the foreseeable future**" (emphasis added). The USFWS identified the principal regulatory mechanisms for the US Department of the Interior, Bureau of Land Management (BLM) and US Department of Agriculture Forest Service (USFS) as conservation measures in LUPs. Conservation measures would include both restrictions on land uses and programs that affect GRSG and measures to reduce the impacts of BLM/USFS programs or authorized uses. Because the BLM and USFS manage 50 percent of GRSG habitat across the range, the agencies have begun the process of amending their LUPs to include the addition of GRSG conservation measures.

The Federal Land Policy and Management Act of 1976 (FLPMA) directs the BLM to develop and periodically revise or amend its Resource Management Plans (RMPs), which guide management of BLM-administered public lands. For the purpose of this document, the term RMP applies to all BLM LUPs, including the BLM's older Management Framework Plans. The National Forest Management Act of 1976 (NFMA) directs the USFS to develop and periodically revise or amend its Land and Resource Management Plans (Forest Plans), which guide management of National Forest System lands. These two agencies' plans are generically referred to as LUPs throughout the remainder of this document.

In response to the USFWS findings, the BLM and the USFS intend to prepare LUP amendments (LUPAs) with associated environmental impact statements (EISs) to incorporate specific conservation measures across the range of the GRSG, consistent with national BLM and USFS policy. The planning strategy will evaluate the adequacy of BLM and USFS LUPs and address, as necessary, amendments throughout the range of the GRSG (with the exceptions of the bi-state population in California and Nevada and the Washington State distinct population segment, which will be addressed through other planning efforts). The BLM is the lead agency, and the USFS is a cooperating agency in developing these EISs. These EISs have been coordinated under two administrative planning regions: the Rocky Mountain Region and the Great Basin Region. These regions are drawn roughly to correspond with the threats identified by USFWS in the 2010 listing decision, along with the Western Association of Fish and Wildlife Agencies (WAFWA) Management Zones framework (Stiver et al. 2006).

The Rocky Mountain Region comprises LUPs in the states of Montana, North Dakota, South Dakota, Wyoming, Colorado, and portions of Utah. This region comprises the WAFWA Management Zones I (Great Plains), II (Wyoming Basin) and a portion of VII (Colorado Plateau). The Northwest Colorado planning area overlaps two WAFWA Management Zones, Zones II and VII. Refer to **Figure 1-1**, Greater Sage-Grouse WAFWA Management Zones and Colorado Management Zones. The USFWS has identified a number of threats in this region, the most pressing being habitat loss and fragmentation caused by development (e.g., oil and gas development, energy transmission, and wind energy development).

In addition to the WAFWA Management Zones, the BLM/USFS have also identified 21 Colorado Management Zones (MZs) based on data from the Colorado Department of Natural Resources, Parks and Wildlife (CPW) in which they identified preliminary priority habitat (PPH), preliminary general habitat (PGH), and linkage/connectivity habitat. The Colorado MZs are used in the analysis to identify site-specific impacts and to differentiate between different areas of identified habitat. Refer to **Figure 1-1**, Greater Sage-Grouse WAFWA Management Zones and Colorado Management Zones. **Table 1.1**, Colorado GRSG Management Zones, represents acres per Colorado MZ and field office.

Table 1.1. Colorado GRSG Management Zones

Colorado Management Zone	Field Office	Acres (All Ownership)	Acres (BLM/USFS Surface)
1	LSFO	15,200	8,400
2	LSFO	172,900	120,100
3	LSFO	547,400	461,800
4	LSFO	244,400	111,100
5	LSFO	258,300	123,100
6	LSFO	307,900	50,600
7	LSFO/Routt National Forest	83,300	18,000
8	LSFO	252,300	4,700
9	LSFO	372,400	150,000
9	WRFO	50,800	21,800
10	LSFO	3,700	100
10	WRFO	282,000	190,300
11	KFO/Routt National Forest	413,200	138,600
12	KFO	18,300	6,800
13	KFO/Routt National Forest	272,400	72,900
14	CRVFO	97,300	41,000
14	LSFO	51,000	2,300
14	KFO/Routt National Forest	0	0
15	WRFO	47,600	3,000
16	WRFO	11,300	11,300
17	CRVFO	37,600	23,900
17	GJFO	78,600	14,500
17	WRFO	237,500	75,900
18	WRFO	19,200	13,000
19	CRVFO	5,400	2,100
19	WRFO	219,800	62,400
19	LSFO	0	0
20	LSFO	40,600	2,200
21	KFO	10,700	2,200
Total		**4,151,100**	**1,732,100**

The Great Basin Region comprises LUPs in California, Nevada, Oregon, Idaho, and portions of Utah and Montana. This region comprises the WAFWA Management Zones III (Southern Great Basin), IV (Snake River Plain), and V (Northern Great Basin). The USFWS has identified a number of threats in this region, the most pressing being wildfire, loss of native habitat to invasive species, and habitat fragmentation.

Both the Rocky Mountain and Great Basin regions are further divided into sub-regions. This National Environmental Policy Act (NEPA) EIS analysis is being done at the sub-regional level. These sub-regions are generally based on the identified threats to the GRSG and the WAFWA Management Zones.

On a sub-regional level, the BLM Northwest District and the Routt National Forest are proposing to complete this Northwest Colorado EIS to analyze the effects of amending up to six LUPs in order to provide Northwest Colorado-wide consistent management of GRSG habitat for all included BLM-administered and National Forest System lands. These proposed LUP amendments would identify and incorporate appropriate regulatory mechanisms to conserve, enhance, and/or restore GRSG habitat, and would be designed to eliminate, reduce, or minimize threats to GRSG priority and general habitats on BLM and National Forest System lands in Northwest Colorado. The proposed LUP amendments address both Listing Factors A and D (above). The BLM and USFS intend to issue separate Records of Decision (RODs) for the LUP amendments of each agency to be finalized by September 30, 2014, and expect that they could provide a basis to reduce the need for USFWS to list GRSG as a threatened or endangered species under the ESA. The following LUPs are proposed to be amended during this effort to incorporate appropriate conservation measures:

- BLM Colorado River Valley RMP (projected to be completed in mid-2014)
- BLM Grand Junction RMP (projected to be completed in early 2014)
- BLM Kremmling RMP (projected to be completed in mid-2014)
- BLM Little Snake RMP (BLM 2011)
- BLM White River RMP (BLM 1997) and associated amendments
- Routt National Forest Plan/Oil and Gas Leasing Availability Decision, and associated amendments (USFS 1997)

While the BLM and USFS propose to amend the existing LUPs, there could be conservation measures contained in the LUPs that the BLM and USFS consider protective of GRSG and/or GRSG habitat that the BLM and USFS would choose not to amend.

Due to ongoing litigation on the Roan Plateau Resource Management Plan and Environmental Impact Statement (BLM 2007d), the BLM will analyze impacts to the GRSG habitat in the Roan Plateau planning area, but does not anticipate making a decision on these lands during this planning process. Separate decisions will be made for this area in the revised or amended Roan Plateau RMP/EIS.

This LUP amendment/EIS undertaking is one of seven that are ongoing within the eleven western states that have GRSG occupied habitat. A goal of all such LUP amendments is to ensure consistency across each sub-region, as well as across the range of the GRSG.

BLM Instruction Memorandum 2012-044, BLM National Greater Sage-Grouse Land Use Planning Strategy (BLM 2012a) (**Appendix A**) provides direction for considering GRSG conservation measures in the land use planning process. The Instruction Memorandum requires that the BLM consider conservation measures when revising or amending LUPs in GRSG habitat. The conservation measures that should be considered were developed by the Sage-Grouse National Technical Team (NTT), a group of resource specialists, land use planners, and scientists from the BLM, state fish and wildlife agencies, USFWS, Natural Resources Conservation Service, and US Geological Survey. The report drafted by the NTT, A Report on National Greater Sage-Grouse Conservation Measures (NTT 2011) provides the latest science and best biological judgment to assist in making management decisions relating to the GRSG. The Instruction Memorandum requires that the BLM consider all applicable conservation measures developed by the NTT when revising or amending its LUPs in GRSG habitat.

This LUP amendment (LUPA) addresses GRSG habitat within the Northwest District. The BLM's Northwest District office and the Routt National Forest have mapped this habitat preliminarily in coordination with the CPW. GRSG habitat falls into one of the three following categories:

- **Preliminary Priority Habitat (PPH)** - Areas that have been identified as having the highest conservation value to maintaining sustainable GRSG populations. These areas include breeding, late brood-rearing, and winter concentration areas.
- **Preliminary General Habitat (PGH)** - Areas of occupied seasonal or year-round habitat outside of preliminary priority habitat.
- **Linkage/Connectivity Habitat** - Areas that have been identified as broader regions of connectivity important to facilitate the movement of GRSG and maintain ecological processes.

The current delineations of GRSG may be refined in collaboration with CPW, USFS, and USFWS as additional information is gained and data are refined regarding GRSG habitats and use. Collectively, PPH, PGH, and linkage/connectivity habitat are referred to as all designated habitat (ADH).

Through this land use planning process, the BLM and USFS continue to refine the habitat data to: (1) identify priority habitat and analyze actions within priority habitat to conserve GRSG habitat functionality, and/or where appropriate, improve habitat functionality; (2) identify general habitat and analyze actions within general habitat that provide for major life history function (i.e., breeding, migration, or winter survival) in order to maintain genetic diversity needed for sustainable GRSG populations; and (3) identify linkage/connectivity habitat and analyze actions within linkage/connectivity habitat that provide for major life history function (i.e., breeding, migration, or winter survival) in order to maintain genetic diversity needed for sustainable GRSG populations. PPH and PGH are considered preliminary until a decision on this document is made, at which point they would be referred to as Priority Habitat and General Habitat, respectively.

1.1.2. Partner Agency Involvement

USFS Involvement

The USFS is a cooperating agency with BLM as part of the GRSG planning strategy. Across the range of the GRSG, the USFS manages approximately 8 percent of the total GRSG habitat, that combined with the approximately 50 percent managed by the BLM, represents approximately 58 percent GRSG habitat across its range.

The USFS has partnered with the BLM to help complete the LUP amendments and EISs to implement the GRSG planning strategy. As part of the initial Notice of Intent published in the Federal Register on December 9, 2011, numerous USFS LUPs were identified to be amended through this combined effort. After further evaluation, a Notice of Correction was published in the Federal Register on February 10, 2012, which added several additional USFS LUPs to the list of plans to be amended through this process.

The USFS has structured their involvement similar to the BLM strategy, with involvement at the national, regional and sub-regional levels. Since December 2011, the BLM and USFS have been working jointly through scoping, issue and alternative development, impact analysis, and document completion. At the culmination of this process, the USFS intends to issue USFS-specific RODs to amend USFS LUPs based on the analysis and evaluation presented in the Draft and Final EISs.

US Fish and Wildlife Service Involvement

The USFWS is a cooperating agency with the BLM as part of the GRSG planning strategy. The USFWS is ultimately responsible for the evaluation and findings regarding potential ESA listing of the GRSG. The March 2010 USFWS *12-Month Finding for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered* (75 *Federal Register* 13910, March 23, 2010) indicated that GRSG is warranted for listing but precluded by higher-priority listing actions ("warranted but precluded"). This designation placed the GRSG on the federal list of candidate species.

The USFWS, in a separate but related effort, created the Conservation Objectives Team to identify conservation objectives to ensure the long-term viability of the GRSG. Recognizing the management expertise and authority of state wildlife agencies, this team is composed of state and USFWS representatives. The Conservation Objectives Team identified the major threats to each GRSG population across the range of the species, identified range-wide conservation objectives for the GRSG, and defined "…the degree to which threats need to be reduced or ameliorated to conserve [GRSG] so that it is no longer in danger of extinction or likely to become in danger of extinction in the foreseeable future." Those range-wide conservation and objectives for GRSG were published in the final Conservation Objectives Team Report (COT Report) in February 2013 (USFWS 2013). The COT Report is built on the guiding concepts of redundancy – multiple, geographically dispersed population and habitats across a species' range; ecological diversity; and resilience – and the ability of the species and/or its habitat to recover from disturbances. The COT Report includes areas identified as priority areas for conservation, the most important areas needed for maintaining GRSG representation, redundancy, and resilience across the landscape. The COT Report also identifies conservation objectives that are targeted at maintaining redundant, representative, and resilient GRSG habitats and populations. The priority areas for conservation and the conservation objectives are incorporated into the planning strategy as appropriate for assessment and evaluation in the EIS. The alternatives included in this EIS were developed directly in response to the specific threats and conservation objectives identified in the COT Report for GRSG populations in Northwest Colorado.

Colorado Parks and Wildlife Involvement

CPW is involved as a cooperating agency with the BLM as part of the GRSG planning strategy. CPW is also participating in the process through membership on the Regional Management Team and the Regional Interdisciplinary Team. CPW identified PPH, PGH, and linkage/connectivity

habitat. These delineations of habitat are used in the analysis to identify site-specific impacts and to differentiate between different areas of identified habitat.

1.2. Purpose of and Need for the Land Use Plan Amendments

The BLM and USFS are preparing LUP amendments with associated EISs for LUPs containing GRSG habitat. This effort responds to the need to inform USFWS's March 2010 "warranted, but precluded" ESA listing petition decision. Inadequacy of regulatory mechanisms was identified as a significant threat in the USFWS finding on the petition to list the GRSG. The need is to ensure that the BLM and USFS have adequate regulatory mechanisms in its LUPs for consideration by USFWS a year in advance of its anticipated 2015 listing. USFWS identified the principal regulatory mechanisms for the BLM and the USFS as conservation measures embedded in LUPs. Changes in management of GRSG habitats are necessary to avoid the continued decline of populations that are anticipated across the species' range. These LUP amendments will focus on areas affected by threats to GRSG habitat identified by USFWS in the March 2010 listing decision.

The purpose of these plan amendments is to identify and incorporate appropriate Sage-grouse conservation measures into the plans. In compliance with IM 2012-044, the measures to be considered include appropriate conservation measures developed by the NTT. For the purposes of this planning effort, conservation measures include both restrictions on land uses and programs that affect GRSG and measures to reduce the impacts of BLM/USFS programs or authorized uses. The BLM and USFS will consider such measures in the context of their multiple-use missions and propose to incorporate measures that will help conserve, enhance and/or restore Greater Sage-grouse habitat by reducing, eliminating, or minimizing threats to that habitat.

1.3. Description of the Greater Sage-Grouse Planning Area

1.3.1. Overview

The Northwest Colorado GRSG LUPA/EIS planning area is part of the larger Rocky Mountain Region and encompasses approximately 15 million acres, including 8.5 million acres of public lands managed by five BLM field offices (Colorado River Valley, Grand Junction, Kremmling, Little Snake, and White River) and the Routt National Forest in the 10 northwest Colorado counties of Eagle, Garfield, Grand, Jackson, Larimer, Mesa, Moffat, Rio Blanco, Routt, and Summit. In addition, the planning area encompasses National Park Service, US Department of Defense, USFWS, State of Colorado, County, City, and private lands (**Table 1.2**, Planning Area Land Ownership and GRSG Habitat [in Acres]), totaling an additional approximately 7 million acres. A map of the planning area is provided as **Figure 1-2**, Northwest Colorado Greater Sage-Grouse EIS Planning Area Boundaries, in **Appendix B**, Figures.

The planning area encompasses a diverse range of elevations and habitat types. Elevations in the planning area range from approximately 4,000 to over 9,000 feet above sea level. Habitat types range from desert scrub in the low deserts to aspen groves and conifer forests in the higher elevations.

The planning area includes PPH, the historic GRSG distribution zone (PGH), linkage/connectivity habitat, and additional lands not designated as PPH, PGH, or linkage/connectivity habitat.

Though the planning area includes private and other lands, decisions in this amendment are only made for BLM-administered and Routt National Forest surface (totaling approximately 1.7 million acres) and BLM-administered federal mineral estate that may lie beneath other surface ownership (approximately 2.9 million acres) within PPH, PGH, and linkage/connectivity habitat; these comprise the decision area.

GRSG habitat on BLM-administered and National Forest System lands in the planning area consists of 926,700 acres (921,500 acres BLM and 5,200 acres USFS) of PPH, 742,900 acres (728,100 acres BLM and 14,800 acres USFS) of PGH, and 82,000 acres of linkage/connectivity habitat (all BLM acres; there are no National Forest System lands within linkage/connectivity habitat). PPH, PGH, and linkage/connectivity habitat were mapped in cooperation with the CPW. **Table 1.2,** Planning Area Land Ownership and GRSG Habitat (in Acres), provides acres of PPH and PGH by landowner. **Table 1.3**, Decision Area Subsurface Federal Mineral Estate and GRSG Habitat (in Acres), provides acres of PPH and PGH by type of subsurface federal mineral estate in the decision area. **Figure 1-3**, Greater Sage-Grouse Current and Historic Distribution, and **Figure 1-4**, Preliminary Priority Habitat, Preliminary General Habitat, and Linkages, in **Appendix B** depict areas mapped as PPH, PGH, and linkage/connectivity habitat. There is no PPH, PGH, or linkage/connectivity habitat on US Department of Defense lands in the planning area. **Table 1.4**, Total PPH and PGH in the Planning Area, provides acres of PPH and PGH within each BLM Field Office and the Routt National Forest.

Table 1.2. Planning Area Land Ownership and GRSG Habitat (in Acres)

County	GRSG Habitat Type	BLM[1]	USFS[1]	National Park Service	USFWS	State	State, County, and City	Private	Unclassified
Eagle	PPH	20,900	0	0	0	700	0	15,100	0
	PGH	16,100	2,500	0	0	0	0	15,600	0
	Linkage	0	0	0	0	0	0	0	0
Garfield	PPH	24,800	0	0	0	0	300	123,700	0
	PGH	35,900	0	0	0	0	600	35,600	0
	Linkage	0	0	0	0	0	45	7600	0
Grand	PPH	60,700	1,000	0	0	20,300	5,200	116,500	0
	PGH	11,300	1,600	0	0	2,300	0	40,500	0
	Linkage	6,700	0	0	0	0	0	0	0
Jackson	PPH	137,600	800	0	22,800	25,200	2,600	195,100	0
	PGH	1,100	100	0	0	8,000	500	27,000	0
	Linkage	2,200	0	0	0	1,000	0	7,500	0
Larimer	PPH	0	0	0	0	0	0	0	0
	PGH	6,700	0	0	0	2,100	2,100	9,400	0
	Linkage	0	0	0	0	0	0	0	0
Mesa	PPH	0	0	0	0	0	0	0	0
	PGH	4,500	300	0	0	0	800	8,700	0
	Linkage	0	0	0	0	0	0	0	0
Moffat	PPH	623,300	0	3,600	0	116,200	13,900	540,400	200
	PGH	542,000	0	6,300	11,900	53,500	1,000	357,000	100
	Linkage	1,700	0	0	0	0	0	5,300	0
Rio Blanco	PPH	36,400	0	0	0	0	5,500	52,300	0
	PGH	108,800	200	0	0	0	1,800	83,600	0
	Linkage	69,100	0	0	0	0	6,100	147,900	0
Routt	PPH	17,100	600	0	0	25,100	1,300	151,600	0
	PGH	1,600	10,200	0	0	5,400	0	74,500	0
	Linkage	2,200	0	0	0	3,600	0	34,800	0
Summit	PPH	700	2,800	0	0	0	0	1,800	0
	PGH	0	0	0	0	0	0	0	0
	Linkage	0	0	0	0	0	0	0	0

County	GRSG Habitat Type	BLM[1]	USFS[1]	National Park Service	USFWS	State	State, County, and City	Private	Unclassified
Total[2]		**1,731,400**	**20,100**	**9,900**	**37,400**	**263,400**	**41,745**	**2,051,500**	**300**

Source: CPW 2012

[1]BLM and USFS subsurface federal mineral estate data

[2]There is no PPH or PGH on US Department of Defense lands in the planning area

*Decisions in this document apply only to BLM-administered and National Forest System surface and split-estate lands.

Table 1.3. Decision Area Subsurface Federal Mineral Estate and GRSG Habitat (in Acres)

County	GRSG Habitat Type	All Minerals	Coal, Oil and Gas	Coal	Oil and Gas	Other	No Minerals	Decision Area Subtotal PPH + PGH	Decision Area Total
Eagle	PPH	27,200	0	0	2,200	0	7,300	**56,600**	**857,000**
	PGH	26,600	0	0	700	0	7,000		
Garfield	PPH	28,800	0	0	0	23,900	96,200	**107,900**	**1,262,700**
	PGH	11,400	500	0	0	43,300	16,800		
Grand	PPH	89,100	700	10,200	2,400	1,100	99,000	**127,000**	**768,700**
	PGH	22,100	300	400	600	80	30,500		
Jackson	PPH	190,000	400	11,800	2,000	14,800	164,900	**230,200**	**442,900**
	PGH	10,100	200	700	200	10	25,600		
Larimer	PPH	0	0	0	0	0	0	**11,800**	**364,400**
	PGH	11,800	0	0	0	0	6,500		
Mesa	PPH	0	0	0	0	0	0	**6,600**	**1,447,700**
	PGH	6,500	0	0	100	0	7,600		
Moffat	PPH	804,500	11,000	162,900	17,000	9,200	293,000	**1,801,800**	**703,800**
	PGH	653,400	7,800	131,000	5,000	100	174,400		
Rio Blanco	PPH	43,300	300	900	300	17,300	32,100	**222,600**	**1,560,300**
	PGH	132,200	1,300	2,600	800	23,600	33,900		
Routt	PPH	54,000	1,600	43,500	400	800	95,500	**141,600**	**868,300**
	PGH	21,900	200	18,100	1,100	70	50,200		
Summit	PPH	4,800	0	0	300	0	200	**5,200**	**314,100**
	PGH	0	0	0	0	0	0		
TOTALS		**2,137,700**	**24,300**	**382,100**	**33,100**	**134,260**	**1,140,700**	**2,711,300**	**8,589,900**

Table 1.4. Total PPH and PGH in the Planning Area

BLM Field Office or National Forest	All Surface Land Ownership (Acres)			BLM-Administered or National Forest System Surface Estate (Acres)		
	PPH	PGH	Lands not designated as PPH or PGH	PPH	PGH	Lands not designated as PPH or PGH
Colorado River Valley	69,800	62,400	1,167,100	24,700	40,200	502,100
Grand Junction	49,300	29,000	1,940,400	5,600	8,900	1,263,100
Little Snake	1,353,100	928,400	1,101,800	570,400	479,700	288,900
Kremmling	585,800	106,800	648,900	198,900	18,900	161,100
White River	299,100	328,900	1,664,000	122,000	180,200	1,154,400
Routt National Forest	5,200	14,900	1,364,800	1,600	10,900	1,242,500
White River National Forest*	3,700	4,000	2,405,200	2,800	2,800	2,215,000
Grand Mesa, Uncompahgre, Gunnison National Forest*	0	200	380,800	0	200	372,600
Arapaho Roosevelt National Forest*	1,000	1,000	789,200	700	800	745,900
Pike San Isabel National Forest*	0	0	70	0	0	70
Manti La Sal National Forest*	0	0	1,800	0	0	1,800
Total	**2,367,000**	**1,475,600**	**11,464,070**	**926,700**	**742,600**	**7,947,470**

Source: CPW 2012

*National Forests not participating in the Northwest Colorado GRSG LUPA/EIS

Colorado River Valley Field Office

Current populations within the Colorado River Valley Field Office (CRVFO) are north of Eagle, Gypsum, and Wolcott on scattered BLM-administered and private lands. This habitat is where the majority of the mapped PPH falls within the CRVFO boundary. Based on 2004 lek counts, this population of GRSG numbers from 304 to 489 (CPW 2004).

The Northern Eagle/Southern Routt GRSG population is one of the smaller populations in Colorado. A significant portion of remaining GRSG habitat in the Northern Eagle portion of the population is managed by the CRVFO.

Grand Junction Field Office

The southern end of the Parachute-Piceance-Roan Plateau population of the GRSG occurs on the northeastern side of the Grand Junction Field Office (GJFO), and Colorado has identified 5,600 acres of PPH and 8,900 acres of PGH. Sixteen active and inactive GRSG leks occur within the GJFO; three occur on BLM-administered lands, and thirteen occur on private lands. Of these 16 leks, 7 are considered active. One of the active leks occurs on BLM-administered lands on 4A ridge. In winter 2008, GRSG droppings were found within the GJFO just north of the town of Mesa (Sunnyside) in an area between occupied Gunnison sage-grouse habitat and GRSG habitat. A follow-up study was conducted in winter 2009 by the Rocky Mountain Bird Observatory where numerous droppings and cecal casts were discovered, suggesting the area is an important wintering area. Genetic information could not be collected from the droppings and cecal casts;

therefore, the species of sage-grouse (Gunnison or Greater) is still unknown (Beason 2009). However, it is believed to be GRSG; as a result, this area has been mapped as PGH.

Kremmling Field Office

In Jackson County, there are approximately 32 active leks, 5 inactive leks, and 19 historic leks (CPW 2010). Of the active leks, 20 are on BLM-managed public lands. In Grand County, there are 19 active leks, 1 inactive lek, and 41 historic leks (2010 data). Seven of those 19 leks are on BLM-managed public lands. In Larimer County, there is 1 historic lek (last active in the 1960s). In Summit County there is 1 active lek and 1 historic lek (2010 data). In Eagle County, there are no leks within the planning area. Sagebrush habitat in Jackson County is largely intact, and there is little threat of fragmentation. Currently, oil and gas development and related infrastructure is low; however, in 2006, there was an increased interest in coal bed methane exploration. In Grand County there is a high risk of habitat fragmentation and loss due to urban development and related infrastructure, especially at the east end of the county.

Little Snake Field Office

In Routt County, there are four distinct GRSG groups:

- two areas with fair population density (near the towns of Toponas and Hayden) and approximately equal numbers and range;
- one area in the upper Slater Creek and Snake River areas in the extreme northern part of Routt County with a light population in the summer months and a wintering area near the Wyoming line; and;
- one area north of Steamboat Springs and west of Clark on Deep Creek with small range and numbers.

The highest concentration of GRSG in the county was in the Twentymile area southeast of Hayden on the upper Sage and Fish Creek drainages.

Within the Little Snake Field Office (LSFO) today, essentially all of the land west of State Highway 13 (except the area on the south side of Cold Spring Mountain and the lands closest to the Yampa and Green River drainages) is within GRSG range. The central portion of this area (north, west, and southeast of Maybell), as well as a broad area along the northern boundary of the planning area from Middle Mountain near the northwest corner of Colorado to Baker Peak east of State Highway 13, provides winter range. A number of comments in the BLM Little Snake Field Office's land health assessments focus on GRSG populations and habitat. The following comments characterize the attention given to this species:

- Axial. GRSG habitat types in the Axial Basin Landscape include strutting grounds, brood-rearing habitat, and winter range. Thirty leks have been documented within this landscape. Of these, 11 (37 percent) are active; 6 (20 percent) are inactive (no activity the last 5 years); 11 (37 percent) are historic (no activity the last 6 years or longer), and 2 (7 percent) are unknown.
- Douglas Draw. The watershed does have potential to support GRSG near Sheephead Basin. There has not been any documented use by GRSG in this area, but treatments of encroaching juniper may make the area more attractable to GRSG.

- Cold Spring Mountain. The large expanses of sagebrush steppe intermixed with wet meadows provide important GRSG nesting and brood-rearing habitats. GRSG numbers are up since the early 1990s, with lek counts remaining stable over the last 3 years; however, GRSG are only at 50 to 60 percent of their historic population numbers for the area.

- Douglas Mountain. Sagebrush grasslands and sagebrush mixed shrub habitat types have the potential to support GRSG within this landscape. There are no known leks within the landscape; however, efforts to locate breeding GRSG in the landscape have been minimal.

- Dry Creek. The large expanses of sagebrush steppe intermixed with wet meadows provides important GRSG nesting and brood-rearing habitats along Vermillion Creek, although there are no known leks within this watershed. Heavy historic grazing, especially in mesic areas at the higher elevations, has reduced the quality of brood-rearing habitat essential for GRSG in the area.

- Four Mile Creek. The entire landscape is considered a GRSG production area, although the quality of brood-rearing habitat has been reduced by heavy historic grazing, especially in mesic areas at the higher elevations. The large expanses of sagebrush steppe intermixed with wet meadows provide important GRSG nesting and brood-rearing habitats along Timberlake Creek. Fourteen GRSG leks have been identified, and brood-rearing habitats have been documented.

- Green River. The Green River landscape provides habitat for GRSG and the various life cycle stages for which they are used. There are no known leks or nesting habitat within the landscape; however, hens with broods are often observed in the Ryegrass area. GRSG are also observed near Chicken Springs and Five Springs. A small amount (200 acres) of winter habitat is located near Five Springs. Sagebrush in this area was in good condition, providing suitable winter habitat for GRSG. Overall, the Green River Watershed provides productive habitat for GRSG.

- Lay Creek. The majority of this watershed provides habitat for GRSG, which use the watershed throughout the year for breeding, nesting, brood rearing, and wintering. This watershed is an important production area for GRSG in Colorado. There are seven active leks within this watershed, with two additional active leks within 1 mile of the watershed boundary. Breeding, nesting, brood-rearing, and wintering habitat are all found within the boundaries of this watershed. Some portions of the watershed are capable of providing all four habitat requirements in the same area.

- Powder Wash. This is an important area for GRSG breeding, nesting, and brood rearing, containing 10 known leks and approximately 2,400 acres of GRSG winter range.

- Sand Hills. Available habitats provide winter range, nesting, and brood rearing for GRSG.

- Sand Wash. This is an import production area for GRSG nesting and winter range. The numerous historic leks on Seven Mile Ridge are no longer active.

- Williams Fork. Sagebrush grasslands and sagebrush mixed shrub habitat types have the potential to support GRSG within this landscape. There are no identified leks or critical habitat, such as nesting or winter, located in the Williams Fork watershed.

White River Field Office

The Northwest Colorado GRSG population area is composed of several distinct segments that differ widely in character for GRSG. The Blue Mountain portion of this population (higher-elevation sagebrush communities north of US Highway 40) represents the White River Field Office's (WRFO) largest continuous block of suitable and occupied GRSG habitat. Broods gradually disperse and drift to higher elevations (e.g., Moosehead Mountain), such that essentially all sagebrush habitat on Blue Mountain is considered brood range. Blue Mountain's capacity for strong production and recruitment is largely attributable to an abundance of wet meadow habitats and well-developed herbaceous understories.

The remaining segments of the Northwest Colorado population area in the WRFO consist of: (1) isolated and sporadically occupied parcels in the Douglas Creek drainage south of the White River; (2) extremely small and insular groups of birds along and probably once connected by habitats along the White River valley; (3) a sparsely populated southern extension of the larger Sagebrush Draw population located in the adjoining Little Snake Field Office; and (4) most notably, an expansive low-elevation salt-desert complex extending west from Pinyon Ridge along the US Highway 40 corridor and south to the White River. This area supports limited year-round occupation by GRSG, but these xeric habitats, whose ground cover is often dominated by invasive annuals weeds, are considered marginal in their support of nesting and brood-rearing functions. These areas have been known to support concentrated high-density winter use. The breeding population in the western half of this area (west of Massadona) had begun to collapse prior to the mid-1970s, and this trend continued through the 1980s. The only remaining active lek is located on the far eastern end of the area. Suitable sagebrush stands along US Highway 40 are relatively limited. These predominantly salt desert habitats are characteristically traversed by deeply incised channels, which assume the role of brood habitat, although the regular occurrence of broods along the White River probably originate from the lower Red Wash and Boise Creek areas. The origin of large numbers of wintering birds in lower Wolf Creek is unclear but likely involves much of the US Highway 40 population.

The Crooked Wash complex is administratively split between the WRFO and the LSFO to the north, and is composed of a high percentage of private lands. Although upland sagebrush conditions are superficially adequate for nesting in the WRFO, upper portions of the basin are likely preferred. Late season brood use has been noted, although brood habitat conditions are considered suboptimal in portions of the basin within the WRFO. Although a number of channels in the area support persistent flow, riparian expression is extremely limited. Concentrated winter use in the Crooked Wash area is assumed to represent the major fraction of this complex. The small summer population in Black's Gulch seems to be a fragment of the Crooked Wash complex. This area has also supported concentrated winter use in the past.

The Parachute-Piceance-Roan Plateau area is comprised of roughly 152,600 acres of GRSG PPH and 84,400 acres of PGH. Virtually all seasonal use functions take place on relatively narrow mid-elevation ridges, with a drift toward higher elevations along the Piceance Rim and Roan Plateau through the brood and general summer use periods. Winter use appears to occur at all elevations, depending on accumulated snow depth and snow texture. Broad ridges at lower elevations may support the bulk of wintering birds during extreme conditions.

The Magnolia has within the past decade become heavily industrialized. This area is comprised entirely of BLM-administered lands and contains approximately 7,500 acres of GRSG PPH and 3,700 acres of PGH.

The Meeker GRSG population area encompasses approximately 47,600 acres in the area outside the Piceance Basin (13,000 acres of PPH and 34,600 acres PGH). Federal mineral estate underlies about 15,500 acres (31 percent) of all mapped range, but estate associated with habitats currently supporting GRSG use (north of the White River and across the north flank of LO7 15 Hill) are limited to about 460 acres in 7 parcels (less than 4 percent). The largest parcel, approximately 300 acres, consists primarily of private agricultural lands but supports consistent use by this remnant flock of birds. The BLM-administered surface estate that presently supports habitat potentially suited for this population of GRSG is limited to approximately 300 acres.

Approximately 115 leks have been identified in the WRFO, of which about 55 are active. The status of approximately 20 leks is unknown because of limited or irregular use. The count of males at leks in the WRFO in 2012 was 290 birds.

Routt National Forest

On the Routt National Forest, GRSG habitat is largely peripheral and represents extensions of GRSG habitat occurring predominately on lower-elevation non-National Forest System lands. GRSG habitat on the Routt National Forest occurs in Colorado MZs 7, 11, 13, and 14, with the majority of habitat occurring in the California Park and Slater Park areas north of Hayden in Colorado MZ 7. The Slater Park area has one historic GRSG lek, which has not been utilized for over 10 years. There are no other active or inactive GRSG leks on the Routt National Forest.

The planning area includes the Routt National Forest and portions of three other National Forests: the White River, the Arapaho Roosevelt, and the Grand Mesa-Gunnison and Uncompahgre. Early in the planning process it was decided that only the Routt National Forest would be included in this LUPA/EIS. Although most GRSG habitat on the National Forests is peripheral, the Routt National Forest was included because it had a more significant amount of GRSG habitat compared to the other Forests, as well as a historic GRSG lek. The Grand Mesa-Gunnison and Uncompahgre National Forest has only a very small amount (200 acres) of GRSG habitat, and all of it is secondary. Additionally, the Grand Mesa-Gunnison and Uncompahgre National Forest includes habitat for the Gunnison Sage-Grouse, and the Forest has additional measures in place to manage for the species. The White River National Forest has two active GRSG leks and some PPH and PGH. The White River National Forest Plan was revised in 2002; at that time, it included direction for GRSG habitat management based on best available science (Connelly et al. 2000). Because of this existing plan direction and limited habitat, it was determined that the management direction in the White River National Forest Plan is adequate. The Arapaho Roosevelt National Forest is not included in this amendment process because it contains very limited amounts of PPH and PGH and contains no active or historic GRSG leks.

On the Routt National Forest, GRSG habitat occurs within 10 management prescription designations identified in the Routt National Forest Plan, as indicated in **Table 1.5**, Management Areas on the Routt National Forest with Designated GRSG Habitat. Wildlife habitat conservation objectives currently apply to all of these areas, with many of these areas emphasizing wildlife conservation goals and objectives. The 2.1, Special Interest Area, and 5.41, Deer and Elk Winter Range, management areas have wildlife conservation emphasis; these areas encompass 67 percent of the GRSG habitat on the Routt National Forest. As identified in **Table 1.5**, Management Areas on the Routt National Forest with Designated GRSG Habitat, these changes would apply to a very small percentage of acres within each of the 10 affected management prescription designations and would affect only approximately 1 percent of the land area managed by the Routt National Forest.

Table 1.5. Management Areas on the Routt National Forest with Designated GRSG Habitat

Management Area Code	Management Area Description	Forest-wide Management Area Acres	Acres in GRSG Habitat	Portion Affected by the Proposed Amendment
1.32	Backcountry Recreation Nonmotorized with Limited Motorized Use in Winter	261,500	200	0.1%
1.5	National River System Wild Rivers Designated and Eligible	5,400	200	3.9%
2.1	Special Interest Areas Limited Use and Interpretation	28,700	6,700	23.4%
3.31	Backcountry Recreation Year-Round Motorized	27,800	600	2.2%
4.2	Scenery	29,700	2,300	7.6%
4.3	Dispersed Recreation	40,200	30	0.1%
5.11	General Forest and Rangelands Forest Vegetation Emphasis	273,600	300	0.1%
5.12	General Forest and Rangelands Range Vegetation Emphasis	37,800	400	1.1%
5.13	Forest Products	203,700	40	0.0%
5.41	Deer and Elk Winter Range	53,800	1,700	3.2%
Source: USFS 2013				

1.3.2. Land Uses

Major land uses on public and private lands within the planning area include, but are not limited to:

- Leasable minerals development, including fluid mineral and coal exploration and development
- Livestock grazing
- Rights-of-way (ROWs), including roads, power lines, pipelines, and communication sites
- Recreation, including hunting, hiking, and camping
- Locatable and salable mineral development

1.4. Planning Processes

1.4.1. BLM Planning Process

The FLPMA requires the BLM to use RMPs as tools by which "present and future use is projected" (43 United States Code [USC] 1701[a][2]). FLPMA's implementing regulations for planning (43 Code of Federal Regulations [CFR] Part 1600) state that LUPs are a preliminary step in the overall process of managing public lands "designed to guide and control future management actions and the development of subsequent, more detailed and limited scope plans for resources and uses" (43 CFR Part 1601.0-2). Public participation and input are important components of land-use planning.

Under BLM regulations, all RMP revisions and any RMP amendments to existing plans that have significant environmental effects require preparation of an EIS under NEPA.. This EIS accompanies the amendment of the existing RMPs and analyzes the impacts of various numbers of alternatives for the Northwest Colorado LUPAs, including the no action alternative.

The BLM uses a nine-step planning process (**Diagram 1-1**, Nine-Step Planning Process) to develop or revise RMPs (43 CFR Part 1600 and planning program guidance in the BLM Handbook H-1601-1, Land Use Planning Handbook [BLM 2005a]). The planning process is designed to help the BLM identify the uses of BLM-administered lands desired by the public and to consider these uses to the extent that they are consistent with the laws established by Congress and the policies of the executive branch of the federal government.

Once an RMP is approved, it may be changed through amendment. An amendment can be initiated in response to monitoring and evaluation findings, new data, new or revised policy, a change in circumstances, or a proposed action that may result in a change in the scope of resource uses or a change in the terms, conditions, and decisions of the approved plan. If the BLM decides to prepare an EIS, the amending process shall follow the same procedure required for preparation and approval of the plan, but the focus shall be limited to that portion of the plan being amended (43 CFR 1610.5-5).

As depicted in **Diagram 1-1**, Nine-Step Planning Process, the planning process is issue-driven (**Step 1**). The planning process is undertaken to resolve management issues and problems as well as to take advantage of management opportunities. The BLM utilizes the public scoping process to identify planning issues to direct (drive) a revision or amendment of an existing plan. The scoping process also is used to introduce the public to preliminary planning criteria, which set the parameters, or sideboards, for conducting the planning process (**Step 2**).

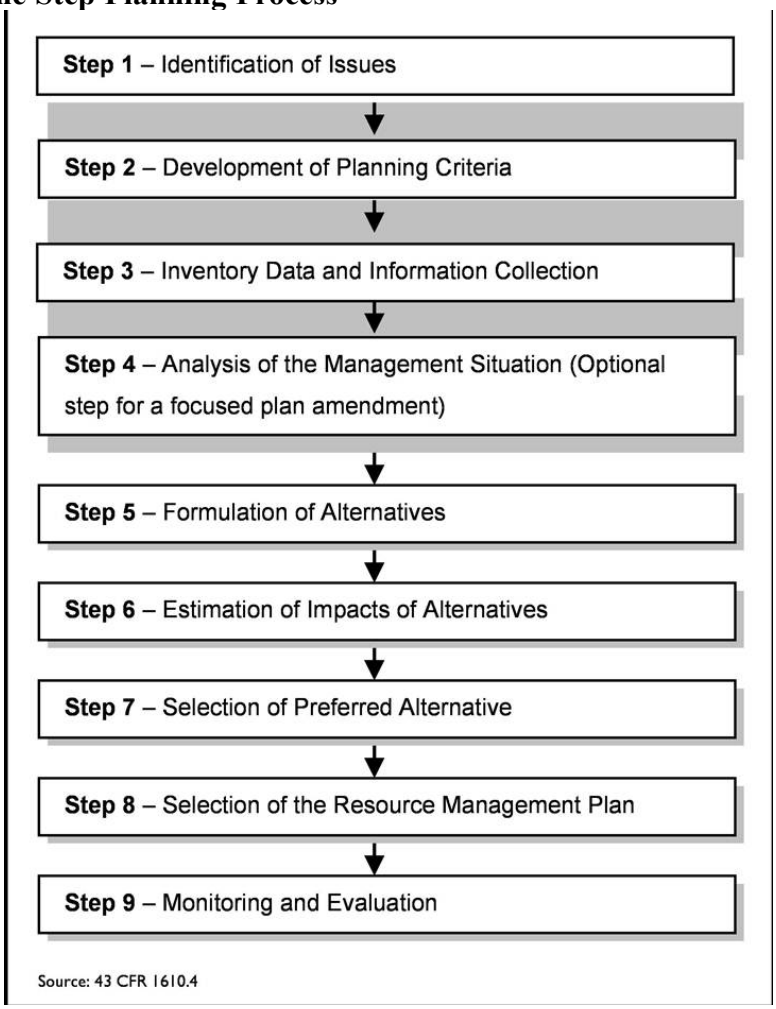
The BLM uses existing data from files and other sources and collects new data to address planning issues and to fill data gaps identified during public scoping (**Step 3**). Using these data, information concerning the resource management programs, and the planning criteria, the BLM completes an Analysis of the Management Situation (**Step 4**) to describe current management and develop or inform the affected environment portion of the RMP. Typically, the Analysis of the Management Situation is conducted at the outset of planning for an entire RMP or RMP revision and is incorporated by reference into development of a single-focus RMPA. In this case, direction for the RMPA is provided through new national policy (BLM Instruction Memorandum 2012-044 [BLM 2012a] [**Appendix A**]). The affected environment is also incorporated by reference into the RMPA and updated with new information to the degree necessary to set the context for the analysis in the accompanying EIS. The GRSG EISs may not conduct formal Analyses of the

Management Situation, as Analyses of the Management Situation are required for RMP revisions but not necessarily for RMPAs.

Results of the first four steps of the planning process clarify the purpose and need and identify key planning issues that need to be addressed by the amendment. Key planning issues reflect the focus of the LUPA and are described in more detail in **Section 1.5.2**, Issues Identified for Consideration in the Northwest Colorado Greater Sage-Grouse Land Use Plan Amendments.

Alternatives constitute a range of management actions that set forth different priorities and measures to emphasize certain uses or resource values over other uses or resource values. The alternatives usually represent a continuum from extraction and development to preservation and conservation, pursuant to the multiple-use and sustained yield mandate, so as to achieve certain goals or objectives consistent with the purpose and need. During alternative formulation (**Step 5**), the BLM collaborates with cooperating agencies to identify goals and objectives (desired outcomes) for resources and resource uses within the planning area. The alternatives represent a reasonable range of planning strategies for managing resources and resource uses. **Chapter 2** of this document, Alternatives, describes and summarizes the preferred alternative and the other draft alternatives considered in detail.

Diagram 1–1. Nine Step Planning Process



This Draft LUPA/EIS also includes an analysis of the impacts of the preferred alternative and the other draft alternatives in **Chapter 4**, Environmental Consequences (**Step 6**). With input from cooperating agencies and BLM specialists, and consideration of planning issues, planning criteria, and the impacts of alternatives, the BLM identifies and recommends a preferred alternative from among the alternatives presented in the EIS (**Step 7**). This is documented in the Draft LUPA/EIS, which is then distributed for a 90-day public review and comment period.

Step 8 of the land-use planning process occurs following receipt and consideration of public comments on the Draft LUPA/EIS. In preparing the Proposed LUPA/Final EIS, the BLM will consider all comments it receives during the public comment period. The Proposed LUPA will be crafted from the draft alternatives.

Step 9 is the monitoring and evaluation process. Monitoring is the repeated measurement of activities and conditions over time. Evaluation is a process in which the plan and monitoring data are reviewed to see if management goals and objectives are being met and if management direction is sound. Monitoring data gathered over time are examined and used to draw conclusions on whether management actions are meeting stated objectives, and if not, why. Conclusions are then used to make recommendations on whether to continue current management or what changes need to be made in management practices to meet objectives.

The two types of monitoring that are tied to the planning process include implementation and effectiveness monitoring. LUP monitoring is the process of (1) tracking the implementation of land use planning decisions and (2) collecting and assessing the information necessary to evaluate the effectiveness of land use planning decisions.

- **Implementation Monitoring:** Implementation monitoring is the most basic type of monitoring and simply determines whether planned activities have been implemented in the manner prescribed by the plan. Some agencies call this compliance monitoring. This monitoring documents BLM's progress toward full implementation of the LUP decision. There are no specific thresholds or indicators required for this type of monitoring.

- **Effectiveness Monitoring:** Effectiveness monitoring is aimed at determining if the implementation of activities has achieved the desired goals and objectives. Effectiveness monitoring asks the question: Was the specified activity successful in achieving the objective? This requires knowledge of the objectives established in the RMP as well as indicators that can be measured. Indicators are established by technical specialists in order to address specific questions and, thus, to focus on collection of only necessary data. Success is measured against the benchmark of achieving desired future conditions established by the plan.

Regulations in 43 CFR 1610.4-9 require that the proposed plan establish intervals and standards, as appropriate, for monitoring and evaluation of the plan, based on the sensitivity of the resource decisions involved. Progress in meeting the plan objectives and adherence to the management framework established by the plan is reviewed periodically. Council on Environmental Quality (CEQ) regulations implementing NEPA state that agencies may provide for monitoring to assure that their decisions are carried out and should do so in important cases (40 CFR 1505.2[c]). To meet these requirements, the BLM will review the plan on a regular schedule in order to provide consistent tracking of accomplishments and provide information that can be used to develop annual budget requests to continue implementation.

LUP evaluations will be used by the BLM to determine if the decisions in the LUPA, supported by the accompanying NEPA analysis, are still valid. Evaluation of the LUPA will generally

be conducted every 5 years per BLM policy, unless unexpected actions, new information, or significant changes in other plans, legislation, or litigation triggers an evaluation. LUP evaluations determine if decisions are being implemented, whether mitigation measures are satisfactory, whether there are significant changes in the related plans of other entities, whether there are new data of significance to the plan, and if decisions should be changed through amendment or revision. Evaluations will follow the protocols established by the BLM Land Use Planning Handbook H-1601-1 (BLM 2005a) in effect at the time the evaluation is initiated. Specific monitoring and evaluation needs are identified by resource/uses throughout **Chapter 2**, Alternatives.

1.4.2. Forest Service Planning Process

The Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the NFMA (16 USC 1600 et seq.), requires the USFS to develop, maintain, and, as appropriate, revise land and resource management plans (Forest Plans) for units of the National Forest System using a systematic interdisciplinary approach to achieve integrated consideration of physical, biological, economic, and other sciences. Consistent with the Multiple-Use Sustained-Yield Act of 1960 (16 USC 528-531), the overall goal of managing the National Forest System is to sustain the multiple uses of its renewable resources in perpetuity while maintaining the long-term productivity of the land. Forest Plans provide broad guidance and information for project and activity decision-making. In particular, Forest Plans coordinate outdoor recreation, range, timber, watershed, wildlife and fish, and wilderness. Public participation and input are important components of land-use planning.

Forest Plans developed under the 1982 planning rule procedures (36 CFR parts 200 to 299, revised July 1, 2000) have resulted in:

1. Establishment of forest multiple-use goals and objectives;
2. Establishment of forest-wide management requirements (standards and guidelines);
3. Establishment of management areas and management area direction (management area prescriptions) applying to future activities in that management area;
4. Designation of suitable timber land and establishment of allowable timber sale quantity;
5. Nonwilderness allocations or wilderness recommendations; and
6. Establishment of monitoring and evaluation requirements.

Forest Plans are never completed or final, as the NFMA requires plans to be maintained, amended, and revised. Adaptive management requires ongoing adjustment of goals, objectives, management area prescriptions, standards, and guidelines constraining land uses. An amendment can be started in response to monitoring and evaluation findings, new data, new or revised policy, a change in circumstances or a proposed action that may result in a change in the scope of resource uses, or a change in the standards and guidelines of the approved plan. Plan revisions and amendments are part of the collaborative and adaptive cycle of planning: plan development; plan implementation; plan monitoring, inventory, and assessment; and plan review and evaluation.

The USFS responsible official may amend a plan in response to the need for change. For this amendment, the process involves eight steps:

1. Public notice for initiating plan amendment;
2. Consideration of need for change;
3. Documentation of affected environment and environmental consequences in an EIS;
4. Development of the proposed plan amendment;
5. Public notice for proposed plan amendment, draft EIS, and 90–day comment period;
6. Response to comments;
7. Public notice of the beginning of the 60–day objection period before approval and availability of the plan amendment, EIS, and draft plan decision document; and
8. Upon resolution of the objection (36 CFR 219 subpart B), approval of the plan by the responsible official.

Under USFS regulations, a Forest Plan revision or amendment of an existing plan is a federal action requiring appropriate NEPA documentation. Thus, this EIS accompanies the amendment of the Routt National Forest Plan (USFS 1997). This EIS analyzes the impacts of various alternatives for the plan amendment, including the no action alternative. The proposed plan direction, Forest Plan Standards and Guidelines, is described for Alternative D in **Appendix C**, Routt National Forest Alternative D Forest Plan Standards and Guidelines. Regulations at 36 CFR 228.102 require the USFS to decide which National Forest System lands are administratively available for oil and gas leasing. This decision includes identifying necessary lease stipulations to protect surface resources. The oil and gas leasing availability decision for the Routt National Forest was originally made in March 1993 and was updated in February 1998 when the Forest Plan was revised. In addition to amending the Routt National Forest Plan, the decision resulting from this analysis will also amend the Routt National Forest's leasing availability decision to incorporate necessary GRSG conservation measures as required lease stipulations. For simplicity throughout this EIS, a reference to amending the Routt National Forest Plan also refers to amending its oil and gas leasing decision. An amendment to the Routt National Forest Plan to include direction for GRSG conservation is anticipated to be a non-significant amendment to the Forest Plan under the NFMA (which is a different determination than significance under NEPA).

1.4.3. National Greater Sage-Grouse Planning Strategy

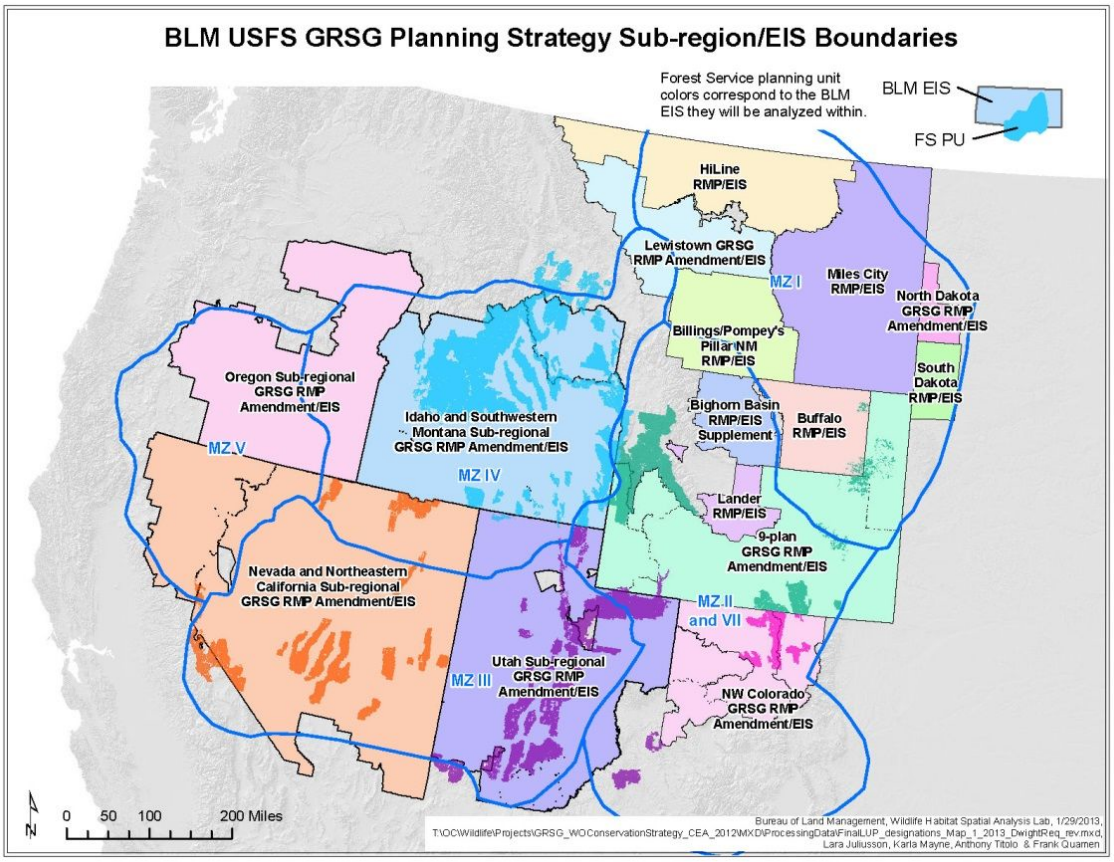
On December 9, 2011, a Notice of Intent was published in the Federal Register to initiate the BLM and USFS GRSG Planning Strategy across nine western states, including California, Oregon, Nevada, Idaho, Utah, and Southwest Montana in the Great Basin Region and Northwest Colorado, Wyoming, Montana, South Dakota, and North Dakota in the Rocky Mountain Region. This Northwest Colorado GRSG LUPA/EIS is 1 of 15 separate EISs that are currently being conducted to analyze and incorporate specific conservation measures across the range of the GRSG, consistent with National BLM and USFS policy.

On December 27, 2011, the BLM Washington Office released Instruction Memorandum 2012-044, BLM National Greater Sage-Grouse Land Use Planning Strategy (BLM 2012a) (**Appendix A**), which directed all of the planning efforts across the GRSG range to consider all applicable conservation measures when revising or amending its LUPs in GRSG habitat, including the measures developed by the NTT that were presented in their December 2011 document, A Report

on National Greater Sage-Grouse Conservation Measures (NTT 2011). Instruction Memorandum 2012-044 directs all planning efforts associated with the national strategy to consider and analyze (as appropriate) the conservation measures presented in the report.

Along with the applicable measures that were outlined in the NTT report (NTT 2011), planning efforts associated with this National GRSG Planning Strategy will also analyze applicable conservation measures that were submitted to the BLM and USFS from various state governments and from citizens during the public scoping process. It is the goal of the BLM and USFS to make a final decision on these plans by the end of 2014, so that adequate regulatory mechanisms are incorporated in place before USFWS makes a listing decision in 2015.

Diagram 1–2. BLM-USFS GRSG Planning Strategy Sub-region/EIS Boundaries



1.5. Scoping and Identification of Issues For Development of Draft Alternatives

1.5.1. The Scoping Process

Scoping is an early and open process for determining the scope, or range, of issues to be addressed and for identifying the significant issues to consider in the planning process. Scoping identifies the affected public and agency concerns, defines the relevant issues and alternatives that will be examined in detail in the EIS, and eliminates those that are not relevant. A planning issue is defined as a major controversy or dispute regarding management or uses on public lands that can

be addressed through a range of alternatives. The environmental impacts of these alternative management scenarios are analyzed and addressed in the draft EIS.

A public scoping period was initiated on December 9, 2011, with the Federal Register publication of a Notice of Intent to begin a planning effort. Scoping is designed to be consistent with the public involvement requirements of the FLPMA, NFMA, and NEPA. The cooperative process included soliciting input from interested state and local governments, tribal governments, other federal agencies and organizations, and individuals, to identify the scope of issues to be addressed in the LUP amendment, and to assist in the formulation of reasonable alternatives. The scoping process is a method for opening dialogue between the BLM, USFS, and the general public about management of GRSG and their habitats on public lands, and for identifying the concerns of those who have an interest in this subject and in the GRSG habitats. As part of the scoping process, the BLM also requested that the public submit nominations for potential Areas of Critical Environmental Concern (ACECs) for GRSG and their habitats.

Public scoping was extended through a Notice of Correction published February 10, 2012, and ended on March 23, 2012. Scoping included scheduled open-house meetings in Walden, Lakewood, Silt, and Craig, Colorado. In addition, news releases were used to notify the public regarding the scoping period and the planning process and to invite the public to provide written comments from many sources including via email, fax, and US Mail. Comments obtained from the public during the scoping period were used to define the relevant issues that would be addressed by a reasonable range of alternatives.

For the Northwest Colorado planning process, scoping comments received from the public were placed in one of three categories:

1. Issues identified for consideration in the Northwest Colorado LUP amendments;
2. Issues to be addressed through policy or administrative action (and therefore not addressed in the LUP amendments); and
3. Issues eliminated from detailed analysis because they are beyond the scope of the LUP amendments (and therefore not addressed in the LUP).

Some important issues to be addressed in the LUP amendments were identified by the public and the agencies during the scoping process for the statewide planning effort. The Scoping Summary Report (BLM and USFS 2012) prepared in conjunction with these LUP amendments summarizes the scoping process. The issues identified in the Final Scoping Summary fall into one of several broad categories (see **Section 1.5.2**, Issues Identified for Consideration in the Northwest Colorado Greater Sage-Grouse Land Use Plan Amendments). Other resource and use issues are identified in the BLM Planning Handbook and Manual (H-1610-1) (BLM 2005a) and USFS Handbook 1909.15. All of these issues were considered in developing the alternatives brought forward for analysis.

1.5.2. Issues Identified for Consideration in the Northwest Colorado Greater Sage-Grouse Land Use Plan Amendments

The issues identified for consideration in the Northwest Colorado GRSG LUP amendments are:

- GRSG habitat management

- Fluid minerals
- ROWs, including transmission
- Livestock grazing
- Locatable and salable minerals
- Fire
- Invasive species

1.6. Planning Criteria

Planning criteria are based on appropriate laws, regulations, BLM and USFS Manual and Handbook sections, and policy directives, as well as on public participation and coordination with cooperating agencies, other federal agencies, state and local governments, and Native American tribes. Planning criteria are the standards, rules, and factors used as a framework to resolve issues and develop alternatives. Planning criteria are prepared to ensure decision making is tailored to the issues, and to ensure that the BLM and USFS avoid unnecessary data collection and analysis. The preliminary planning criteria are:

- The BLM and USFS will use the WAFWA Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats (Connelly et al. 2004), and any other appropriate resources, to identify GRSG habitat requirements and best management practices (BMPs).
- The approved LUP amendments will be consistent with BLM Instruction Memorandum 2012-044, BLM National Greater Sage-Grouse Land Use Planning Strategy (BLM 2012a) (**Appendix A**).
- The approved LUPAs will comply with FLPMA; NEPA; CEQ regulations at 40 CFR 1500–1508; US Department of the Interior regulations at 43 CFR 46 and 43 CFR 1600; USFS regulations at 36 CFR 220; BLM Land Use Planning Handbook (H-1601-1) (BLM 2005a), Appendix C (Program-Specific and Resource-Specific Decision Guidance Requirements) for the affected resource programs; the BLM NEPA Handbook (H-1790-1) (BLM 2008a); USFS Handbook 1909.15; and all other applicable BLM and USFS policies and guidance.
- The approved Forest Plan amendments will comply with NFMA, NEPA, CEQ regulations at 40 CFR 1500–1508, Regulations of the Secretary of Agriculture at 36 CFR 219, USFS Regulation for Leasing analyses and decisions at 36 CFR 228.102, USFS Manual 1920, and USFS Handbook 1909.12.
- The LUP amendments will be limited to making land use planning decisions specific to the conservation of GRSG habitats.
- The BLM and USFS will consider allocative and/or prescriptive standards to conserve GRSG habitat, as well as objectives and management actions to restore, enhance, and improve GRSG habitat.
- The LUP amendments will recognize valid existing rights.

- Lands addressed in the LUP amendments will be public lands, including surface estate and split-estate lands, managed by the BLM and USFS in GRSG habitats. Any decisions in the LUP amendments will apply only to federal lands administered by either the BLM or the USFS.

- The BLM and USFS will use a collaborative and multi-jurisdictional approach, where appropriate, to determine the desired future condition of BLM-administered and National Forest System lands for the conservation of GRSG and their habitats.

- As described by law and policy, the BLM and USFS will strive to ensure that conservation measures are as consistent as possible with other planning jurisdictions within the planning area boundaries.

- The BLM and USFS will consider a range of reasonable alternatives, including appropriate management prescriptions, that focus on the relative values of resources while contributing to the conservation of the GRSG and its habitat.

- The BLM and USFS will address socioeconomic impacts of the alternatives. Socioeconomic analysis will use an accepted input-output quantitative model such as impact analysis for planning (IMPLAN).

- The BLM and USFS will endeavor to use current scientific information, research, technologies, and results of inventory, monitoring, and coordination to determine appropriate local and regional management strategies that will enhance or restore GRSG habitats.

- Management of GRSG habitat that intersects with Wilderness Study Areas (WSA) on BLM-administered lands will be guided by BLM Manual 6330, Management of WSAs (BLM 2012b). Land use allocations made for WSAs must be consistent with the manual and with other laws, regulations, and policies related to WSA management.

- For BLM-administered lands, all activities and uses within GRSG habitats will follow existing BLM Colorado Public Land Health Standards. Standards and guidelines for livestock grazing and other programs that have developed standards and guidelines will be applicable to all alternatives for BLM lands.

- The BLM and USFS will consult with Native American tribes to identify sites, areas, and objects important to their cultural and religious heritage within GRSG habitats.

- The BLM and USFS will coordinate and communicate with state, local, and tribal governments to ensure that the BLM and USFS consider provisions of pertinent plans, seek to resolve inconsistencies between state, local, and tribal plans, and provide ample opportunities for state, local, and tribal governments to comment on the development of amendments.

- The BLM and USFS will develop vegetation management objectives, including objectives for managing noxious weeds and invasive species, including identification of desired future condition for specific areas, within GRSG habitat.

- The LUP amendments will be based on the principles of adaptive management.

- Reasonable Foreseeable Development Scenarios (RFDSs) and planning for fluid minerals will follow BLM Handbook H-1624-1 and current fluid minerals manual guidance for fluid

mineral (oil and gas, coal-bed methane, oil shale) and geothermal resources. For National Forest System lands, the USFS will use applicable and relevant policy and procedures.

- The LUP amendments will be developed using an interdisciplinary approach to prepare RFDSs, identify alternatives, and analyze resource impacts, including cumulative impacts on natural and cultural resources and the social and economic environment.
- The most current approved BLM and USFS corporate spatial data will be supported by current metadata and will be used to ascertain GRSG habitat extent and quality. Data will be consistent with the principles of the Information Quality Act of 2000.
- State game and fish agencies' GRSG data and expertise will be utilized to the fullest extent practicable in making management determinations on federal lands. Analysis of impacts in the LUP amendments will address the resources and resource programs identified in the NTT report (NTT 2011) and alternatives, which contain specific management measures for conservation of GRSG habitat.
- Resources and resource programs that do not contain specific management direction for GRSG and that may be indirectly affected by proposed management actions will be identified and discussed only to the degree required to fully understand the range of effects of the proposed management actions.
- An additional criterion was received in public scoping comments during the scoping period (December 9, 2011, to March 23, 2012) and was added to the planning criteria. This comment was that state game and fish agencies have the responsibility and authority to manage wildlife.

1.7. Relationship to Other Policies, Plans, and Programs

This planning process will recognize the many ongoing programs, plans, and policies that are being implemented in the planning area by other land managers and government agencies. The BLM and USFS will seek to be consistent with or complementary to other management actions whenever possible. Plans that need to be considered during the GRSG planning effort include the following:

1.7.1. Programmatic National-Level Environmental Impact Statement Documents

- Vegetation Treatment on BLM Lands in Thirteen Western States (BLM 1991) (common to the proposed plan and draft alternatives)
- Final Vegetation Treatments on BLM Lands in 17 Western States Programmatic EIS and Associated ROD (FES 07-21) (BLM 2007a)
- Approved RMPAs/ROD for Designation of Energy Corridors on BLM-administered Lands in the 11 Western States (US Department of Energy, USFS and BLM 2009)
- ROD and RMPAs for Geothermal Leasing in the Western US (BLM and USFS 2008b)
- Final Programmatic EIS on Wind Energy Development on BLM-administered Lands in the Western US (FES 05-11) (BLM 2005b)

- Final Programmatic EIS for Solar Energy Development in Six Southwestern States (BLM 2012c)

1.7.2. State Plans (Developed by Local Working Groups)

- Middle Park Greater Sage-Grouse Conservation Plan (CPW 2000)
- Northern Eagle and Southern Routt Greater Sage-Grouse Conservation Plan (CPW 2004)
- North Park Greater Sage-Grouse Conservation Plan (CPW 2001)
- Northwestern Colorado Greater Sage-Grouse Conservation Plan (CPW 2008a)
- Parachute-Piceance-Roan Plateau Greater Sage-Grouse Conservation Plan (CPW 2008b)
- Parachute-Piceance-Roan Plateau Greater Sage-Grouse Work Group (CPW 2008c)

1.7.3. County Land Use Plans

- Eagle County Comprehensive Plan (Eagle County 2005)
- Garfield County Land Use Resolution (Garfield County 2008)
- Grand County Master Plan (Grand County 2011)
- Jackson County Master Plan (Jackson County 1998)
- Larimer County Master Plan (Larimer County 1997)
- Mesa County Master Plan (Mesa County 2000)
- Moffat County Land Use Plan (Moffat County 2001)
- Rio Blanco County Master Plan (Rio Blanco County 2011)
- Routt County Master Plan (Routt County 2003)
- Summit County General Plan (Summit County 2006)
- Garfield County Greater Sage-Grouse Conservation Plan (Garfield County 2013) (**Appendix D**)

1.7.4. Other Federal Plans

- BLM Colorado River Valley RMP, In Progress
- BLM Grand Junction RMP, In Progress
- BLM Kremmling RMP, In Progress
- BLM Little Snake RMP (BLM 2011)
- BLM White River RMP (BLM 1997)

- BLM White River Oil and Gas Development RMPA, In Progress
- Routt National Forest Land and Resource Management Plan (USFS 1997)

1.7.5. Endangered Species Recovery Plans

Endangered species recovery plans are prepared by USFWS to promote the recovery of threatened and endangered species. The relevant plans include:

- Black-footed Ferret Recovery Plan (USFWS 1988)
- Bonytail Recovery Goals (USFWS 2002a)
- Canada Lynx Recovery Outline (USFWS 2005)
- Colorado Pikeminnow Recovery Goals (USFWS 2002b)
- Greenback Cutthroat Trout Recovery Plan (USFWS 1998a)
- Humpback Chub Recovery Goals (USFWS 2002c)
- Razorback Sucker Recovery Plan (USFWS 1998b)

1.7.6. Memorandum of Understanding

- Memorandum of Understanding(MOU) between the BLM and USFS Concerning Oil and Gas Leasing Operations. In 2006, the BLM and the USFS signed an MOU Concerning Oil and Gas Leasing Operations for the purpose of efficient, effective compliance with statutory and regulatory requirements. The purpose of this MOU is to establish joint BLM and USFS policies and procedures for managing oil and gas leasing and operational activities pursuant to oil and gas leases on National Forest System lands that are consistent with applicable law and policy. The MOU establishes the roles of the USFS and the BLM in processing Applications for Permits to Drill and review of subsequent operations.
- MOU between the BLM and Colorado Department of Natural Resources concerning geothermal leasing, permitting, and administration in Colorado (March 2011).
- MOU among the US Department of Agriculture, US Department of Commerce, US Department of Defense, US Department of Energy, US Environmental Protection Agency (EPA), CEQ, Advisory Council on Historic Preservation, US Department of Interior, and Federal Energy Regulatory Commission (October 2009) to improve coordination among project applicants, federal agencies, and states and tribes involved in the siting and permitting process; to improve uniformity, consistency, and transparency; and to provide a single point of contact for significant transmission lines defined as high voltage (generally, though not necessarily, 230 kilovolts or more) and their attendant facilities.

1.7.7. Activity Plans and Amendments

- BLM Bangs Canyon Transportation Management Plan, GJFO (BLM 2007b)
- BLM Emerald Mountain Transportation Management Plan, LSFO (BLM 2007c)

- BLM North Fruita Desert Transportation Management Plan, GJFO (BLM 2005c)
- BLM Wilson Creek Travel Management Plan, WRFO (BLM 2005d)
- Northwest Colorado Fire Program Area Fire Management Plan (BLM 2012d)
- BLM White River Oil and Gas Resource Management Plan Amendment, In Progress.
- GJFO and CRVFO Fire Management Plans (updated annually).
- Routt National Forest Oil and Gas Leasing Final EIS and Record of Decision (USFS 1993, 1998).

1.7.8. Habitat Management Plans

A Habitat Management Plan provides guidance for managing a defined habitat for a target wildlife species, protecting and improving habitat for that species and for other species utilizing the habitat. These plans are usually written in coordination with State Wildlife Agencies.

- Lower Colorado River Habitat Partnership Program Habitat Management Plan (CPW 2008c)
- Northwest Colorado Habitat Partnership Program Habitat Management Plan (CPW 2009)

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Chapter 2. Alternatives

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2.1. Introduction

This chapter details Alternatives A through D for the Northwest Colorado GRSG LUPA/EIS and includes references to maps (**Appendix B**, Figures) identifying where actions would be applicable. The proposed alternatives were formulated in response to issues and concerns identified through public scoping, and in an effort to maintain or increase GRSG abundance and distribution by conserving, enhancing, or restoring the sagebrush ecosystem upon which populations depend throughout WAFWA Management Zones II and VII of the Rocky Mountain Region (Stiver et al. 2006). Decisions in this LUPA would apply to federal surface land and federal subsurface mineral estate in the decision area (shown in **Appendix B**, **Figure 1-2**, Northwest Colorado BLM Greater Sage-Grouse EIS Planning Area Boundaries), which are administered by the BLM Northwest Colorado District Office and the Routt National Forest.

The No Action Alternative (Alternative A) represents the continuation of current management direction in the field office LUPs and proposes no new plan or management actions. This alternative is required by CEQ regulations and provides a baseline for comparison of the other alternatives (CEQ 1981). The BLM and USFS developed the action alternatives (B, C, and D) by considering issues and concerns raised during the public scoping period, as well as planning criteria and guidance applicable to management of resources and resource uses relevant to managing GRSG habitat. The three action alternatives (B, C, and D) describe proposed changes to current management as well as any existing management that would be carried forward. These alternatives provide a range of choices for resolving the planning issues identified in **Chapter 1,** Introduction.

The BLM and USFS recognize that social, economic, and environmental issues cross land ownership lines and that extensive cooperation is needed to actively address issues of mutual concern. To the extent possible, these alternatives were developed utilizing input from public scoping comments and cooperating agencies.

2.2. Introduction to Resource Management Plan Amendment Alternatives

LUP decisions consist of identifying and clearly defining goals and objectives (desired outcomes) for resources and resource uses, followed by developing allowable uses and management actions necessary for achieving the goals and objectives. These critical determinations guide future land management actions and subsequent site-specific implementation actions to meet multiple use and sustained yield mandates while maintaining land health.

Components of Alternatives

Goals are broad statements of desired outcomes (LUP-wide and resource or resource-use specific) and are not quantifiable or measurable. Objectives are specific measurable desired conditions or outcomes intended to meet goals. While goals are the same across alternatives, objectives typically vary, resulting in different allowable uses and management actions for some resources and resource uses.

Management actions and allowable uses are designed to achieve objectives. Management actions are measures that guide day-to-day and future activities. Allowable uses delineate which uses are permitted, restricted, or prohibited, and may include stipulations or restrictions. Allowable

uses also identify lands where specific uses are excluded to protect resource values, or where certain lands are open or closed in response to legislative, regulatory, or policy requirements. Implementation decisions are site-specific on-the-ground actions and are typically not addressed in LUPs.

Purpose of Alternative Development

Alternative development is the heart of the LUPA/EIS process. Land use planning and NEPA regulations require the BLM and USFS to formulate a reasonable range of alternatives. Alternative development is guided by established planning criteria (as outlined in 43 CFR Section 1610).

The basic goal of alternative development is to produce distinct potential management scenarios that:

- Address the identified major planning issues
- Explore opportunities to enhance management of resources and resource uses
- Meet the purpose and need for the LUP or LUPA
- Are feasible

Pursuit of this goal provides the BLM, the FS and the public with an appreciation for the diverse ways in which conflicts regarding resources and resource uses might be resolved, and offers the BLM State Director/Forest Supervisor a reasonable range of alternatives from which to make an informed decision. The components and broad aim of each alternative considered for the Northwest Colorado GRSG RMPA/EIS are discussed below.

2.3. Alternative Development Process

The Northwest Colorado GRSG RMPA/EIS planning team employed the BLM and Forest Service planning process (outlined in **Chapter 1**, Introduction) to develop a reasonable range of alternatives for the RMPA. The BLM and Forest Service complied with NEPA and the CEQ implementing regulations at 40 CFR 1500 in the development of alternatives for this draft RMPA/EIS, including seeking public input and analyzing reasonable alternatives. The alternatives include management options for the planning area that would modify or amend decisions made in the field office RMPs, as amended, to meet the planning criteria, to address issues and comments from cooperating agencies and the public, or to provide a reasonable range of alternatives. Since this is a plan amendment to address GRSG conservation, many decisions from the field office RMPs are acceptable and reasonable. In these instances, there is no need to develop alternative management prescriptions.

Public input received during the scoping process was considered to ensure that all issues and concerns would be addressed, as appropriate, in developing the alternatives. The planning team developed planning issues to be addressed in the RMPA, based on broad concerns or controversies related to conditions, trends, needs, and existing and potential uses of planning area lands and resources.

2.3.1. Develop a Reasonable Range of Alternatives

Between May and September 2012, the BLM and cooperating agencies met to develop management goals and identify objectives and actions to address the goals. The various groups met numerous times throughout this period to refine their work. Using a two-step process, the planning team:

1. Develop one no action alternative (Alternative A) and two preliminary action alternatives. The action alternatives were designed to:
   - Address the planning issues
   - Fulfill the purpose and need for the RMPA (outlined in **Chapter 1, Section 1.2**, Purpose of and Need for the Land Use Plan Amendments)
   - Meet the multiple use mandates of the FLPMA (43 USC 1716).
2. Blended goals, objectives, and actions from the two action alternatives to formulate a third action alternative (Alternative D) that strives for balance among competing interests and has the greatest potential to effectively address the planning issues.

2.4. Resulting Range of Alternatives

The three resulting action alternatives (Alternatives B, C, and D) offer a range of possible management approaches for responding to planning issues and concerns identified through public scoping, and to maintain or increase GRSG abundance and distribution in the planning area. While the goal is the same across alternatives, each alternative contains a discrete set of objectives and management actions and constitutes a separate RMPA with the potential for different long-range outcomes and conditions.

The relative emphasis given to particular resources and resource uses differs as well, including allowable uses, restoration measures, and specific direction pertaining to individual resource programs. When resources or resource uses are mandated by law or are not tied to planning issues, there are typically few or no distinctions between alternatives.

All of the action alternatives were developed to employ resource programs to address the USFWS-identified threats to GRSG and their habitat. **Table 2-1**, USFWS-Identified Threats to GRSG and Their Habitat and Applicable BLM/Forest Service RMP/LUP Resource Programs for Addressing Threats, identifies the threats and the applicable BLM and Forest Service resource programs in RMPs and LUPs for addressing the threats. The major threats to GRSG identified by USFWS in WAFWA Management Zones II and VII include oil and gas development, infrastructure, agriculture and urbanization, and livestock grazing (Manier et al. 2013, pages 253-256).

Meaningful differences among the four alternatives are described in **Table 2-2**, Comparative Summary of Alternatives, in **Section 2.8**, Summary Comparison of Alternatives. **Table 2-3**, Description of Alternatives A and B, and **Table 2-4**, Description of Alternatives B, C, and D, in **Section 2.8**, Summary Comparison of Alternatives, provide a complete description of proposed decisions for each alternative, including the project goal and objectives, management actions, and allowable uses for individual resource programs. Complete descriptions of the stipulations developed for implementation of the management actions described in the alternatives are found

in **Appendix D**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations. Figures in **Appendix B** provide a visual representation of differences between alternatives. In some instances, varying levels of management overlap a single polygon due to management prescriptions from different resource programs. In instances where varying levels of management prescriptions overlap a single polygon, the stricter of the management prescriptions would apply.

Data from geographic information systems (GIS) have been used in developing acreage calculations and for generating many of the figures in **Appendix B**, Figures. Calculations in this EIS are rounded and are dependent upon the quality and availability of data. Data were collected from a variety of sources, including the BLM, collaborative partners, stakeholders, and cooperating agencies. Given the scale of the analysis, the compatibility constraints between datasets, and the lack of data for some resources, all calculations are approximate and serve for comparison and analytic purposes only. Likewise, the figures in **Appendix B**, Figures, are provided for illustrative purposes and subject to the limitations discussed above. Detailed, site-specific information is available from local BLM offices. The BLM may receive additional GIS data; therefore, the acreages may be recalculated and revised.

Table 2.1. USFWS-Identified Threats to GRSG and Their Habitat and Applicable BLM/USFS LUP Resource Programs for Addressing Threats

USFWS-identified Threat to GRSG and Their Habitat[1]	Applicable BLM RMP Resource Program for Addressing the Threat
Oil and Gas Development	Program: Fluid Minerals Decisions: Identify open and closed areas to fluid mineral leasing; identify open areas with no surface occupancy (NSO), controlled surface use (CSU), and timing limitation (TL) stipulations
	Program: Lands and Realty Decisions: Issue ROW grant; identify ROW avoidance or exclusion areas
Infrastructure	Program: Lands and Realty – Utilities Decisions: Issue ROW grant; identify ROW avoidance or exclusion areas; identify utility corridors
	Program: Lands and Realty – Communication Sites Decisions: Issue ROW grant; identify ROW avoidance or exclusion areas
	Program: Range Management – Fences Decisions: Installation or removal of fences
	Program: Comprehensive Trails and Travel Management/Range Management – Fences/culverts/stream crossings Decisions: Installation or removal of fences, culverts or stream crossings
	Program: Comprehensive Trails and Travel Management – Roads Decisions: Identify travel management areas; identify modes of access and travel; identify areas open, limited, or closed to off-highway vehicles (OHVs)
	Program: Lands and Realty – Railroads Decisions: Issue ROW grant; identify ROW avoidance or exclusion areas

USFWS-identified Threat to GRSG and Their Habitat[1]	Applicable BLM RMP Resource Program for Addressing the Threat
Invasive Species	Program: Vegetation Decisions: Weed control, suppression, or eradication via natural processes; restrictions on allowable uses; active management or treatment
Wildfire	Program: Wildland Fire Management Decisions: Changes to fire management strategies; identify areas suitable/unsuitable for managed wildland fire; identify priority areas for suppression
Grazing	Program: Range Management Decisions: Identify acres open and closed to grazing; establish animal unit months (AUMs); manage grazing systems; conduct range improvements; identify season of use; identify stocking rates
	Program: Wild Horse and Burro Decisions: Identify herd areas and herd management areas (HMAs)
	Program: Special Status Species Decisions: Identify habitat management
Agriculture	Program: Lands and Realty Decisions: Identify retention, disposal, and acquisition areas
Disease	Program: Comprehensive Trails and Travel Management/Range Management Decisions: Establish design features and BMPs
	Program: Minerals Decisions: Establish design features and BMPs
Urbanization	Program: Lands and Realty Decisions: Identify retention, disposal, and acquisition areas
Coal/Strip Mining	Program: Coal Decisions: Identify suitable and unsuitable areas for coal development; identify areas withdrawn from coal development; identify open areas with NSO, CSU, and TL stipulations
Weather	There is no resource program in RMPs for addressing this threat to GRSG and their habitat.
Predation	Program: Lands and Realty Decisions: Establish design features and Preferred Design Features (PDFs)/Required Design Features (RDFs)
	Program: Minerals Decisions: Establish design features and PDFs/RDFs
Prescribed Fire	Program: Wildland Fire Management Decisions: Establish fire management strategies; identify areas suitable and unsuitable for prescribed fire use

USFWS-identified Threat to GRSG and Their Habitat[1]	Applicable BLM RMP Resource Program for Addressing the Threat
Human	Program: Recreation Decisions: Issue special recreation permits (SRPs)
	Program: Lands and RealtyDecision: Issue ROW grant; identify ROW avoidance or exclusion areas
	Program: MineralsDecision: Identify areas as open or closed to leasable mining; identify open areas with NSO, CSU, TL stipulations; petition for withdrawal lands from locatable mineral development; establish terms, conditions, or special considerations; identify open and closed areas to mineral materials disposal.
Conifer Invasion	Program: Vegetation Decisions: Conduct vegetation treatments
Water Development	Program: Range Management Decisions: Identify number, location, and type of range water developments
Hard Rock Mining	Program: Locatable Minerals Decisions: Petition for withdrawal lands from locatable mineral development; establish terms, conditions, or special considerations
	Program: Salable Mineral Materials Decisions: Identify open and closed areas to mineral materials disposal; establish terms, conditions, or special considerations
	Program: Nonenergy Leasable Minerals Decisions: Identify open and closed areas to nonenergy leasable minerals; Establish terms, conditions, or special considerations
Hunting	The BLM has no authority over this use; therefore, there is no resource program for addressing this threat to GRSG and their habitat.
Climate Change	There is no one resource program for addressing this threat to GRSG and their habitat; however, this threat has been considered as part of individual resource concerns and monitored trends.
Contaminants	Program: Minerals Decisions: Plan of operations requirements
	Program: Public Health and Safety Decisions: Remediate and resolve illegal dumping
[1]USFWS 2010	

2.4.1. Alternative A

Alternative A meets the CEQ requirement that a no action alternative be considered. This alternative continues current management direction and prevailing conditions derived from the existing field office and forest planning documents. Goals and objectives for resources and resource uses are based on the most recent RMP decisions, along with associated amendments, activity and implementation level plans, and other management decision documents. Laws, regulations, and BLM policies that supersede RMP decisions would apply.

Goals and objectives for BLM-administered lands and mineral estate would not change. Appropriate and allowable uses and restrictions pertaining to activities such as mineral leasing and development, recreation, construction of utility corridors, and livestock grazing would also

remain the same. The BLM would not modify existing or establish additional criteria to guide the identification of site-specific use levels for implementation activities.

2.4.2. Alternative B

GRSG conservation measures in *A Report on National Greater Sage-Grouse Conservation Measures* (NTT 2011) were used to form BLM management direction under Alternative B. Management actions by the BLM in concert with other state and federal agencies, and private land owners play a critical role in the future trends of GRSG populations. To ensure BLM management actions are effective and based on the best available science, the National Policy Team created a NTT in August 2011. The BLM's objective for chartering this planning strategy effort was to develop new or revised regulatory mechanisms, through RMPs, to conserve and restore GRSG and their habitat on BLM-administered lands on a range-wide basis over the long term. Conservation measures included in Alternative B focus primarily on GRSG PPH and include a 3-percent disturbance cap in PPH. PPH areas have the highest conservation value to maintaining or increasing GRSG populations.

2.4.3. Alternative C

During scoping for the Northwest Colorado GRSG RMPA/EIS, individuals and conservation groups submitted management direction recommendations for protection and conservation of GRSG and their habitat. The recommendations, in conjunction with resource allocation opportunities and internal sub-regional BLM input, were reviewed in order to develop BLM management direction for GRSG under Alternative C. Conservation measures in Alternative C are mostly focused on ADH (PPH, PGH, and linkage/connectivity habitat). These areas have been identified by CPW in coordination with respective BLM offices. Conservation measures included in Alternative C would include a 3-percent cap on disturbance in ADH.

2.4.4. Alternative D

Alternative D is the Northwest Colorado Sub-region's adjustments alternative, which emphasizes balancing resources and resource use among competing human interests, land uses, and the conservation of natural and cultural resource values, while sustaining and enhancing ecological integrity across the landscape, including plant, wildlife, and fish habitat. This alternative incorporates adjustments to the NTT report (NTT 2011) to provide a balanced level of protection, restoration, enhancement, and use of resources and services to meet ongoing programs and land uses. Anthropogenic surface disturbance would be managed not to exceed 5 percent in ecological sites that support sagebrush within PPH (**Figure 2-1**, Ecological Sites Supporting Sagebrush in Preliminary Priority Habitat, in **Appendix B**, Figures). Additional information on disturbance cap management under Alternative D can be found in **Appendix E**, Disturbance Cap Management. Under Alternative D, the WRFO Reclamation Plan (**Appendix F**, Surface Reclamation Plan) would be followed for reclamation of lands to go back into rotation under the disturbance caps.

2.5. Management Common to All Alternatives

Allowable uses and management actions from the existing RMP that remain valid and do not require revision have been carried forward to all of the proposed alternatives. Other decisions are common only to the action alternatives (B, C, and D).

Although each alternative emphasizes a slightly different mix of resources and resource uses, all four alternatives contain the following goals:

- Conserve, enhance and restore the sagebrush ecosystem upon which GRSG populations depend in an effort to maintain or increase their abundance and distribution, in cooperation with other conservation partners.
- Comply with state and federal laws, regulations, policies, and standards, including FLPMA multiple use mandates and National Forest Management Act mandates.
- Implement actions originating from laws, regulations, and policies and conform to day-to-day management, monitoring, and administrative functions not specifically addressed.
- Preserve valid existing rights, which include any leases, claims, or other use authorizations established before a new or modified authorization, change in land designation, or new or modified regulation is approved. Existing fluid mineral leases are managed through conditions of approval (COAs).
- Collaborating with adjacent landowners, federal and state agencies, local governments, tribes, communities, other agencies, and other individuals and organizations, as needed, to monitor and implement decisions to achieve desired resource conditions.
- Providing for human safety and property protection from wildfire.

In addition to the shared elements above, allowable uses, and management actions common to all four alternatives (as indicated by a single cell across the table row) are listed in **Table 2-3**, Description of Alternatives A and B, and **Table 2-4**, Description of Alternatives B, C, and D, in **Section 2.8**, Summary Comparison of Alternatives.

2.6. Alternatives Considered but not Analyzed in Detail

2.6.1. Area of Critical Environmental Concern Proposals Applied to All Designated Habitat

Two public-proposed alternatives for designations of new ACECs were submitted to the BLM/Forest Service during the public scoping period:

- ADH would be an ACEC
- PPH would be an ACEC

The BLM has carried forward the proposal that all PPH be designated as an ACEC to protect sagebrush habitat under Alternative C. The PPH proposal was found to meet ACEC relevance and importance criteria by a team of BLM biologists. See **Appendix H**, Areas of Critical Environmental Concern Relevance and Importance Rationale, for the relevance and importance worksheet.

The proposal to designate ADH as an ACEC did not meet relevance and importance criteria. Specifically, PGH and linkage/connectivity habitat areas did not meet ACEC relevance and

importance criteria; therefore, this alternative is not carried forward for detailed analysis. Refer to **Appendix H**, Areas of Critical Environmental Concern Relevance and Importance Rationale, for the relevance and importance worksheet for PGH and linkage/connectivity habitat.

ACECs differ from other special designations, such as Wilderness Study Areas, in that designation by itself does not automatically prohibit or restrict other uses in the area.

2.6.2. Garfield County Alternative

On March 21, 2013, Garfield County, Colorado, submitted their Greater Sage-Grouse Conservation Plan to the BLM. Garfield County formally requested that this alternative be included as the preferred alternative for the Garfield County portion of the Northwest Colorado Greater Sage-Grouse EIS. The alternative is presented in **Appendix C**, Garfield County Greater Sage-Grouse Conservation Plan, but has not been analyzed in detail primarily because it is contained within the existing range of alternatives. The Garfield County alternative is more restrictive and more focused regarding "modeled suitable habitat" than Alternative A. The alternative is less restrictive and identifies less PPH than Alternatives B, C, and D. Given the Garfield County alternative's position within the range of alternatives, the conservation measures contained could be selected, in whole or in part, pending detailed analysis in the final EIS. Consequently, the public is asked to review the Garfield County alternative and provide comments.

Garfield County's effort was motivated by their observation that the GRSG habitat in the county was "naturally fragmented" relative to the expanses of sagebrush-dominated rangeland further north. Figure 6 of the Garfield County alternative is noteworthy because it depicts the lands to be managed with specific conservation measures under the alternative. The natural fragmentation concept is supported by **Figure 2-1**, Ecological Sites Supporting Sagebrush in Preliminary Priority Habitat (in **Appendix B**, Figures), which identifies ecological sites in PPH that support stands of sagebrush. It is evident from this figure that the GRSG in Garfield County and southern Rio Blanco County use sagebrush habitat that is relatively discontinuous.

Garfield County's valid observations, however, may fail to allow for the connectivity of habitat necessary to maintain the GRSG population. The Parachute-Piceance-Roan population in northwest Colorado is relatively small and isolated in the southernmost extent of the species' range. Birds in this population have been documented to use atypical habitat, including sagebrush/mixed shrub communities where the mountain shrub component is greater than 10 percent (Apa 2010). PPH mapped by CPW has incorporated known seasonal bird movements and habitat use within this population.

2.7. Considerations for Selecting a Preferred Alternative

The proposed alternatives offer a range of discrete strategies for resolving potential deficiencies in existing management, exploring opportunities for enhanced management, and addressing issues identified through internal assessment and public scoping related to maintain or increase GRSG abundance and distribution on BLM-administered lands. Comments submitted by other government agencies, public organizations, state and tribal entities, and interested individuals were given careful consideration. Public scoping efforts enabled the BLM to identify and shape significant issues pertaining to GRSG habitat, energy development, livestock grazing, potential ACECs, public land access, and other program areas. Cooperating agencies participated, reviewed

and provided comments at critical intervals during the alternative development process, as well as the EIS process in general.

The BLM's NEPA handbook (H-1790-1) requires the BLM to identify a preferred alternative in the draft RMPA/EIS. Formulated by the planning team, the preferred alternative represents those goals, objectives, and actions determined to be most effective at resolving planning issues and balancing resource use at this stage of the process. While collaboration is critical in developing and evaluating alternatives, the final designation of a preferred alternative remains the exclusive responsibility of the BLM and Forest Service. The BLM's preferred alternative is Alternative D.

2.8. Summary Comparison of Alternatives

This section summarizes and compares the four alternatives (A through D) considered in the EIS. To reduce the length and avoid confusion, only select meaningful differences (those with the most potential to affect resources) among alternatives are summarized in this section. Combined with the appendices and maps, **Table 2-2**, Comparative Summary of Alternatives, **Table 2-3**, Description of Alternatives A and B, and **Table 2-4**, Description of Alternatives B, C, and D, highlight the meaningful differences among the alternatives relative to what they establish and where they occur. The acres depicted in **Table 2-2** reflect the acres that would be allocated/restricted based on the management actions for that alternative. However, there may be overlap between acres currently managed (Alternative A) for a resource/use and the acres depicted under the action alternatives (B, C, and D).

Decisions made by this RMP amendment are anticipated to be subsequently implemented. Restrictions on resource uses (e.g., closed to leasing) made through this amendment apply for the life of the RMP. Actions taken or authorized by the BLM during RMPA implementation would comply with standard practices and **Appendix H,** Required Design Features (RDFs), Preferred Design Features (PDFs), and Suggested Design Features (SDFs). Therefore, these practices and guidelines are considered part of each alternative.

Table 2.2. Comparative Summary of Alternatives (Acres)

Resource or Resource Use	Alt A	Alt B	Alt C	Alt D
Resources				
GRSG Habitat Areas (BLM/USFS surface and federal mineral estate, including coal)		***Figure 1-4***	***Figure 1-4***	***Figure 1-4***
Preliminary Priority (PPH)	0	1,576,900	1,576,900	1,576,900
Preliminary General (PGH)	0	1,134,800	1,134,800	1,134,800
Linkage/Connectivity	0	181,900	181,900	181,900
Resource Uses				
Livestock Grazing	***Figure 2-2***	***Figure 2-2***	***Figure 2-3***	***Figure 2-2***
Acres closed to all classes of livestock grazing (acres) (including outlying areas)	0	0	1,751,600	0
Comprehensive Travel and Transportation Management				
Open to cross-country motorized travel	202,600	202,600	202,600	202,600
Closed to motorized travel	52,600	52,600	52,600	52,600
Lands and Realty	***Figure 2-4***	***Figure 2-5***	***Figure 2-6***	***Figure 2-7***
ROW exclusion areas	25,600	926,800	1,751,600	0

Resource or Resource Use	Alt A	Alt B	Alt C	Alt D
ROW avoidance areas	127,600	0	0	930,500
ROW avoidance areas for large transmission lines (greater than 230 kilovolts)				***Figure 2-8***
	0	0	0	68,000
ROW exclusion areas for large transmission lines (greater than 230 kilovolts)	0	0	0	881,000
Recommend for withdrawal (federal minerals in PPH)	0	1,576,900	1,576,900	0
Coal				
Unsuitable for surface mining and operations	1,670,800	1,576,900	1,576,900	criteria applied to 1,576,900 acres
Fluid Mineral Leasing[1]	***Figure 2-9***	***Figure 2-10***	***Figure 2-11***	***Figure 2-9***
Closed to fluid mineral leasing	100,200	1,347,400	2,473,000	100,200
Open to leasing subject to No Surface Occupancy (NSO)-BLM surface/federal minerals	***Figure 2-12***	***Figure 2-12***	***Figure 2-12***	***Figure 2-13***
	350,300	350,300	350,300	1,347,400
Locatable Minerals, Mineral Materials, and Nonenergy Solid Leasable Minerals				
Closed to mineral materials sales	***Figure 2-14***	***Figure 2-15***	***Figure 2-15***	***Figure 2-14***
	104,200	926,800	926,800	200
Closed to nonenergy mineral leasing	***Figure 2-16***	***Figure 2-17***	***Figure 2-17***	***Figure 2-16***
	11,200	926,800	926,800	11,200
Special Designations				
Areas of Critical Environmental Concern	***Figure 2-18***	***Figure 2-18***	***Figure 2-19***	***Figure 2-18***
16 Existing ACECs	33,200	33,200	33,200	33,200
Sage-Grouse Habitat ACEC/Zoological Area (all PPH)	0	0	926,800	0
(all PPH)				

Source: BLM 2013a

[1] Decisions for leasable fluid minerals also apply to oil shale and uranium.

2.8.1. How to Read Tables 2–3 and 2–4

Table 2-3, Description of Alternatives A and B, and **Table 2-4**, Description of Alternatives B, C, and D, depict the range of alternatives. The following describes how **Table 2-3** and **Table 2-4** are written and formatted to show the LUP decisions proposed for each alternative.

Per Appendix C of BLM Land Use Planning Handbook H-1601-1, LUP decisions are broad-scale decisions that guide future land management actions and subsequent site-specific implementation decisions (BLM 2005a). LUP decisions fall into two categories, which establish the base structure for **Table 2-3**, Description of Alternatives A and B, and **Table 2-4**, Description of Alternatives B, C, and D: desired outcomes (goals and objectives) and allowable uses and actions to achieve outcomes.

- Goals are broad statements of desired outcomes that usually are not quantifiable.
- Objectives identify specific desired outcomes for resources. Objectives may be quantifiable and measurable and may have established timeframes for achievement, as appropriate.

- Actions identify measures or criteria to achieve desired outcomes (i.e., objectives), including actions to maintain, restore, or improve land health.
- Allowable uses identify uses or allocations that are allowable, restricted, or prohibited on public lands and mineral estate.
- Stipulations that fall under the allowable uses category, such as NSO, CSU, and TL, are also applied to surface-disturbing activities to achieve desired outcomes (i.e., objectives). Stipulations are summarized in **Appendix D**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.

In general, only those resources and resource uses that have been identified as planning issues have notable differences between the alternatives.

Actions that are applicable to all alternatives are shown in one cell across a row. These particular objectives and actions would be implemented regardless of which alternative is ultimately selected.

Actions that are applicable to multiple, but not all, alternatives are indicated by either combining cells for the same alternatives, or by denoting those objectives or actions as the "Same as Alternative B," for example.

Table 2.3. Description of Alternatives A and B

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat			
NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
		Objective: Maintain and enhance populations and distribution of GRSG by protecting and improving sagebrush habitats that sustain GRSG populations.	**Objective: No similar objective.**
Travel and Transportation		**Objective: Manage travel and transportation to 1) reduce mortality from vehicle collisions, 2) limit change in GRSG behavior, 3) avoid, minimize, and mitigate habitat fragmentation, 4) limit the spread of noxious weeds, and 5) limit disruptive activity associated with human access.**	**Objective: No similar objective.**
1	Travel	(PPH) Limit motorized travel to existing roads, primitive roads, and trails at a minimum.	**Colorado River Valley RMP:** Designate OHV area travel as follows: ● Open: 294,300 acres ● Limited to existing routes: 38,000 acres ● Limited to existing routes May 1 to November 30: 4,300 acres ● Limited to designated routes: 123,000 acres ● Closed: 44,000 acres **Grand Junction RMP:** Assign off-road vehicle designations to all public land as follows: ● Open (Intensive): 12,500 acres ● Open to cross-country travel: 445,400 acres ● Closed: 35,300 acres ● Limited to designated roads: 225,500 acres (includes 5,500 acres with seasonal limitations) ● Limited to existing roads and trails: 342,700 acres (includes 108,000 acres with seasonal limitations)

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat			
NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			Kremmling RMP: Designate OHV-area travel as follows: ● Open: 307,300 acres ● Limited to Existing Routes: 7,300 acres ● Limited to Designated Routes: 54,500 acres ● Closed: 8,700 acres **Little Snake RMP:** Travel Management Areas have been designated as open, limited, or closed to vehicle use. ● Open: 19,710 acres ● Limited to Existing Routes: 992,780 acres ● Limited to Designated Routes: 199,790 acres ● Closed: 124,620 acres **Roan Plateau RMP:** The Roan Plateau Area TMA delineation allows *muscle-powered* (i.e., foot, ski, horse, stock) travel cross-country year-round. Mechanized (i.e., wheeled conveyance) travel in the Roan Plateau Area TMA is limited to designated routes year-round as signed or identified on maps. **White River RMP:** No areas will be designated as open to OHV use at this time. Winter snowmobile use will remain open, except within the Moosehead road closure area, Oak Ridge State Wildlife Area, and the six WSAs. Until a Travel Management Plan is completed, motorized vehicles will be limited to existing roads, ways, and trails on most of the public lands in the Resource Area from October 1 through April 30 each year (see Map 2-22 [of the White River RMP]).

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat			
NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			Motorized vehicle travel will be limited to existing roads, ways, and trails all year in identified fragile soil areas, the black footed ferret reintroduction areas, the Texas-Missouri- Evacuation Creek cultural resource area, and in areas with potential habitat for Threatened and Endangered or sensitive plant species. Motorized vehicle use will be limited to designated roads and, trails in: ACECs, in order to protect sensitive resources (see Maps 2-23A through 2-23F [of the White River RMP]); the Indian Valley/Deep Channel area, to comply with a court ruling (see Map 2-24 [of the White River RMP]); and the Canyon Pintado National Historic District, in order to protect fragile cultural resources (see Map 2-25 [of the White River RMP]). The Cow Creek/Timber Gulch/Hay Gulch areas (7,390 acres) will be closed to motorized vehicle use from August 15 through November 30 each year in order to establish nonmotorized quality hunting areas. All six WSAs are designated as closed until time that congress either designates them as wilderness or releases them for multiple uses. (p2-44). **Routt National Forest:** (ADH) The 2007 Motor Vehicle Use Map limits motorized travel to designated roads and motorized trails. Additional Forest Plan Standards include: ● Limit roads and other disturbed sites to the minimum feasible number, width, and total length consistent with the purpose of specific operations, local topography, and climate (Forestwide Soils Standard, p. 1-6). ● Prohibit motorized use with wheeled vehicles on lands outside designated travel ways unless a forest order indicates that such use is specifically allowed (Forestwide Infrastructure – Travelways Standard 4).

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat			
NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			Prohibit motorized access from private land where access for the general public is not available, except by special permit (Forestwide Infrastructure – Travelways Standard 6, p. 1-23).
2	Travel	(PPH) Travel management should evaluate the need for permanent or seasonal road or area closures.	**Colorado River Valley RMP:** Allowable Use: STIPULATION GS-TL-3: *GRSG Winter and Nesting Habitat.* Prohibit surface occupancy and surface-disturbing activities during certain timeframes in GRSG crucial winter habitat and nesting habitat (includes GRSG). GRSG nesting habitat is described as sagebrush stands with sagebrush plants between 30 and 100 centimeters (approximately 12 and 40 inches) in height and a mean canopy cover between 15 and 40 percent within a 2-mile radius of an active lek. Winter habitat: December 16 to March 15. Nesting habitat: March 1 to June 30. **Grand Junction RMP:** Manage 35,300 acres as *closed* to OHV use: ● Palisade municipal watershed ● Whitewater Hill Sensitive Plant Study Site ● Pyramid Rock ACEC Kremmling RMP: Designate OHV-area travel as follows: ● Open: 307,300 acres ● Limited to Existing Routes: 7,300 acres ● Limited to Designated Routes: 54,500 acres ● Closed: 8,700 acres. Implement the following seasonal travel closures: Prohibit motorized travel from April 1 to June 1: ● Grouse Mountain Road No. 2758. Prohibit motorized travel from April 15 to June 1:

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat			
NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			• Dice Hill Road No. 2750; • Black Mountain Access Road No. 2757; • Smith Mesa Road No. 2759; • Kinney Creek Road No. 2755; • Strawberry Road No. 2751; • Hurd Peak Road No. 2765; • Buffalo Peak Access Road No. 2507 and No. 2508; • Independence Mountain Access Roads No. 2503 and No. 2504; • Bull Mountain Road No. 2505; and • Owl Mountain Road No. 2502 and No. 2506. Prohibit motorized travel from Labor Day to June 1: • Smith Mesa Lower Mainline Road No. 2762; • McQueary Creek Road No. 2756; and, • Kinney Creek Spur Roads. Prohibit motorized travel from June 1 to August 1: • Hebron Slough: Closed to all motorized vehicles (in order to protect nesting waterfowl). Prohibit motorized travel from June 1 to Labor Day: • Radium Hot Springs Access Road. Prohibit motorized travel from August 1 to July 1:

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat			
NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			• Hebron Slough: motorized vehicles Limited to Designated Roads and Trails. (Exception: Snowmobiles operating on snow.) Prohibit motorized travel from October 1 to June 1: • Three Mile Creek Road No. 2510 (Exception: Snowmobiles operating on snow). Prohibit motorized travel from December 1 to April 1: • Inspiration Point Flats Road and Jeep Trail; and • Pumphouse Recreation Site Access Road. Prohibit motorized travel year-long: • Sheriff Creek Road No. 2764; • Parson's Draw Road No. 2513; • Mitchell Placer Road No. 2511; and • Owl Mountain Spur Roads. Other: • Spruce Creek Road No. 2767 – Prohibit motorized travel from Labor Day to June 1. • Spruce Creek Spur Roads No. 2770 and 2771 – Prohibit motorized travel from Labor Day to June 1. • Wolford Mountain Single Track – Prohibit motorized travel from September 15 to June 1 • Wolford Mountain Travel Management Area – Prohibit motorized travel from December 16 to April 14.

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat			
NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			Little Snake RMP: To prevent disturbing up to 75 percent of nesting birds, between March 1 and June 30, GRSG nesting and early brood-rearing habitat (Map 5 [of the Little Snake RMP]) will be stipulated as CSU for oil and gas operations and avoidance areas for other surface disturbing activities within a 4-mile radius of the perimeter of a lek. All surface disturbing activities will avoid only nesting and early brood-rearing habitat within the 4-mile radius of the lek during this time period. **Roan Plateau RMP:** Prevent the need for listing of proposed, candidate and sensitive species under the ESA and improve the condition of special status species and their habitats to a point where their special status recognition is no longer warranted. Promote recovery of special status species plants that may become listed. **White River RMP:** Vehicular access by the public on important wildlife habitats and/or during sensitive functional use periods (e.g., big game severe winter range, critical summer use areas, raptor nesting areas, GRSG reproductive habitats) would be subject to restrictions as directed by the Area Manager. Use of restricted road segments by authorized personnel (e.g., BLM personnel, law enforcement, permitted land users) may be allowed for administrative and operational purposes. Methods used to restrict vehicular access may include: installing lockable gates, barricades or other forms of deterrents, signing, or reclaiming and abandoning roads or trails no longer necessary for management, or other methods prescribed by the Area Manager. (COA pB-16). **Routt National Forest:** (ADH) Manage motorized use by seasonal use restriction if 'use causes unacceptable wildlife conflict or habitat degradation' (Forestwide Infrastructure – Travelways Guideline 3b, p. 1-23). California Park Road, National Forest Service Road 150, is seasonally closed for wildlife May 1 to July 1, and areas of designated elk winter range, including those that have PPH or PGH, are seasonally closed to motor vehicles from December 15 to April 15.

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat			
NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
3	Travel	(PPH) Complete activity level travel plans within 5 years of the ROD. During activity level planning, where appropriate, designate routes with current administrative/agency purpose or need to administrative access only.	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP: Travel Management route designation is being completed as a part of the RMP revision. Little Snake RMP: Colorado State BLM policy requires that all areas in limited Travel Management areas have completed Transportation Plans within 5 years of the completion of the ROD. Roan Plateau RMP: Generate and maintain a travel management plan to minimize disturbance and redundant routes. White River RMP: A comprehensive Travel Management Plan will be initiated upon approval. Routt National Forest: Activity level plans are already completed in ADH.
4	Travel	(PPH) Limit route construction to realignments of existing designated routes if that realignment has a minimal impact on GRSG habitat, eliminates the need to construct a new road, or is necessary for motorist safety.	**Colorado River Valley RMP:** Grant administrative use authorizations on a case-by-case basis with approval from the BLM authorized officer. For all authorizations that allow off-route motorized/mechanized travel, specify the following: what type of use is allowed and for what purpose, times, dates or seasons of access; and where motorized/mechanized vehicle travel off designated routes is allowed. Administrative routes are limited to authorized users (typically motorized access). These are existing routes that lead to developments that have an administrative purpose, where the BLM or a permitted user must have access for regular maintenance or operation. **Grand Junction RMP:** No similar action. **Kremmling RMP:** Prohibit motorized/mechanized travel off designated routes in Limited and Closed areas, with the following exceptions and supplementary stipulations: ● BLM authorization for administrative use (such as accessing private land; accessing minerals/energy sites; administering grazing allotments; or conducting maintenance or installation

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat			
NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			of range improvements, habitat treatments, trail construction, communication sites, and reservoirs). ● BLM authorization to exercise valid existing rights. **Little Snake RMP:** Areas have been designated as open, limited, or closed to vehicle use. Roan Plateau RMP: Additional routes authorized as part of permitted activities would generally be for administrative access only in order to reduce impacts to wildlife and habitat fragmentation, but may be open to limited use by recreationists, or for other resource management purposes. White River RMP: No similar action. Routt National Forest: No similar action.
5	Travel	(PPH) Use existing roads or realignments as described above to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then build any new road constructed to the absolute minimum standard necessary, and add the surface disturbance to the total disturbance in the priority area. If that disturbance exceeds 3 percent for that area, then evaluate and implement additional, effective mitigation necessary to offset the resulting loss of GRSG habitat (see Objectives).	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, White River RMP: No similar action. **Routt National Forest:** Allow motorized use on new or designated travel ways unless a documented decision shows that: a) Motorized use conflicts with the purpose for which the travel ways were constructed; b) Motorized use is incompatible with the ROS class; c) Travel ways are located in areas closed to motorized use and are not designated routes; d) Motorized use creates user conflicts that result in unsafe conditions unrelated to weather; e) Physical characteristics of travel ways preclude any form of motorized use;

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat			
NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			f) Travel ways do not serve an existing or identified future public need; g) Financing is not available for maintenance necessary to protect resources (Forestwide Infrastructure – Travelways Standard 2, p. 1-23). Consider developing new trail systems that expand the range of recreation opportunities, provide for user safety, and disperse existing use into different areas (Infrastructure Guideline, p. 1-23). Obliterate, revegetate, and slope to drain those system travel ways which are no longer needed to achieve management objectives or where resource damage cannot be mitigated (Forestwide Infrastructure – Travelways Guideline 1, p.1-23).
6	Travel	(PPH) Allow no upgrading of existing routes that would change route category (road, primitive road, or trail) or capacity unless the upgrading would have minimal impact on GRSG habitat, is necessary for motorist safety, or eliminates the need to construct a new road.	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Roan Plateau RMP: No similar action. **Little Snake RMP:** Develop an access/transportation plan that: ● Enables access where needed ● Limits points of access to reduce the number of redundant roads and trails ● Reroutes, rehabilitates, or eliminates existing roads and trails that are causing damage to cultural or natural resources ● Reroutes roads and trails that are landlocked by private parcels ● Restricts access to meet resource objectives (seasonal road closures, gating, etc.) ● Concentrates stream and riparian crossings ● Reduces habitat fragmentation ● Considers new construction and reconstruction of roads and trails.

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat			
NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			Actively pursue access to specific parcels to improve access to public lands for land management purposes. **White River RMP:** As proposals for construction of new roads or trails are received, NEPA documentation will analyze impacts and determine appropriate designations and the potential for replacement of other existing roads. Criteria will be developed as part of the travel management planning process to aid in the determination for changing a particular area's road and trail designations, or adding/ closing roads and trails. Base road design criteria and standards on road management objectives such as traffic requirements of the proposed activity and the overall transportation plan, economic analysis, safety requirements, resource objectives, and minimizing damage to the environment. **Routt National Forest:** (ADH) The 2007 Motor Vehicle Use Map limits motorized travel to designated roads and motorized trails. Additional Forest Plan Standards include: Negotiate surface management for private oil and gas minerals with the owner and operator to be as close as possible to the standards used for federal minerals; Prohibiting such development is not an alternative (Forestwide Mineral and Energy – Reserved and Outstanding Rights Standard 1, p.1-6). Do not retain facilities acquired from land donation, exchange, or purchase unless they serve a definite future purpose and funding is available for their maintenance (Forestwide Infrastructure – Facilities Standard 1, p.1-22). Prohibit motorized use with wheeled vehicles on lands outside designated travel ways unless a forest order indicates that such use is specifically allowed (Forestwide Infrastructure – Travelways Standard 4, p. 1-23).Prohibit motorized access from private land where access for the general public is not available, except by special permit (Forestwide Infrastructure – Travelways Standard 4, p.1-23).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			Manage motorized use by seasonal use restriction if: b. Use causes unacceptable wildlife conflict or habitat degradation (Forestwide Infrastructure – Travelways Guideline 3b, p.1-23). Retain existing access rights, where needed, to meet forest plan goals and objectives (Forestwide Real Estate-Rights-of-way Standard 1, p.1-25).
7	Travel	(PPH) Conduct restoration of roads, primitive roads and trails not designated in travel management plans. This also includes primitive route/roads that were not designated in WSAs and within lands with wilderness characteristics that have been selected for protection in previous RMPs.	Colorado River Valley RMP, Grand Junction RMP, Roan Plateau: No similar action. **Kremmling RMP:** Re-seed or plant disturbed areas with desirable vegetation when the native plant community cannot recover and occupy the site sufficiently. **Little Snake RMP:** Use early and effective reclamation techniques to allow GRSG habitat to be reestablished. **White River RMP:** Adapted forms of succulent forbs should be included in seed mixes applied to surface disturbances on GRSG brood ranges. Seed mixes will be subject to reseeding conditions established for each GRA and identified in Appendix B (of the White River RMP). Comparable or superior varieties of sagebrush should be established within occupied GRSG ranges in those instances where sagebrush conversion or removal has exceeded 500 acres. The extent and level of reestablishment effort will not exceed 20 percent of converted acreage at mature canopy densities of ≤15 percent. **Routt National Forest:** (ADH) Reclaim roads and other disturbed sites when use ends, as needed, to prevent resource damage (Forestwide Soils Standard 4, p.1-6). Obliterate, revegetate, and slope to drain those system travel ways which are no longer needed to achieve management objectives or where resource damage cannot be mitigated (Infrastructure Guideline, p.1-23).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			Vegetative restoration projects may be needed where human activities have altered natural ecosystems, and there is no reasonable expectation of natural revegetation; Use native species in restoration efforts; Where nonnative species must be used, select plants based on the likelihood that they will not persist beyond the rehabilitation period (Forestwide Wilderness Guideline 6, p.1-22). (ADH) Use genetically local (at the subsection level), native plant species for revegetation efforts where technically and economically feasible; Use weed-free seed mixtures; While native perennials are becoming established, nonnative annuals or sterile perennial species may be used to prevent soil erosion (Forestwide Biological Diversity Standard 3, p.1-8).
8	Travel	(PPH) When reseeding roads, primitive roads and trails, use appropriate seed mixes and consider the use of transplanted sagebrush.	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Roan Plateau RMP: No similar action. **Little Snake RMP:** Use early and effective reclamation techniques to allow GRSG habitat to be reestablished. **White River RMP:** Adapted forms of succulent forbs should be included in seed mixes applied to surface disturbances on GRSG brood ranges. Seed mixes will be subject to reseeding conditions established for each GRA and identified in Appendix B (of the White River RMP). Comparable or superior varieties of sagebrush should be established within occupied GRSG ranges in those instances where sagebrush conversion or removal has exceeded 500 acres. The extent and level of reestablishment effort will not exceed 20 percent of converted acreage at mature canopy densities of ≤15 percent. Routt National Forest: (ADH) Use genetically local (at the subsection level), native plant species for revegetation efforts where technically and economically feasible; Use weed-free seed mixtures; While native perennials are becoming established, nonnative annuals or sterile perennial species may be used to prevent soil erosion (Forestwide Biological Diversity Standard 3, p.1-8).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
Recreation		**Objective: Manage Recreation to avoid activities that 1) disrupt GRSG, 2) fragment GRSG habitat, or 3) spread noxious weeds.**	**Objective: No similar objective.**
9	Recreation	(PPH) Only allow BLM SRPs and USFS Recreation Special Use Authorizations (SUAs) in PPH that have neutral or beneficial effects to PPH areas.	Colorado River Valley RMP, Grand Junction RMP, Roan Plateau RMP, Routt National Forest: No similar action. Kremmling RMP: Issue SRPs as a discretionary action. Little Snake RMP: (1) SRPs will be considered on a case-by-case basis; (2) Commercial outfitter camps will be considered on a case-by-case basis; (3) Commercial use permits that provide… and protect resources will be authorized. White River RMP: SRPs will be issued to qualified commercial guides and outfitters based on need and demand for services. Use limits or allocations will be made based on services provided, prior use history, responsiveness, and proven responsibility of applicants. Allocations may also be used to resolve conflicts, protect resources, or reduce impacts to resources, clients and other public land users.
Lands and Realty Management		**Objective: Manage the Lands and Realty program to avoid, minimize, and mitigate the loss of habitat and habitat connectivity through the authorizations of ROWs, land tenure adjustments, proposed land withdrawals, agreements with partners, and incentive programs.**	**Objective: No similar objective.**
Rights-of-Way (ROWs)			

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
10	Lands/ Realty	(PPH) Make GRSG PPH areas exclusion areas for new BLM ROW or USFS SUA permits.	**Colorado River Valley RMP:** Allowable Use: STIPULATION GS-NSO-12: *Threatened or Endangered Species.* Prohibit surface occupancy and surface-disturbing activities on habitat areas for those species listed by the federal or state government as endangered or threatened and for federal proposed or candidate species. Habitat areas include occupied habitat and habitat necessary for the maintenance or recovery of the species. **Grand Junction RMP:** Designate approximately 234,900 acres as unsuitable for public utilities. Deny proposals in these zones on the basis that utility project impacts could not be mitigated to prevent undue damage to the resources of concern. Areas of Resource Concern designated as unsuitable include: ACECs: A portion of Badger Wash (685 acres); A portion of The Palisade (1,920 acres); A portion of Pyramid Rock (470 acres); A portion of Rough Canyon (2,560 acres); and Unaweep Seep (80 acres). Soils: Douglas/Baxter Soil Slumps and Plateau Creek Slump. Water Resources Management: Badger Wash Study Area (685 acres); Grand Junction municipal watershed; and Indian Wash Dam. Wildlife: Rough Canyon Threatened and Endangered Species: Bald eagle concentrations areas; Pyramid Rock; and Unaweep Seep.

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			Visual Resource Management (VRM): Juanita Arch; The Goblins; Dolores River Canyon; Gunnison River Corridor; Mt. Garfield Cliffs; Bangs Canyon Area; Sinbad Valley; Granite Creek; Unaweep Canyon Area; Hunter/Garvey Canyons Areas; and Vega Reservoir Viewshed. Cultural Resource Management: Indian Creek; Rough Canyon (1,000 acres); Site 5ME1358; and Ladder Springs. Recreation Resource Management: A portion of Rough Canyon ACEC (2,560 acres); and The Palisade ONA. Developed Recreation Sites: Island Acres; Vega Reservoir; and Highline Reservoir. Wilderness Management: Sewemup Mesa WSA Encourage use of existing corridors or upgrading of existing facilities in sensitive and suitable zones Kremmling RMP: No similar action. **Little Snake RMP:** ROW exclusion areas are limited to existing WSAs, Limestone Ridge area, Irish Canyon ACEC, and parts of Vermillion Basin area. Identify and establish major utility and transportation corridors within the planning area. “Designated” corridors limited to Section 368 corridors from 2009 Westwide Energy Corridor EIS.

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			Roan Plateau RMP: STIPULATION GS-NSO-ROAN-24, *Threatened, Endangered, or Candidate Species Habitat* – In order to protect occupied habitat and immediately adjacent potential habitat crucial for the maintenance or recovery of species listed under the ESA or by the State of Colorado as threatened or endangered (including proposed or candidate species under the ESA), no ground-disturbing activities will be authorized within occupied habitat or immediately adjacent potential habitat necessary for maintenance or recovery of the species. Allow utility corridors within 50 feet of BLM designated and administrative travel routes except where such placement would negatively impact other important resource values. In such areas, utilities would be placed within the existing roadway or realigned to avoid important resource values. STIPULATION GS-CSU-ROAN-13: *Parachute Creek High Value Watershed* -- Total unreclaimed surface will be limited to 350 acres (1 percent of planning area). Limit surface disturbance to the minimum area necessary by avoiding development of roads, pipelines, and well pads on steep slopes; minimize the potential for surface disturbance through careful planning; grouping facilities to the extent possible; and sharing ROWs such as burying pipelines along roadways. White River RMP: Land use authorizations will be denied in exclusion areas, with the exception of short-term land use permits involving no development, and projects that are consistent with management objectives for the area. **Routt National Forest:** Retain existing access rights, where needed, to meet forest plan goals and objectives (Forestwide Real Estate and Rights-of-Way Standard 1, p.1-25).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			Conserve existing and designated inventoried ROWs needed for implementation of the Forest Plan (Forestwide Utility Corridors Standard 1, p.1-25). Authorize proposals to utilize designated utility corridors without alternative route analysis, subject to site-specific environmental analysis (Forestwide Utility Corridors Standard 2, p.1-25) Do not authorize conflicting uses or activities within transportation and utility corridors (Forestwide Utility Corridors Standard 3, p.1-25). Bury electrical utility lines of 33 kilovolts or less, and telephone lines, unless…(Forestwide Utility Corridors Standard 4, p.1-25). Consolidate occupancy of transportation or utility corridors and sites wherever possible and compatible (Forestwide Utility Corridors Guideline 1, p.1-26). Utilize current utility corridors fully. Provide corridors in the future in areas that meet the needs of society while protecting the integrity of the environment (Forestwide Utility Corridors Guideline 4, p.1-26). ROWs: Consolidate occupancy of transportation or utility corridors and sites wherever possible and compatible (Utility Corridors Guideline, p. 1-26). Utilize current utility corridors fully; Provide corridors in the future in areas which meet the needs of society while protecting the integrity of the environment (Utility Corridors Guideline, p. 1-26).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
		(PPH) Within designated ROW or SUA corridors encumbered by existing ROW or SUA authorizations: new ROWs or SUAs may be collocated only if the entire footprint of the proposed project (including construction and staging), can be completed within the existing disturbance associated with the authorized ROWs or SUAs.	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP: No similar action. White River RMP: New construction or modification of above ground electric transmission facilities will be required to incorporate the most current raptor protection guidelines. Where appropriate, conductor separation methods will be employed rather than features that discourage perching. **Routt National Forest:** Conserve existing and designated inventoried ROWs needed for implementation of the Forest Plan (Forestwide Utility Corridors Standard 1, page 1-25). Authorize proposals to utilize designated utility corridors without alternative route analysis, subject to site-specific environmental analysis (Forestwide Utility Corridors Standard 2, page 1-25) Do not authorize conflicting uses or activities within transportation and utility corridors (Forestwide Utility Corridors Standard 3, page 1-25). Bury electrical utility lines of 33 kilovolts or less, and telephone lines, unless…(Forestwide Utility Corridors Standard 4, page 1-25).
		(PPH) Subject to valid existing rights: where new ROWs or SUAs associated with valid existing rights are required, collocate new ROWs or SUAs within existing ROWs or SUAs or where it best minimizes GRSG impacts. Use existing roads, or realignments as described above, to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then build any new road constructed to the absolute minimum standard necessary, and add the surface disturbance to the total disturbance in the priority area. If that disturbance exceeds 3 percent for that area, then evaluate and implement additional effective mitigation to offset the resulting loss of GRSG habitat.	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Roan Plateau RMP: No similar action. **Little Snake RMP:** Use early and effective reclamation techniques to allow GRSG habitat to be reestablished. **White River RMP:** All disturbed sites shall be promptly reclaimed to the satisfaction of the Area Manager. Reclamation should be implemented concurrent with construction and site operations to the fullest extent possible. Final reclamation actions shall be initiated within 6 months of the termination of operations unless otherwise approved in writing by the Authorized Officer. The goal for rehabilitation of any disturbed area shall be the permanent restoration of original site conditions and productive capability.

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			Routt National Forest: Do not retain facilities acquired from land donation, exchange, or purchase unless they serve a definite future purpose and funding is available for their maintenance (Forestwide Infrastructure – Facilities Standard 1, p.1-22).
11	Lands/ Realty	(PPH) Evaluate and take advantage of opportunities to remove, bury, or modify existing power lines within GRSG PPH areas.	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau: No similar action. White River RMP: New construction or modification of above ground electric transmission facilities will be required to incorporate the most current raptor protection guidelines. Where appropriate, conductor separation methods will be employed rather than features that discourage perching. **Routt National Forest:** Conserve existing and designated inventoried ROWs needed for implementation of the Forest Plan (Forestwide Utility Corridors Standard 1, page 1-25). Authorize proposals to utilize designated utility corridors without alternative route analysis, subject to site-specific environmental analysis (Forestwide Utility Corridors Standard 2, page 1-25). Do not authorize conflicting uses or activities within transportation and utility corridors (Forestwide Utility Corridors Standard 3, page 1-25). Bury electrical utility lines of 33 kilovolts or less, and telephone lines, unless…(Forestwide Utility Corridors Standard 4, page 1-25).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
12	Lands/ Realty	(PPH) Where existing leases, ROWs or SUAs have had some level of development (road, fence, well, etc.) and are no longer in use, reclaim the site by removing these features and restoring the habitat. *Planning Direction Note:* Relocate existing designated ROW corridors crossing GRSG PPH void of any authorized ROWs, outside of the PPH area. If relocation is not possible, undesignate that entire corridor during the planning process.	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Roan Plateau RMP: No similar action. **Little Snake RMP:** Use early and effective reclamation techniques to allow GRSG habitat to be reestablished. **White River RMP:** All disturbed sites shall be promptly reclaimed to the satisfaction of the Area Manager. Reclamation should be implemented concurrent with construction and site operations to the fullest extent possible. Final reclamation actions shall be initiated within 6 months of the termination of operations unless otherwise approved in writing by the Authorized Officer. The goal for rehabilitation of any disturbed area shall be the permanent restoration of original site conditions and productive capability. Routt National Forest: Do not retain facilities acquired from land donation, exchange, or purchase unless they serve a definite future purpose and funding is available for their maintenance (Forestwide Infrastructure – Facilities Standard 1, p.1-22).
13	Lands/ Realty	(PGH) Make GRSG PGH areas “avoidance areas” for new ROWs or SUAs.	**Colorado River Valley RMP:** Allowable Use STIPULATION GS-NSO-12: *Threatened or Endangered Species.* Prohibit surface occupancy and surface-disturbing activities on habitat areas for those species listed by the federal or state government as endangered or threatened and for federal proposed or candidate species. Habitat areas include occupied habitat and habitat necessary for the maintenance or recovery of the species. **Grand Junction RMP:** Designate 441,400 acres as sensitive to public utility development. Design utility routes and projects in these zones to protect resources of concern from undue degradation (note: corresponding stipulations [i.e., NSO, CSU, TL] are found in Appendix B [of the Grand Junction RMP]): ACECs:

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			A portion of Badger Wash (1,230 acres); and a portion of The Palisade (17,258 acres). Soils: Steep slopes Water Resources Management: Palisade municipal watershed; Jerry Creek Reservoirs; and Perennial streams. Wildlife: Deer and elk winter range; Bighorn sheep winter range; and Elk calving areas. Threatened and Endangered Species: Badger Wash uplands; Colorado cutthroat trout; *Cryptantha eleta* site; Peregrine falcon habitat; Sensitive plant species; and Colorado hookless cactus (formerly known as Uinta Basin hookless cactus). Little Book Cliffs Wild Horse Range (LBCWHR): Horse Range; LBCWHR winter range; and LBCWHR foaling area. VRM: Bang's Canyon area (25,920 acres); Face of the Book Cliffs; Grand Mesa slopes; Granite Creek (12,760 acres); Gunnison River Corridor (9,040 acres); Highway corridors; Hunter/Garvey Canyons area (11,400 acres); South Shale Ridge; Sinbad Valley (7,490 acres); and Unaweep Canyon area (6,400 acres). Cultural Resource Management: Transect 7

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			Recreation Resource Management: Little Park Road; Pine Mountain roadside; and the Palisade ONA. Kremmling RMP: No similar action. **Little Snake RMP:** NSO applied to 0.6-mile radius of a lek. Exceptions established in Appendix B (of the Little Snake RMP). To prevent disturbing up to 75 percent of nesting birds, between March 1 and June 30, GRSG nesting and early brood-rearing habitat (Map 5 [of the Little Snake RMP]) will be stipulated as CSU for oil and gas operations and avoidance areas for other surface disturbing activities within a 4-mile radius of the perimeter of a lek. All surface disturbing activities will avoid only nesting and early brood-rearing habitat within the 4-mile radius of the lek during this time period. Roan Plateau RMP: No similar action. **White River RMP:** Development will be allowed in avoidance areas under these same conditions [subject to the use of COAs (see Appendix B [of the White River RMP]), all applicable surface use stipulations listed in Appendix A [of the White River RMP], and any site specific stipulations identified through the NEPA process] where no feasible alternative can be identified. GRSG leks would be classified as avoidance areas for the permitting of land use authorizations. Routt National Forest: There is no direction in the Forest Plan related to this item.

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14	Lands/ Realty	(PGH) Where new ROWs or SUAs are necessary in PGH, collocate new ROWs or SUAs within existing ROWs or SUAs where possible.	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP: No similar action. White River RMP: New construction or modification of above ground electric transmission facilities will be required to incorporate the most current raptor protection guidelines. Where appropriate, conductor separation methods will be employed rather than features that discourage perching. **Routt National Forest:** Conserve existing and designated inventoried ROWs needed for implementation of the Forest Plan (Forestwide Utility Corridors Standard 1, page 1-25). Authorize proposals to utilize designated utility corridors without alternative route analysis, subject to site-specific environmental analysis (Forestwide Utility Corridors Standard 2, page 1-25). Do not authorize conflicting uses or activities within transportation and utility corridors (Forestwide Utility Corridors Standard 3, page 1-25). Bury electrical utility lines of 33 kilovolts or less, and telephone lines, unless…(Forestwide Utility Corridors Standard 4, page 1-25).
Land Tenure Adjustment			
15	Lands/ Realty	(PPH) Retain public ownership of GRSG PPH. Consider exceptions where: (PPH) There is mixed ownership, and land exchanges would allow for additional or more contiguous federal ownership patterns within the GRSG PPH area. (PPH) Under GRSG PPH areas with minority federal ownership, include an additional, effective mitigation agreement for any disposal of federal land. As a final preservation measure, consideration should be given to pursuing a permanent conservation easement.	Colorado River Valley RMP: No similar action. **Grand Junction RMP:** Consider land exchanges in retention areas on a case-by-case basis in order to meet resource objectives if the exchange is in the public interest and would: 1) improve management efficiency; or 2) result in the acquisition of private property with high resource values. **Kremmling RMP:** Standard stipulation #1, Appendix E-13 (of the Kremmling RMP). **Little Snake RMP:** Additional retention areas can be identified during the life of the plan for the public good.

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			Disposal allowed on lands within any zone suitable for public purposes and of special importance to local communities, State and/or federal agencies. Roan Plateau RMP: Retain lands atop the plateau. **White River RMP:** Category III lands [are] not suitable for disposal of any kind. Category III lands include WSAs and ACECs. Approximately 11,325 acres of public land meet the category I sale criteria under Section 203 of FLPMA. Category I lands are suitable for disposal by any means, including, but not limited to, sale, exchange, or jurisdictional transfer. These lands are listed by legal description in Table 2-15A through 2-15D, Appendix D (of the White River RMP). Approximately 1,282,195 acres of public lands not specifically identified for disposal or retention are designated Category II lands. Category I lands. Proposals for the disposal of Category 1 lands will be considered on a case by case basis. While these parcels may be sold, exchange will be the preferred method of disposal in most cases. Concerns of adjacent owners, current users, and local governments will be considered prior to disposal. An environmental assessment or other appropriate NEPA documentation will be prepared for all such proposals. **Routt National Forest:** In land adjustment activities, give priority to acquiring lands that contain habitat identified by USFWS as necessary for recovery of federally listed threatened and endangered species (Real Estate-Land Adjustments Standard, p. 1-24). In land adjustment activities including land exchange, purchase, disposal, and donation, consider the following: a) Evaluate and balance the overall combination of all resource values and factors including wildlife habitat, fisheries habitat, riparian areas, wetlands, cultural resources, recreation opportunities, scenic value, watershed protection, timber resources, rangelands, public

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			access, better federal land management, and other factors. In all land adjustment activities, consider the important impacts to issues and resources identified during site-specific scoping. b) Consider the effect of land adjustments on sensitive species habitat. Avoid land adjustments which could result in a trend toward federal listing or loss of population viability for any sensitive species. Ownership of sensitive species habitat can be conveyed if conveyance would not result in a trend toward federal listing or adversely impact the population viability of the species or if effects could be mitigated. c) Acquire lands that contain resource values identified during scoping as important in contributing toward national forest system resource management goals and objectives as stated in the forest plan. Examples include: wetlands, riparian areas, essential wildlife habitat, threatened or endangered species habitat, sensitive species habitat, significant cultural resources, timber lands, rangelands, or other areas (Real Estate-Land Adjustments Standard, p. 1-24).
16	Lands/ Realty	(PPH) Where suitable conservation actions cannot be achieved, seek to acquire state and private lands with intact subsurface mineral estate by donation, purchase or exchange in order to best conserve, enhance, or restore GRSG habitat.	Colorado River Valley RMP: No similar action. **Grand Junction RMP:** Consider acquisition of lands that meet the following criteria: ● Private land within areas recommended as suitable for designation as wilderness; ● Private land needed for management of Wild and Scenic Rivers; ● Potential national or historic trails; ● Potential natural or RNAs; ● Potential areas for cultural or natural history designation; ● Potential ACECs; ● Private land within designated wild horse preserves;

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			• Private land with potential for other congressional designations; • Threatened or endangered species habitat areas; • Riparian habitat areas; • Valuable recreation areas; • Wetland areas as defined in Executive Order 11990, dated May 24, 1977; and • Floodplain areas (100-year) as defined in Executive Order 11988, dated May 24, 1977. **Kremmling RMP:** Apply the following criteria when considering land tenure adjustments: • Retain all public lands or interests in land (such as easements) that enhance multiple-use and sustained-yield management; • Acquire lands or interests in land that complement important resource values and further management objectives; and **Little Snake RMP:** Central Zone: Acquisition of lands in the area should be actively sought to protect wildlife habitat, especially GRSG. Central, East and West Zones: Acquisition areas can be identified for the public's interest. **Roan Plateau RMP:** Retain lands on top of the plateau, and acquire in-holdings atop the plateau. Acquisition of inholdings, and other lands with important resource values, would be encouraged or allowed. **White River RMP:** Acquisition of non-BLM lands may be pursued through exchange, purchase or donation, where the acquisition will serve to enhance the BLM's objectives and special emphasis programs.

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			For purchase or donation, acquisitions will generally be limited to inholdings within designated areas. **Routt National Forest:** In land adjustment activities including land exchange, purchase, disposal, and donation, consider the following: c) Acquire lands that contain resource values identified during scoping as important in contributing toward national forest system resource management goals and objectives as stated in the forest plan. Examples include: wetlands, riparian areas, essential wildlife habitat, threatened or endangered species habitat, sensitive species habitat, significant cultural resources, timber lands, rangelands, or other areas (Real Estate-Land Adjustments Standard, p. 1-24).
Proposed Land Withdrawals			
17	Lands/ Realty	(PPH) Propose lands within GRSG PPH areas for mineral withdrawal.	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, Routt National Forest: No similar action. **White River RMP:** BLM lands not withdrawn or segregated from mineral entry under the Mining Law of 1872 are open to mining claim location that are unavailable for location. Several withdrawals and reserves exist that limit the availability of lands for entry. Of the approximate 1,648,770 acres that could be available for location, 997,450 acres are currently withdrawn or unavailable to some extent. In the current RMP, the coal withdrawal of 1910 closes 366,570 acres to nonmetalliferous minerals only, as does 5,480 acres of Federal Water Reserves, and the oil shale withdrawal closes 625,400 acres to all mining claim location. If the three WSAs that were recommended to be carried forward are designated as wilderness, the Wilderness Act will withdraw those areas from location. This will add 41,250 acres to the lands that are unavailable for location.

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18	Lands/ Realty	(PPH) In PPH, do not recommend withdrawal proposals not associated with mineral activity unless the land management is consistent with GRSG conservation measures. (For example; in a proposed withdrawal for a military training range buffer area, manage the buffer area with GRSG conservation measures.)	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, Routt National Forest: No similar action. **White River RMP:** Recommendations will be made for the revocation of all BLM public land withdrawals which are no longer needed. Recommendations will be made to continue (as is or modify) withdrawals which are still needed for the purposes for which the original withdrawal was made.
Range Management		**Objectives: Manage the Range Management program to 1) maintain residual herbaceous cover to reduce predation during nesting, 2) avoid GRSG habitat changes due to herbivory, 3) avoid direct effects of herbivores on GRSG, such as trampling of nests and eggs, 4) avoid altering GRSG behavior due to the presence of herbivores, 5) avoid impacts to GRSG and GRSG behavior from structures associated with grazing management, and 6) maintain and develop agreements with partners that are consistent with before-stated Range Management objectives.**	Objective: No similar objective.
19	Range	(PPH) Within GRSG PPH, incorporate GRSG habitat objectives and management considerations into all BLM and USFS grazing allotments through Allotment Management Plans or permit renewals and/or USFS Annual Operating Instructions.	Colorado River Valley RMP: Make adjustments to grazing management (e.g., AUMs, periods of use, allotments, class of livestock, distribution) based on monitoring. **Grand Junction RMP:** Manage vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado while taking in to account site potential as determined by ecological site inventories, Range/Ecological Site Descriptions, Soils, completed Land Health Assessments, and site-specific management objectives. Implement changes in livestock use through allotment management plans, grazing use agreements, and terms and conditions on grazing permits for priority allotments based on the current prioritization process and/or land health issues

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			Revise or implement allotment management plans/grazing use agreements to resolve conflicts between grazing and management of soils, riparian, and water resources. Kremmling RMP: Standard Operating Procedure (Required by Colorado Public Land Health Standard #4). **Little Snake RMP:** Identify and initiate restoration and rehabilitation of sagebrush habitat while maintaining a mosaic of canopy cover and seral stages. Special status, threatened and endangered species, and other plants and animals officially designated by the BLM and their habitats are maintained and enhanced by sustaining healthy, native plant and animal communities Guidelines for Livestock Grazing Management A-3, #7, "Natural occurrences...should be combined with livestock management practices to move toward the sustainability of biological diversity across the landscape, including the maintenance, restoration, or enhancement of habitat to promote and assist recovery and conservation of threatened, endangered, or other special status species by helping provide natural vegetation patterns, a mosaic of successional stages, and vegetation corridors thus minimizing habitat fragmentation." **Roan Plateau RMP:** Ensure that Land Health Standards are being met through Land Health assessments, and application of the GSFO (CRVFO) Monitoring Plan. Use a combination of administrative solutions (season of use revisions, livestock exclusion, and stocking level adjustments) and rangeland projects (fences, ponds, etc.) to direct livestock use to meet resource objectives and Land Health Standards. **White River RMP:** Standard Operating Procedure (Required by Colorado Public Land Health Standard #4). Routt National Forest: Manage forage for livestock and wildlife based on specific habitat area objectives identified during allotment

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			management plan revision (Management Area Prescription for 5.11, 5.12, 5.13, p. 2-40, p. 2-43, 2-45). Design livestock grazing prescriptions to include achievement of wildlife goals for deer and elk winter range (Management Area Prescription 5.41, p. 2-48).
20	Range	(ADH) Work cooperatively on integrated ranch planning within GRSG habitat so operations with deeded/BLM and/or USFS allotments can be planned as single units.	Colorado River Valley RMP: Make adjustments to grazing management (e.g., AUMs, periods of use, allotments, class of livestock, distribution) based on monitoring. **Grand Junction RMP:** Manage vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado while taking in to account site potential as determined by ecological site inventories, Range/Ecological Site Descriptions, Soils, completed Land Health Assessments, and site-specific management objectives. Implement changes in livestock use through allotment management plans, grazing use agreements, and terms and conditions on grazing permits for priority allotments based on the current prioritization process and/or land health issues Revise or implement allotment management plans/grazing use agreements to resolve conflicts between grazing and management of soils, riparian, and water resources. Kremmling RMP: No similar action. **Little Snake RMP:** Sustain the integrity of the sagebrush biome to maintain viable populations of GRSG...consistent with local conservation plans. Identify and initiate restoration and rehabilitation of sagebrush habitat while maintaining a mosaic of canopy cover and seral stages. Roan Plateau RMP: Ensure that Land Health Standards are being met through Land Health surveys, and application of the GSFO Monitoring Plan. Use a combination of administrative solutions (season of use revisions, livestock exclusion, and stocking level adjustments) and

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			rangeland projects (fences, ponds, etc.) to direct livestock use to meet resource objectives and Land Health Standards. White River RMP: Monitor, evaluate, and adjust livestock management practices to meet resource objectives. **Routt National Forest:** Develop site-specific vegetation utilization and residue guidelines during rangeland planning, and document them in allotment management plans. In the absence of updated planning or an approved allotment management plan, apply the utilization and residue guidelines in Tables 1-2 and 1-3 (Range Guideline, p. 1-9). Table 1-2. Allowable Use Guidelines Type of Management | Existing Rangeland Condition | Satisfactory* | Unsatisfactory* Season-long | 30-40% | 0-30% Deferred rotation | 40-50% | 35-45% Rest rotation | 45-55% | 35-45% Table 1-3. Riparian Vegetation Residue Allowances Season of Use and Existing Rangeland Condition ● Spring Use Pasture: Satisfactory=4 Inches, Unsatisfactory=6 inches. ● Summer and Fall Use Pasture: Satisfactory=6 Inches and Unsatisfactory=6 Inches Manage forage for livestock and wildlife based on specific habitat area objectives identified during allotment management plan revision (Management Area Prescription for 5.11, 5.12, 5.13, p. 2-40, p. 2-43, 2-45). Design livestock grazing prescriptions to include achievement of wildlife goals for deer and elk winter range (Management Area Prescription 5.41, p. 2-48).

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			Ecological Site Descriptions have not been developed for the Routt National Forest and we are not currently using them in NEPA or Allotment Management Plan revisions. The Routt National Forest completes Rangeland Health Assessments based on the R2 Rangeland Analysis and Management Training Guide (US Department of Agriculture, Rocky Mountain Region 1996) in NEPA and Allotment Management Plan revisions.
21	Range	(PPH) Prioritize completion of land health assessments (USFS may use other analyses) and processing grazing permits within GRSG PPH areas. Focus this process on allotments that have the best opportunities for conserving, enhancing or restoring habitat for GRSG. Utilize BLM Ecological Site Descriptions (USFS may use other methods) to conduct land health assessments to determine if standards of range-land health are being met.	Colorado River Valley RMP, Kremmling RMP, Roan Plateau RMP: No similar action. **Grand Junction RMP:** Manage vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado while taking in to account site potential as determined by ecological site inventories, Range/Ecological Site Descriptions, Soils, completed Land Health Assessments, and site-specific management objectives. Implement changes in livestock use through allotment management plans, grazing use agreements, and terms and conditions on grazing permits for priority allotments based on the current prioritization process and/or land health issues Revise or implement allotment management plans/grazing use agreements to resolve conflicts between grazing and management of soils, riparian, and water resources. Little Snake RMP: Establish desired plant communities, in coordination with stakeholders across the LSFO, in a way that focuses on native communities and intact ecosystems while allowing nonnative species, where appropriate, on a case-by-case basis. **White River RMP:** Specific desired plant communities goals for rangelands with grassland, saltbush, greasewood, and sagebrush plant communities are as follows: 1) Manage present plant composition as desired plant communities on all areas classified as:

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			a) the PNC, high seral and healthy mid-seral; b) sagebrush rangelands with a high to mid-seral plant community providing suitable habitat for deer winter range, GRSG, and antelope. 2) Improve the present plant species composition on unhealthy or at risk rangelands to a healthy plant community within 10 years on all areas with a mid-seral and within 20 years on all areas with a low-seral plant community. **Routt National Forest:** Manage forage for livestock and wildlife based on specific habitat area objectives identified during allotment management plan revision (Management Area Prescription for 5.11, 5.12, 5.13, p. 2-40, p. 2-43, 2-45). Design livestock grazing prescriptions to include achievement of wildlife goals for deer and elk winter range (Management Area Prescription 5.41, p. 2-48). Ecological Site Descriptions have not been developed for the Routt National Forest and we are not currently using them in NEPA or Allotment Management Plan revisions. The Routt National Forest completes Rangeland Health Assessments based on the R2 Rangeland Analysis and Management Training Guide (US Department of Agriculture, Rocky Mountain Region 1996) in NEPA and Allotment Management Plan revisions.

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22	Range	(ADH) Conduct land health assessments that include (at a minimum) indicators and measurements of structure/condition/composition of vegetation specific to achieving GRSG habitat objectives (Doherty et al. 2011). If local/state seasonal habitat objectives are not available, use GRSG habitat recommendations from Connelly et al. 2000b and Hagen et al. 2007.	Colorado River Valley RMP: Make adjustments to grazing management (e.g., AUMs, periods of use, allotments, class of livestock, distribution) based on monitoring. **Grand Junction RMP:** Manage vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado while taking in to account site potential as determined by ecological site inventories, Range/Ecological Site Descriptions, Soils, completed Land Health Assessments, and site-specific management objectives. Implement changes in livestock use through allotment management plans, grazing use agreements, and terms and conditions on grazing permits for priority allotments based on the current prioritization process and/or land health issues Revise or implement allotment management plans/grazing use agreements to resolve conflicts between grazing and management of soils, riparian, and water resources. **Kremmling RMP:** Common to all - Interpreting Indicators of Rangeland Health Tech Ref 1734-6. Little Snake RMP: Overall habitat goals for the sagebrush biome and GRSG established. Roan Plateau RMP: Ensure that Land Health Standards are being met through Land Health surveys, and application of the GSFO (CRVFO) Monitoring Plan. Use a combination of administrative solutions (season of use revisions, livestock exclusion, and stocking level adjustments) and rangeland projects (fences, ponds, etc.) to direct livestock use to meet resource objectives and Land Health Standards. White River RMP: Livestock and big game management techniques will be used to retain ~50 percent herbaceous growth by weight through September 15, on GRSG brood and nest habitats.

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			Routt National Forest: Manage forage for livestock and wildlife based on specific habitat area objectives identified during allotment management plan revision (Management Area Prescription for 5.11, 5.12, 5.13, p. 2-40, p. 2-43, 2-45). Design livestock grazing prescriptions to include achievement of wildlife goals for deer and elk winter range (Management Area Prescription 5.41, p. 2-48). Ecological Site Descriptions have not been developed for the Routt National Forest and we are not currently using them in NEPA or Allotment Management Plan revisions. The Routt National Forest completes Rangeland Health Assessments based on the R2 Rangeland Analysis and Management Training Guide (US Department of Agriculture, Rocky Mountain Region 1996) in NEPA and Allotment Management Plan revisions.
Implementing Management Actions after Land Health and Habitat Evaluations			
23	Range	(ADH) Develop specific objectives to conserve, enhance or restore GRSG PPH based on BLM Ecological Site Descriptions (USFS may use other methods) and assessments (including within wetlands and riparian areas). If an effective grazing system that meets GRSG habitat requirements is not already in place, analyze at least one alternative that conserves, restores or enhances GRSG habitat in the NEPA document prepared for the permit renewal (Doherty et al. 2011b; Williams et al. 2011).	Colorado River Valley RMP: Assess vegetation attributes within grazing allotments to ensure that BLM Colorado Standards for Public Land Health and Guidelines for Livestock Grazing Management are met per established protocols and technical references. **Grand Junction RMP:** Manage vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado while taking in to account site potential as determined by ecological site inventories, Range/Ecological Site Descriptions, Soils, completed Land Health Assessments, and site-specific management objectives. Implement changes in livestock use through allotment management plans, grazing use agreements, and terms and conditions on grazing permits for priority allotments based on the current prioritization process and/or land health issues Revise or implement allotment management plans/grazing use agreements to resolve conflicts between grazing and management of soils, riparian, and water resources. Kremmling RMP: No similar action.

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			Little Snake RMP: ● Manage for a diversity of seral stages within plant communities. ● Restore natural disturbance regimes, such as fire, and vegetation treatments to accomplish biodiversity objectives. ● Establish desired plant communities in coordination with stakeholders across the LSFO. ● Restore a diversity of seral stages within sagebrush communities. ● Maintain large patches of high-quality sagebrush habitats, consistent with the natural range of variability for sagebrush communities in northwest Colorado. Roan Plateau RMP: Ensure that Land Health Standards are being met through Land Health surveys, and application of the GSFO Monitoring Plan. Use a combination of administrative solutions (season of use revisions, livestock exclusion, and stocking level adjustments) and rangeland projects (fences, ponds, etc.) to direct livestock use to meet resource objectives and Land Health Standards. White River RMP: Acceptable desired plant communities will be managed in an ecological status of high-seral or healthy mid-seral for all rangeland plant communities. An exception may be provided for wildlife habitat -areas where specific cover types are needed. The required cover type in those wildlife habitat areas will be the desired plant communities. The ecological status of a desired plant community in specified wildlife habitat areas could be lower than high seral. In which case, the desired plant communities will be managed, at a minimum, to maintain an at-risk rating (Table 2-6 of Appendix D [of the White River RMP]) and have a stable to improving trend in ecological status. **Routt National Forest:** Develop site-specific vegetation utilization and residue guidelines during rangeland planning, and document them

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			in allotment management plans. In the absence of updated planning or an approved allotment management plan, apply the utilization and residue guidelines in Tables 1-2 and 1-3 (Range Guideline, p. 1-9) as described above.
24	Range	(ADH) Manage for vegetation composition and structure consistent with ecological site potential and within the reference state to achieve GRSG seasonal habitat objectives.	Colorado River Valley RMP: Assess vegetation attributes within grazing allotments to ensure that BLM Colorado Standards for Public Land Health and Guidelines for Livestock Grazing Management are met per established protocols and technical references. **Grand Junction RMP:** Manage vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado while taking in to account site potential as determined by ecological site inventories, Range/Ecological Site Descriptions, Soils, completed Land Health Assessments, and site-specific management objectives. Implement changes in livestock use through allotment management plans, grazing use agreements, and terms and conditions on grazing permits for priority allotments based on the current prioritization process and/or land health issues Revise or implement allotment management plans/grazing use agreements to resolve conflicts between grazing and management of soils, riparian, and water resources. Kremmling RMP: No similar action. **Little Snake RMP:** Manage for a diversity of seral stages within plant communities. Restore natural disturbance regimes, such as fire, and vegetation treatments to accomplish biodiversity objectives. Establish desired plant communities in coordination with stakeholders across the LSFO. Restore a diversity of seral stages within sagebrush communities.

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			Maintain large patches of high-quality sagebrush habitats, consistent with the natural range of variability for sagebrush communities in northwest Colorado. Roan Plateau RMP: Ensure that Land Health Standards are being met through Land Health surveys, and application of the GSFO Monitoring Plan. Use a combination of administrative solutions (season of use revisions, livestock exclusion, and stocking level adjustments) and rangeland projects (fences, ponds, etc.) to direct livestock use to meet resource objectives and Land Health Standards. White River RMP: Acceptable desired plant communities will be managed in an ecological status of high-seral or healthy mid-seral for all rangeland plant communities. An exception may be provided for wildlife habitat -areas where specific cover types are needed. The required cover type in those wildlife habitat areas will be the desired plant communities. The ecological status of a desired plant community in specified wildlife habitat areas could be lower than high seral. In which case, the desired plant communities will be managed, at a minimum, to maintain an at-risk rating (Table 2-6 of Appendix D [of the White River RMP]) and have a stable to improving trend in ecological status. Routt National Forest: Develop site-specific vegetation utilization and residue guidelines during rangeland planning, and document them in allotment management plans. In the absence of updated planning or an approved allotment management plan, apply the utilization and residue guidelines in Tables 1-2 and 1-3 (Range Guideline, p. 1-9) as described above.

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25	Range	(ADH) Implement management actions (grazing decisions, Annual Operating Instructions [USFS only], Allotment Management Plan/Conservation Plan development, or other agreements) to modify grazing management to meet seasonal GRSG habitat requirements (Connelly et al. 2011). Consider singly, or in combination, changes in: 1) Season or timing of use; 2) Numbers of livestock (includes temporary non-use or livestock removal); 3) Distribution of livestock use; 4) Intensity of use; and 5) Type of livestock (e.g., cattle, sheep, horses, llamas, alpacas and goats) (Briske et al. 2011).	Colorado River Valley RMP: No similar action. **Grand Junction RMP:** Manage vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado while taking in to account site potential as determined by ecological site inventories, Range/Ecological Site Descriptions, Soils, completed Land Health Assessments, and site-specific management objectives. Implement changes in livestock use through allotment management plans, grazing use agreements, and terms and conditions on grazing permits for priority allotments based on the current prioritization process and/or land health issues Revise or implement allotment management plans/grazing use agreements to resolve conflicts between grazing and management of soils, riparian, and water resources. Kremmling RMP: Common to All Alternatives. **Little Snake RMP:** Manage resources, vegetation, and watersheds to sustain a variety of uses, including livestock grazing, and to maintain the long-term health of the rangelands. Managing to meet plant reproductive and physiological needs, minimize conflicts...in areas of increased pressure on forage and riparian zones, and manage plant utilization. Grazing management practices promote plant health by providing for one or more of the following: Periodic rest or deferment from grazing during critical growth periods, adequate recovery and regrowth periods, and opportunity for seed dissemination and seedling establishment Natural occurrences...should be combined with livestock management practices to move towards the sustainability of biological diversity.

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			Grazing management practices address the kind, numbers, and class of livestock, season, duration, distribution, frequency, and intensity of grazing use and livestock health Roan Plateau RMP: Ensure that Land Health Standards are being met through Land Health surveys, and application of the GSFO Monitoring Plan. Use a combination of administrative solutions (season of use revisions, livestock exclusion, and stocking level adjustments) and rangeland projects (fences, ponds, etc.) to direct livestock use to meet resource objectives and Land Health Standards. **White River RMP:** The 54 allotments placed in the improve category were identified for development of Allotment Management Plans. The Allotment Management Plans will direct livestock management through decisions, such as: 1) grazing systems; 2) season-of-use; 3) number and kind of livestock; and 4) range developments or vegetative treatments. Monitor, evaluate, and adjust livestock management practices to meet resource objectives. Changes in the 1981 forage allocations will be identified in allotment management plans or integrated activity plans. The average 50 percent above ground annual forage production available for allocation is based upon the following grazing utilization levels on key forage plant species, averaged on a grazing allotment basis: Key Species–Grass

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			• 40 percent averaged utilization for the grazing period from April 1 to June 15 each grazing year. • 40 to 60 percent averaged utilization for the grazing period from June 15 to September 15 each grazing year. • 60 percent averaged utilization for the grazing period from September 15 to March 31 each grazing year Key Species–Browse • 40 percent averaged utilization for the grazing period from April 1 to September 30 each grazing year. • 50 to 60 percent averaged utilization for the grazing period from October 1 to March 31 each grazing year. It is recognized that these utilization levels are used as averages to identify an appropriate allocation mix among grazing/browsing animals. Site specific occurrences of over utilization may occur and may create resource conflicts that cannot be resolved by changing the forage allocation mix. Specific resource conflicts will be identified and corrective management sought through development of allotment management plans or integrated activity plans. Allotment Management Plans for the remaining 35 allotments in the improve category will be developed as time and funding permit. Current livestock grazing levels and management practices will continue to be authorized on the 36 maintain and 54 custodial category allotments. The improve category allotments will receive highest priority for public funding for needed rangeland improvements and livestock management facilities. The custodial category allotments will receive the lowest priority for public funding of rangeland improvements. **Routt National Forest:** Phase out season-long grazing systems that allow for livestock grazing use in an individual unit during the entire

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			vegetative growth period, except where determined to achieve or maintain the desired plant community (Range Standard, p. 1-9). Remove livestock from the grazing unit or allotment when further utilization on key areas will exceed allowable-use criteria in the forest plan or allotment management plan (Range Standard, p. 1-9).
26	Range	(PPH) During drought periods, prioritize evaluating effects of the drought in GRSG PPH areas relative to their needs for food and cover. Since there is a lag in vegetation recovery following drought (Thurow and Taylor 1999), ensure that post-drought management allows for vegetation recovery that meets GRSG needs in GRSG PPH areas.	**Colorado River Valley RMP, Grand Junction RMP, Little Snake RMP, Roan Plateau RMP, White River RMP:** No similar action. **Routt National Forest:** No similar action.
Riparian Areas and Wet Meadows			
27	Range	(P) Manage riparian areas and wet meadows for proper functioning condition or other similar methodology (USFS only) within GRSG PPH.	Colorado River Valley RMP: Manage for riparian/wetland values using management actions for improvement or protection. These actions may include, but are not limited to, implementing grazing management actions (e.g., adjusting livestock numbers, distribution, season of use, duration of use), plantings, recreation restrictions, structures (e.g., fencing), and upland water developments. **Grand Junction RMP:** Manage riparian habitat in compliance with the Land Health Standard 2: Riparian systems associated with both running and standing water function properly and have the ability to recover from major disturbances such as fire, severe grazing, or 100-year floods. Riparian vegetation captures sediment and provides forage habitat and biodiversity. Water quality is improved or maintained. Stable soils store and release water. Protect riparian areas by prohibiting surface disturbances in these areas year round. Kremmling RMP: Under all of the proposed alternatives, the water quality of all water bodies on, or influenced by, BLM-managed public lands, including ground water (where applicable), would be managed in a manner designed to achieve, or exceed, the water quality standards established by the State of Colorado. Water quality standards for

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			surface water and ground water include the designated beneficial uses, numeric criteria, and anti-degradation requirements set forth under State law as required by Section 303(c) of the Clean Water Act. **Little Snake RMP:** Riparian systems… function properly. Riparian vegetation captures sediment and provides forage, habitat, and biodiversity. Special status...species...and their habitats are maintained or enhanced by sustaining healthy, native plant and animal communities. **Roan Plateau RMP:** Apply guidelines and BMPs to rest and defer grazing of riparian areas. Achieve a minimum condition rating of proper functioning condition and late-seral stage plant community development in riparian areas and provide high quality fisheries habitat atop the plateau. Establish condition ratings based on Ecological Site Indices (or equivalent assessments of potential natural vegetation based on site and soil characteristics and conditions). Manage to improve riparian related fisheries habitat atop the plateau based on site potential findings. Avoid or mitigate activities that could cause a downward trend in the condition of riparian resources or functioning condition. Initiate activity plans which identify habitat improvement projects to achieve desired conditions. **White River RMP:** Riparian-wetland objectives will be met by locating livestock management facilities (corrals or holding facilities, wells, pipelines, fences) or livestock management practices (salting and supplemental feeding) outside riparian-wetland areas. Existing livestock management facilities or practices that do not meet management objectives will be relocated or removed from all riparian habitats that are nonfunctioning or functioning at risk.

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			Routt National Forest: Develop site-specific vegetation utilization and residue guidelines during rangeland planning, and document them in allotment management plans. In the absence of updated planning or an approved allotment management plan, apply the utilization and residue guidelines in Tables 1-2 and 1-3 (Range Guideline, p. 1-9) as described above.
28	Range	(ADH) Manage wet meadows to maintain a component of perennial forbs with diverse species richness relative to site potential (i.e., reference state) to facilitate brood rearing. Also conserve or enhance these wet meadow complexes to maintain or increase amount of edge and cover within that edge to minimize elevated mortality during the late brood rearing period (Hagen et al. 2007; Kolada et al. 2009; Atamian et al. 2010).	Colorado River Valley RMP: Manage for riparian/wetland values using management actions for improvement or protection. These actions may include, but are not limited to, implementing grazing management actions (e.g., adjusting livestock numbers, distribution, season of use, duration of use), plantings, recreation restrictions, structures (e.g., fencing), and upland water developments. **Grand Junction RMP:** Manage riparian habitat in compliance with the Land Health Standard 2: Riparian systems associated with both running and standing water function properly and have the ability to recover from major disturbances such as fire, severe grazing, or 100-year floods. Riparian vegetation captures sediment and provides forage habitat and biodiversity. Water quality is improved or maintained. Stable soils store and release water. Protect riparian areas by prohibiting surface disturbances in these areas year round. Kremmling RMP: Under all of the proposed alternatives, the water quality of all water bodies on, or influenced by, BLM-managed public lands, including ground water (where applicable), would be managed in a manner designed to achieve, or exceed, the water quality standards established by the State of Colorado. Water quality standards for surface water and ground water include the designated beneficial uses, numeric criteria, and anti-degradation requirements set forth under State law as required by Section 303(c) of the Clean Water Act. **Little Snake RMP:** Riparian systems… function properly. Riparian vegetation captures sediment and provides forage, habitat, and biodiversity.

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			Special status...species...and their habitats are maintained or enhanced by sustaining healthy, native plant and animal communities. **Roan Plateau RMP:** Apply guidelines and BMPs to rest and defer grazing of riparian areas. Achieve a minimum condition rating of proper functioning condition and late-seral stage plant community development in riparian areas and provide high quality fisheries habitat atop the plateau. Establish condition ratings based on Ecological Site Indices (or equivalent assessments of potential natural vegetation based on site and soil characteristics and conditions). Manage to improve riparian related fisheries habitat atop the plateau based on site potential findings. Avoid or mitigate activities that could cause a downward trend in the condition of riparian resources or functioning condition. Initiate activity plans which identify habitat improvement projects to achieve desired conditions. **White River RMP:** Riparian-wetland objectives will be met by locating livestock management facilities (corrals or holding facilities, wells, pipelines, fences) or livestock management practices (salting and supplemental feeding) outside riparian-wetland areas. Existing livestock management facilities or practices that do not meet management objectives will be relocated or removed from all riparian habitats that are nonfunctioning or functioning at risk. Routt National Forest: Develop site-specific vegetation utilization and residue guidelines during rangeland planning, and document them in allotment management plans. In the absence of updated planning or an approved allotment management plan, apply the utilization and residue guidelines in Tables 1-2 and 1-3 (Range Guideline, p. 1-9) as described above.

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29	Range	(ADH) Where riparian areas and wet meadows meet proper functioning condition or meet standards using other similar methodology (USFS only), strive to attain reference state vegetation relative to the ecological site description. For example: Within GRSG PPH, reduce hot season grazing on riparian and meadow complexes to promote recovery or maintenance of appropriate vegetation and water quality. Utilize fencing/herding techniques or seasonal use or livestock distribution changes to reduce pressure on riparian or wet meadow vegetation used by GRSG in the hot season (summer) (Aldridge and Brigham 2002; Crawford et al. 2004; Hagen et al. 2007).	Colorado River Valley RMP: Manage for riparian/wetland values using management actions for improvement or protection. These actions may include, but are not limited to, implementing grazing management actions (e.g., adjusting livestock numbers, distribution, season of use, duration of use), plantings, recreation restrictions, structures (e.g., fencing), and upland water developments. **Grand Junction RMP:** Manage riparian habitat in compliance with the Land Health Standard 2: Riparian systems associated with both running and standing water function properly and have the ability to recover from major disturbances such as fire, severe grazing, or 100-year floods. Riparian vegetation captures sediment and provides forage habitat and biodiversity. Water quality is improved or maintained. Stable soils store and release water. Protect riparian areas by prohibiting surface disturbances in these areas year round. Kremmling RMP: Under all of the proposed alternatives, the water quality of all water bodies on, or influenced by, BLM-managed public lands, including ground water (where applicable), would be managed in a manner designed to achieve, or exceed, the water quality standards established by the State of Colorado. Water quality standards for surface water and ground water include the designated beneficial uses, numeric criteria, and anti-degradation requirements set forth under State law as required by Section 303(c) of the Clean Water Act. **Little Snake RMP:** Riparian systems… function properly. Riparian vegetation captures sediment and provides forage, habitat, and biodiversity. Special status...species...and their habitats are maintained or enhanced by sustaining healthy, native plant and animal communities. **Roan Plateau RMP:** Apply guidelines and BMPs to rest and defer grazing of riparian areas.

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			Achieve a minimum condition rating of proper functioning condition and late-seral stage plant community development in riparian areas and provide high quality fisheries habitat atop the plateau. Establish condition ratings based on Ecological Site Indices (or equivalent assessments of potential natural vegetation based on site and soil characteristics and conditions). Manage to improve riparian related fisheries habitat atop the plateau based on site potential findings. Avoid or mitigate activities that could cause a downward trend in the condition of riparian resources or functioning condition. Initiate activity plans which identify habitat improvement projects to achieve desired conditions. **White River RMP:** Riparian-wetland objectives will be met by locating livestock management facilities (corrals or holding facilities, wells, pipelines, fences) or livestock management practices (salting and supplemental feeding) outside riparian-wetland areas. Existing livestock management facilities or practices that do not meet management objectives will be relocated or removed from all riparian habitats that are nonfunctioning or functioning at risk. Routt National Forest: Develop site-specific vegetation utilization and residue guidelines during rangeland planning, and document them in allotment management plans. In the absence of updated planning or an approved allotment management plan, apply the utilization and residue guidelines in Tables 1-2 and 1-3 (Range Guideline, p. 1-9) as described above.

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30	Range	(PPH) Authorize new water development for diversion from spring or seep source only when GRSG PPH would benefit from the development. This includes developing new water sources for livestock as part of an Allotment Management Plan/conservation plan to improve GRSG habitat.	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, Routt National Forest: No similar action. **White River RMP:** Development of springs, seeps, and other project improvements will be designed to maintain or improve the ecological and hydrological values of those sites. Water developments (springs, reservoirs, catchments; wells, pipeline and water troughs) will conform to BLM Manual H-1741-2. Impoundments offering conditions suitable for pond fisheries will have aquatic conditions enhanced, where appropriate, by: 1) controlling excessive aquatic plant growth; 2) establishing desirable shoreline vegetation; 3) restoring reservoir depth; and/or 4) controlling sediment input.
31	Range	(PPH) Analyze springs, seeps and associated pipelines to determine if modifications are necessary to maintain the continuity of the predevelopment riparian area within GRSG PPH. Make modifications where necessary, considering impacts to other water uses when such considerations are neutral or beneficial to GRSG.	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, Routt National Forest: No similar action. **White River RMP:** Development of springs, seeps, and other project improvements will be designed to maintain or improve the ecological and hydrological values of those sites. Water developments (springs, reservoirs, catchments; wells, pipeline and water troughs) will conform to BLM Manual H-1741-2. Impoundments offering conditions suitable for pond fisheries will have aquatic conditions enhanced, where appropriate, by: 1) controlling excessive aquatic plant growth; 2) establishing desirable shoreline vegetation;

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			3) restoring reservoir depth; and/or 4) controlling sediment input.
Treatments to Increase Forage for Livestock/Wild Ungulates			
32	Range	(PPH) Only allow treatments that conserve, enhance or restore GRSG habitat (this includes treatments that benefit livestock as part of an Allotment Management Plan/Conservation Plan to improve GRSG habitat).	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, White River RMP, Routt National Forest: No similar action.
33	Range	(PPH) Evaluate the role of existing seedings that are currently composed of primarily introduced perennial grasses in and adjacent to GRSG PPH to determine if they should be restored to sagebrush or habitat of higher quality for GRSG. If these seedings are part of an Allotment Management Plan/ Conservation Plan or if they provide value in conserving or enhancing the rest of the PPH, then no restoration would be necessary. Assess the compatibility of these seedings for GRSG habitat or as a component of a grazing system during the land health assessments (or other analyses [USFS only]) (Davies et al. 2011). For example: Some introduced grass seedings are an integral part of a livestock management plan and reduce grazing pressure in important sagebrush habitats or serve as a strategic fuels management area.	Colorado River Valley RMP, Grand Junction RMP, Roan Plateau RMP: No similar action. Kremmling RMP: Common to all alternatives. Little Snake RMP: ● Preserve and protect special status species. ● Sustain the integrity of the sagebrush biome to maintain viable populations of GRSG. ● Identify and initiate restoration and rehabilitation of sagebrush habitat. **White River RMP:** Standard operating procedure. Routt National Forest: NEPA analysis procedures are described in USFS Manual and Handbook and include the direction proposed in Alternative B.
Structural Range Improvements and Livestock Management Tools			

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34	Range	(PPH) Design any new structural range improvements and location of supplements (salt or protein blocks) to conserve, enhance, or restore GRSG habitat through an improved grazing management system relative to GRSG objectives. Structural range improvements, in this context, include but are not limited to: cattleguards, fences, exclosures, corrals or other livestock handling structures; pipelines, troughs, storage tanks (including moveable tanks used in livestock water hauling), windmills, ponds/reservoirs, solar panels and spring developments. Potential for invasive species establishment or increase following construction must be considered in the project planning process and monitored and treated post-construction.	Grand Junction RMP, Kremmling RMP, Roan Plateau RMP, Routt National Forest: No similar action. Colorado River Valley RMP: Following initial allocation, manipulate 27,800 acres of vegetation on 98 allotments to increase livestock forage by 12,700 AUMs using vegetation manipulation techniques, resulting in total projected allocation of 51,900 AUMs. Little Snake RMP: ● Grazing will be managed by using standards and guidelines processes. ● Appropriate actions for improving allotments that do not meet the Colorado standards and guidelines include: livestock water developments, range improvements, riparian pastures, and enclosures. ● Range improvement projects are designed consistent with overall ecological functions and processes with minimum adverse impacts on other resources. White River RMP: Fence reservoirs, where possible to create riparian vegetation and wildlife habitat providing water to livestock through water gaps in the fence or piped to a water trough.
35	Range	(PPH) When developing or modifying water developments, use applicable PDFs or RDFs (see this table's PDFs/RDFs) to mitigate potential impacts from West Nile virus (Clark et al. 2006; Doherty 2007; Walker et al. 2007b; Walker and Naugle 2011).	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, White River RMP, Routt National Forest: No similar action.

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36	Range	(PPH) Evaluate existing structural range improvements and location of supplements (salt or protein blocks) to make sure they conserve, enhance or restore GRSG habitat.	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Roan Plateau RMP, Routt National Forest: No similar action. **Little Snake RMP:** Preserve and protect special status species. Identify and initiate restoration and rehabilitation of sagebrush habitat while maintaining a mosaic of canopy cover and seral stages. Special status, threatened and endangered species, and other plants and animals officially designated by the BLM and their habitats are maintained and enhanced by sustaining healthy, native plant and animal communities. Natural occurrences...should be combined with livestock management practices to move toward the sustainability of biological diversity across the landscape, including the maintenance, restoration, or enhancement of habitat to promote and assist recovery and conservation of threatened, endangered, or other special status species by helping provide natural vegetation patterns, a mosaic of successional stages, and vegetation corridors thus minimizing habitat fragmentation. White River RMP: Locate livestock water developments and salting sites away from riparian and wetland areas.
37	Range	(PPH) To reduce outright GRSG strikes and mortality, remove, modify or mark fences in high risk areas within GRSG PPH based on proximity to lek, lek size, and topography (Christiansen 2009; Stevens 2011).	**Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, Routt National Forest:** No similar action. White River RMP: Fence design will conform to BLM Manual H 1737-l to accommodate negotiation by big game and minimize fence damage. Modifications to fence design may be authorized on a case-by-case basis by the Area Manager as necessary to satisfy special fencing objectives.

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38	Range	(PPH) Monitor for, and treat invasive species associated with existing range improvements (Gelbard and Belnap 2003; Bergquist et al. 2007).	Grand Junction RMP, Kremmling RMP, Roan Plateau RMP: No similar action. Colorado River Valley RMP: Hold project proponents, including livestock operators, ROWs holders, and other permittees deemed necessary by the Authorized Officer, responsible for monitoring and controlling noxious weeds that result from any new facilities, improvements or other surface disturbances authorized on BLM land (e.g., roads, communication sites, pipelines, stock ponds, fences). **Little Snake RMP:** Grazing management will occur in a manner that does not encourage the establishment or spread of noxious weeds. Range improvement projects are designed consistent with overall ecological functions and processes with minimum adverse impacts on other resources. Reduce the occurrence of noxious and undesirable plant species. Objectives for achieving this goal include: Ensure all land use actions that could potentially increase the occurrence of noxious weeds are conducted by using PDFs; Apply principles of integrated pest management. **White River RMP:** In accordance with the White River Resource Area Noxious Weed Management Plan, manage noxious weeds with particular emphasis on a coordinated, cooperative approach. Implement practices that prevent or reduce the extent and occurrence of noxious and problem weeds throughout the Resource Area. Three contiguous areas encompassing 497,900 acres will be designated as weed free zones upon approval of this document (see Map 2-8 [of the White River RMP]). Weed management will be emphasized in these areas through cooperation with private land owners and state and county governments. The areas will, be identified on the ground with signs. The following special conditions will be attached to use authorizations approved within these areas:

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			1. All construction equipment and vehicles will be cleaned prior to entering BLM Weed Free Zones. 2. All hay, straw, unprocessed feed and seed used in BLM Weed Free Zones must be certified free of specified noxious weeds listed in Colorado Weed Free Forage Certification standards. 3. All authorized users of disturbed areas will be required to inventory for noxious weeds in both the spring and fall. **Routt National Forest:** Control nonnative and noxious plants throughout the Forest, with priority given to designated wilderness (Undesirable Species Standard, p. 1-16). Develop a noxious weed and pest management program that addresses awareness, prevention, inventory, planning, treatment, monitoring, reporting, and management objectives. Priorities for implementing a program for undesirable plants include: a. New invaders, b. New areas, c. Spreading or expanding infestations, d. Existing infestations (Undesirable Species Guideline p. 1-16).
Retirement of Grazing Privileges			
39	Range	(ADH) Maintain retirement of grazing privileges as an option in GRSG PPH when the current permittee is willing to retire grazing on all or part of an allotment. Analyze the adverse impacts of no livestock use on wildfire and invasive species threats (Crawford et al. 2004) in evaluating retirement proposals. *Planning direction note:* Each planning effort will identify the specific allotment(s) where retirement of grazing privileges is potentially beneficial.	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Roan Plateau RMP, Routt National Forest, White River RMP: No similar action. Little Snake RMP: Provide the opportunity to create Reserve Conservation Allotments… A Reserve Conservation Allotment is a vacant allotment with no attached grazing preference whose purpose is to provide alternative forage for BLM permittees/lessees during the rest requirement while their customary allotment is undergoing rangeland recovery from natural disturbances or restoration projects.
Wild Horse Management		**Objective: Manage wild horses in a manner designed to 1) avoid reductions in grass, forb, and shrub cover, 2) avoid increasing unpalatable forbs and invasive plants such as cheatgrass.**	**Objective: No similar objective.**

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Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP, Roan Plateau RMP, Routt National Forest: Wild horses and burros are not present in these field offices and forest.			
40	Wild Horses	(PPH) Manage wild horse and burro population levels within established appropriate management levels.	**Little Snake RMP:** Manage the Sand Wash wild horse herd as an integral part of the public lands ecosystem at an appropriate management level. Periodically reevaluate the existing appropriate management level to ensure herd size remains compatible with other resources. **White River RMP:** Wild horses will be managed to provide a healthy, viable breeding population with a diverse age structure.
41	Wild Horses	(ADH) Prioritize gathers in GRSG PPH, unless removals are necessary in other areas to prevent catastrophic environmental issues, including herd health impacts.	Little Snake RMP: The guidelines and criteria for adjusting appropriate management level include current monitoring data, rate of herd increase, competing uses. The goal is to manage the Sand Wash herd at an appropriate management level that is compatible with other resources. White River RMP: No similar action.
42	Wild Horses	(PPH) Within PPH, develop or amend BLM HMA Plans and USFS Wild Horse Territory Plans to incorporate GRSG habitat objectives and management considerations for all BLM HMAs and USFS Wild Horse Territories.	Little Snake RMP: Appendix F (of the Little Snake RMP) includes direction on collecting data and monitoring a variety of resource indicators. By implementing the monitoring direction in Appendix F (of the Little Snake RMP), the BLM will continue to gather important information to ensure the goals and objectives identified in the Approved RMP are met. White River RMP: Monitoring studies will be conducted and the long term appropriate management level for the HMA will be adjusted based on the results of this monitoring.
43	Wild Horses	(PPH) For all BLM HMAs and USFS Wild Horse Territories within GRSG PPH, prioritize the evaluation of all appropriate management levels based on indicators that address structure/condition/composition of vegetation and measurements specific to achieving GRSG habitat objectives.	**Little Snake RMP, White River RMP:** No similar action.

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44	Wild Horses	(ADH) Coordinate with other resources (Range, Wildlife, and Riparian) to conduct land health assessments to determine existing structure/condition/composition of vegetation within all BLM HMAs and USFS Wild Horse Territories.	Little Snake RMP: Guidelines and criteria for adjusting appropriate management level include current monitoring data, rate of herd increase, competing uses, frequency of gathering cycle, other population management options, and herd genetics. Appendix F (of the Little Snake RMP) includes direction on collecting data and monitoring a variety of resource indicators. By implementing the monitoring direction in Appendix F (of the Little Snake RMP), the BLM will continue to gather important information to ensure the goals and objectives identified in the Approved RMP are met. White River RMP: Monitoring studies will be conducted and the long term appropriate management level for the HMA will be adjusted based on the results of this monitoring.
45	Wild Horses	(PPH) When conducting NEPA analysis for wild horse and burro management activities, water developments or other rangeland improvements for wild horses in GRSG PPH, address the direct and indirect effects to GRSG populations and habitat. Implement any water developments or rangeland improvements using the criteria identified for domestic livestock identified above in PPH.	Little Snake RMP: The guidelines and criteria for adjusting appropriate management level include current monitoring data, rate of herd increase, competing uses. The goal is to manage the Sand Wash herd at an appropriate management level that is compatible with other resources. White River RMP: No similar action.
Fluid Minerals		**Objective: Manage fluid minerals to avoid, minimize, and mitigate 1) direct disturbance, displacement, or mortality of GRSG, 2) direct loss of habitat or loss of effective habitat through fragmentation, and 3) cumulative landscape-level impacts.**	Objective: No similar objective.
Unleased Fluid Minerals			

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46	Fluid Minerals	(PPH) Close GRSG PPH areas to fluid mineral leasing. Upon expiration or termination of existing leases, do not accept nominations/expressions of interest for parcels within PPH.	**Colorado River RMP:** Allowable Use: STIPULATION GS-NSO-12: *Threatened or Endangered Species.* Prohibit surface occupancy and surface-disturbing activities on habitat areas for those species listed by the federal or state government as endangered or threatened and for federal proposed or candidate species. Habitat areas include occupied habitat and habitat necessary for the maintenance or recovery of the species. **Grand Junction RMP: No Leasing:** *BLM surface/federal minerals.* Manage 96,500 acres of the federal mineral estate underlying BLM surface as closed to fluid mineral leasing and geophysical exploration. (Refer to Appendix B [of the Grand Junction RMP].) ● Unaweep Seep ACEC; and ● WSAs. **Kremmling RMP:** Current restriction on use prohibits surface occupancy and surface-disturbing activities within a 0.25-mile radius of an active lek. Chapter 2, Pg. 72. Little Snake RMP: RMP-36/ 2.13. 242,560 ac are closed to leasing. Roan Plateau RMP: No similar action. **White River RMP:** The nondiscretionary lands include the six WSAs and the National Park Service's Harper's Corner Road withdrawal (see Map 2-2 [of the White River RMP]). (p2-5). **Routt National Forest:** No similar action.
		(PPH) Allow geophysical exploration within GRSG PPH areas to obtain information for existing federal fluid mineral leases or areas adjacent to state or fee lands within GRSG PPH areas. Allow geophysical operations only using helicopter-portable drilling, wheeled or tracked vehicles on existing roads, or other approved	Colorado River RMP, Grand Junction RMP, Kremmling RMP, White River RMP, Routt National Forest: No similar action. **Little Snake RMP:** RMP-39/2.31. "Using oil and gas stipulations as reference point, restrictions will be determined at the permitting stage on a case by case basis".

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		methods conducted in accordance with seasonal timing limitations and other restrictions that may apply. If no timing stipulation on NTT Plus, need to add one here.	Roan Plateau RMP: Allow geophysical exploration within GRSG PPH areas to obtain information for existing federal fluid mineral leases or areas adjacent to state or fee lands within GRSG PPH areas. Allow geophysical operations only using helicopter-portable drilling, wheeled or tracked vehicles on existing roads, or other approved methods conducted in accordance with seasonal timing limitations and other restrictions that may apply.
Leased Fluid Minerals			
47	Fluid Minerals	(PPH) Apply the following conservation measures through RMP implementation decisions (e.g., approval of an Application for Permit to Drill, and Sundry Notice) and upon completion of the environmental record of review (43 CFR 3162.5, include appropriate documentation of compliance with NEPA. In this process evaluate, among other things: 1. Whether the conservation measure is "reasonable" (43 CFR 3101.1-2) with the valid existing rights; and 2. Whether the action is in conformance with the approved RMP. (see row for NTT 49 below)	**Colorado River RMP: Lease Notice** LN CO-34: *ESA*. The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the ESA as amended, 16 USC 1531 et seq., including completion of any required procedure for conference or consultation. Grand Junction RMP: No similar action. **Kremmling RMP:** Standard lease terms and leasing stipulations would be applied to leases. COAs, PDFs, and standard operating procedures (see Appendices D and E [of the Kremmling RMP]), design features, and mitigation measures would be applied to development proposals. (The BLM has the discretion to modify surface operations in order to change or to add specific mitigation measures when supported by scientific analysis.) All mitigation and conservation measures not already required as stipulations will be analyzed in a site-specific environmental analysis document, and be incorporated,

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			as appropriate, into COAs of Permits, Plans of Development, or other use authorizations. Ch. 2, Pg. 130. Little Snake RMP: RMP Appendix B (of the Little Snake RMP), p. B-3/B-8. For Existing Leases, PDFs will be required as COAs on drilling applications. **Roan Plateau RMP: Lease Notice** LN CO-34: *ESA*. The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the ESA as amended, 16 USC 1531 et seq., including completion of any required procedure for conference or consultation. **White River RMP:** COAs will be attached, as appropriate, to help mitigate the site specific impacts of an authorization. These mitigating measures may be supplemented with additional requirements or replaced by alternative measures that will accomplish the same result as well or better than the original. (p1-2). For activities other than oil and gas leasing, applicable stipulations will be attached to use authorizations at the Resource Area as COAs. (pA-1). This plan does not repeal valid existing rights on public lands. A valid existing right is a claim or authorization that takes precedence over the decisions developed in this plan. However, such authorizations

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			will be reviewed and brought into conformance with the plan prior to amendment, renewal, or reissuance of the authorization. All future resource authorizations and actions will conform to, or not conflict with, the decisions developed in the RMP. Subject to the valid existing rights mentioned above, all existing operations and activities authorized under permits, contracts, cooperative agreements or other authorization for use or occupancy will be modified, as necessary, to conform with this plan within a reasonable timeframe. (p1-1). Monitoring will help determine whether actions are consistent with current policy and provide feedback as to whether the original assumptions were correctly applied and impacts correctly predicted. It will also provide data as to the adequacy of the mitigation measures (stipulations and COAs). (p1-2). Routt National Forest: (ADH) Recommend consent to lease with appropriate lease terms or stipulations, as set forth in the Forest Oil and Gas Leasing Analysis ROD (1993) and updated by the Forest Plan, Final EIS, and ROD (Mineral and Energy Leasable Minerals Standard, p. 1-4). Recommend against or deny consent to the BLM for issuance of leases, permits, or coal exploration licenses where operational damages to surface resources would not be reclaimed to acceptable conditions (per Forest plan direction); Operational damages to surface resources include impacts from surface-based access, product transportation, and ancillary facilities necessary to production and related operations (Mineral and Energy Leasable Minerals Standard, p. 1-4). Negotiate surface management for private oil and gas minerals with the owner and operator to be as close as possible to the standards used for federal minerals. Prohibiting such development is not an alternative (Mineral and Energy- Reserved and Outstanding Rights, p. 1-6).
48	Fluid Minerals	(PPH) Provide the following conservation measures as terms and conditions on an approved RMP: (see row for NTT 49 below)	**Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, White River RMP, Routt National Forest:** No similar action.

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
49	Fluid Minerals	**GRSG PPH COA-47-51b/c.** The operator/lessee is required to conduct site-specific review of proposed projects prior to approval of Applications for Permit to drill. For leases within PPH, the following COAs would apply: ● Preclude new surface occupancy on existing leases within PPH. ● If the lease is entirely within PPH, do not allow surface occupancy of any portion within 4 miles around the lek and limit permitted disturbances to one per section with no more than 3 percent surface disturbance in that section. ● If the entire lease is within the 4-mile lek perimeter, limit permitted disturbances to one per section with no more than 3 percent surface disturbance in that section. Require any development to be placed at the most distal part of the lease from the lek, or depending on topography and other habitat aspects, in an area that is demonstrably less harmful to GRSG, such as based on topography or vegetation. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)	**Colorado River RMP:** Allowable Use: STIPULATION GS-NSO-12: *Threatened or Endangered Species.* Prohibit surface occupancy and surface-disturbing activities on habitat areas for those species listed by the federal or state government as endangered or threatened and for federal proposed or candidate species. Habitat areas include occupied habitat and habitat necessary for the maintenance or recovery of the species **Grand Junction RMP:** No similar action. **Kremmling RMP:** Timing Limitation CO-15: GRSG Winter Habitat -- Prohibit surface occupancy and surface-disturbing activities during certain timeframes in GRSG crucial winter habitat and nesting habitat (includes GRSG). [GRSG nesting habitat is described as sagebrush stands with sagebrush plants between 30 centimeters and 100 centimeters (approximately 12 inches and 40 inches) in height, and a mean canopy cover between 15 percent and 40 percent within a 2-mile radius of an active lek.] GRSG crucial winter habitat: December 16 to March 15; and GRSG nesting habitat: March 1 to June 30. (See Appendix C [of the Kremmling RMP].) Chapter 2, Pg. 73. Little Snake RMP: RMP-36/ 2.13. 222,910 ac are NSO leasing. NSO would be applied within 0.6 mile of GRSG lek. **Roan Plateau RMP: STIPULATION** GS-NSO-ROAN-24, *Threatened, Endangered, or Candidate Species Habitat* – In order to protect occupied habitat and immediately adjacent potential habitat crucial for the maintenance or recovery of species listed under the ESA or by the State of Colorado as threatened or endangered (including proposed or candidate species under the ESA), no ground-disturbing activities will be authorized within occupied habitat or immediately adjacent potential habitat necessary for maintenance or recovery of the species. **White River RMP:** GRSG Winter Concentration Areas. This area encompasses sagebrush habitats that are occupied by wintering concentrations of GRSG, or represent the only habitats that remain

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			available for use during periods of heavy snowpack. No development activity will be allowed between December 16 and March 15. The Colorado Division of Wildlife (now CPW) has indicated that these features exist on public lands within the White River Resource Area but have not yet delineated specific areas that will be subject to this timing restriction. (pA-21). Routt National Forest: (ADH) Recommend consent to lease with appropriate lease terms or stipulations, as set forth in the Forest Oil and Gas Leasing Analysis ROD (USFS 1993) and updated by the Forest Plan, Final EIS, and ROD (Mineral and Energy Leasable Minerals Standard, p. 1-4). Recommend against or deny consent to the BLM for issuance of leases, permits, or coal exploration licenses where operational damages to surface resources would not be reclaimed to acceptable conditions (per Forest Plan direction). Operational damages to surface resources include impacts from surface-based access, product transportation, and ancillary facilities necessary to production and related operations (Mineral and Energy Leasable Minerals Standard, p. 1-4). Negotiate surface management for private oil and gas minerals with the owner and operator to be as close as possible to the standards used for federal minerals. Prohibiting such development is not an alternative (Mineral and Energy- Reserved and Outstanding Rights, p. 1-6).
50	Fluid Minerals	**GRSG PPH COA-47-51b/c.** The operator/lessee is required to conduct site-specific review of proposed projects prior to approval of Applications for Permit to drill. For leases within PPH, the following COAs would apply: ● Preclude new surface occupancy on existing leases within PPH. ● If the lease is entirely within PPH, do not allow surface occupancy of any portion within 4 miles around the lek and limit permitted disturbances to one per section with no more than 3 percent surface disturbance in that section.	**Colorado River RMP, Grand Junction RMP, Kremmling RMP, Roan Plateau RMP:** No similar action. **Little Snake RMP:** ROD-RMP, Appendix B (of the Little Snake RMP), 3-11. 1 percent and 5 percent disturbance caps voluntary on existing leases in exchange for relaxed winter range restrictions. CSU would be applied to all new leases with priority sagebrush habitat. CSU 1 percent and 5 percent disturbance caps would be voluntary for existing leases and applied to new leases with priority sagebrush habitat. RMP-36/ 2.13. 222,910 ac are NSO leasing. NSO would be applied within 0.6-mile of GRSG lek.

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
		• If the entire lease is within the 4-mile lek perimeter, limit permitted disturbances to one per section with no more than 3 percent surface disturbance in that section. Require any development to be placed at the most distal part of the lease from the lek, or depending on topography and other habitat aspects, in an area that is demonstrably less harmful to GRSG, such as based on topography or vegetation. (Refer to Appendix E, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)	**White River RMP:** Surface occupancy is not allowed within 0.25-mile of identified lek sites. (p. A-5). Routt National Forest: (ADH) Recommend consent to lease with appropriate lease terms or stipulations, as set forth in the Forest Oil and Gas Leasing Analysis ROD (USFS 1993) and updated by the Forest Plan, Final EIS, and ROD (Mineral and Energy Leasable Minerals Standard, p. 1-4). Recommend against or deny consent to the BLM for issuance of leases, permits, or coal exploration licenses where operational damages to surface resources would not be reclaimed to acceptable conditions (per Forest Plan direction). Operational damages to surface resources include impacts from surface-based access, product transportation, and ancillary facilities necessary to production and related operations (Mineral and Energy Leasable Minerals Standard, p. 1-4). Negotiate surface management for private oil and gas minerals with the owner and operator to be as close as possible to the standards used for federal minerals. Prohibiting such development is not an alternative (Mineral and Energy- Reserved and Outstanding Rights, p. 1-6).
51	Fluid Minerals	**GRSG PPH COA-47-51b/c.** The operator/lessee is required to conduct site-specific review of proposed projects prior to approval of Applications for Permit to drill. For leases within PPH, the following COAs would apply: • Preclude new surface occupancy on existing leases within PPH. • If the lease is entirely within PPH, do not allow surface occupancy of any portion within 4 miles around the lek and limit permitted disturbances to one per section with no more than 3 percent surface disturbance in that section. • If the entire lease is within the 4-mile lek perimeter, limit permitted disturbances to one per section with no more than 3 percent surface disturbance in that	Colorado River RMP, Grand Junction RMP, Roan Plateau RMP: No similar action. Kremmling RMP: No Surface Occupancy, CO-02: Grouse Leks - Prohibit surface occupancy and surface-disturbing activities within a 0.25-mile radius of an active lek (courtship area). Grouse includes GRSG, Columbian sharp-tailed grouse, and Lesser and Greater prairie chickens. (See Appendix C [of the Kremmling RMP].) Ch. 2, Pg. 72. **Little Snake RMP:** ROD-RMP, Appendix B (of the Little Snake RMP), 3-11. 1 percent and 5 percent disturbance caps voluntary on existing leases in exchange for relaxed winter range restrictions. CSU would be applied to all new leases with priority sagebrush habitat. CSU 1 percent and 5 percent disturbance caps would be voluntary for existing leases and applied to new leases with priority sagebrush habitat. RMP-36/ 2.13. 222,910 ac are NSO leasing. NSO would be applied within 0.6-mile of GRSG lek.

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
		section. Require any development to be placed at the most distal part of the lease from the lek, or depending on topography and other habitat aspects, in an area that is demonstrably less harmful to GRSG, such as based on topography or vegetation. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)	**White River RMP:** Vegetation treatment widths should generally not exceed 200 feet. Treatment areas should be interspersed with equal or larger intervals of suitable cover. Cumulative adverse manipulations would not be allowed to exceed 10 percent of suitable nest habitat within 2 miles of a lek. (p2-32). Routt National Forest: (ADH) Recommend consent to lease with appropriate lease terms or stipulations, as set forth in the Forest Oil and Gas Leasing Analysis ROD (USFS 1993) and updated by the Forest Plan, Final EIS, and ROD (Mineral and Energy Leasable Minerals Standard, p. 1-4). Recommend against or deny consent to the BLM for issuance of leases, permits, or coal exploration licenses where operational damages to surface resources would not be reclaimed to acceptable conditions (per Forest Plan direction). Operational damages to surface resources include impacts from surface-based access, product transportation, and ancillary facilities necessary to production and related operations (Mineral and Energy Leasable Minerals Standard, p. 1-4). Negotiate surface management for private oil and gas minerals with the owner and operator to be as close as possible to the standards used for federal minerals. Prohibiting such development is not an alternative (Mineral and Energy- Reserved and Outstanding Rights, p. 1-6).
52	Fluid Minerals	**RSG PPH COA-52b/d.** Apply a seasonal restriction on exploratory drilling in PPH to prohibit surface-disturbing activities during the lekking, nesting and early brood-rearing season. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)	Grand Junction RMP, Kremmling RMP, Roan Plateau RMP: No similar action. **Colorado River RMP:** Allowable Use: **STIPULATION** GS-TL-3: *GRSG Winter and Nesting Habitat.* Prohibit surface occupancy and surface-disturbing activities during certain timeframes in grouse crucial winter habitat and nesting habitat (includes GRSG). Nesting habitat is described as sagebrush stands with sagebrush plants between 30 and 100 centimeters (approximately 12 and 40 inches) in height and a mean canopy cover between 15 and 40 percent within a 2-mile radius of an active lek. Winter habitat: December 16 to March 15. Nesting habitat: March 1 to June 30.

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			Little Snake RMP: RMP, Appendix B-13 – Timing Limitations (of the Little Snake RMP) will apply to GRSG nesting and brood-rearing habitat (4 miles from lek) and to GRSG crucial winter habitat. **White River RMP:** GRSG Nesting Habitat. This area encompasses suitable GRSG nesting habitat associated with individual leks. This stipulation will not take effect until direct and indirect impacts to suitable nesting cover exceeds 10 percent of the habitat available within 2 miles of identified leks. Further development, after this threshold has been exceeded, will not be allowed from April 15 through July 7. (Development can occur until 10 percent of the habitat associated with a lek is impacted, from then on, additional activity can occur from July 8 through April 14.) (p. A-18). Routt National Forest: Timing stipulation for Grouse Breeding Complex March 1 through June 30.
53	Fluid Minerals	(P) BLM/USFS should closely examine the applicability of categorical exclusions in PPH. If extraordinary circumstances review is applicable, the BLM/USFS should determine whether those circumstances exist.	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, White River RMP, Routt National Forest: No similar action.
54	Fluid Minerals	**GRSG PPH Notice to Lessees-54b/c.** For leases within PPH, complete Master Development Plans in lieu of single-well Applications for Permit to Drill processing for all but wildcat wells. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)	Colorado River RMP, Kremmling RMP, White River RMP: No similar action. **Grand Junction RMP:** In areas being actively developed, the operator must submit a Master Development Plan (formerly known as Geographic Area Proposal) that describes a minimum of 2 to 3 years activity for operator-controlled federal leases within a reasonable geographic area (to be determined jointly with BLM). Use the Master Development Plan to plan development of federal leases within the area to account for well locations, roads, and pipelines, and to identify cumulative environmental effects and appropriate mitigation. The extent of the analysis would be dependent on the extent of surface ownership, extent of lease holdings, topography, access, and resource concerns. This requirement for a Master Development Plan may be waived for individual or small groups of exploratory wells, for directional wells drilled on previously developed well pads.

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			Little Snake RMP: RMP-24, require development plans. RMP-39/ 2.13. PDFs will be developed. **Roan Plateau RMP:** Prior to exploration and/or lease development within the planning area, the operator must submit a Geographic Area Proposal identifying projected activity (including well locations, pipelines, and facilities) during the next 2 to 5 years and appropriate mitigation. **Routt National Forest:** (ADH) Recommend consent to lease with appropriate lease terms or stipulations, as set forth in the Forest Oil and Gas Leasing Analysis ROD (USFS 1993) and updated by the Forest Plan, Final EIS, and ROD (Mineral and Energy Leasable Minerals Standard, p. 1-4). Recommend against or deny consent to the BLM for issuance of leases, permits, or coal exploration licenses where operational damages to surface resources would not be reclaimed to acceptable conditions (per Forest Plan direction). Operational damages to surface resources include impacts from surface-based access, product transportation, and ancillary facilities necessary to production and related operations (Mineral and Energy Leasable Minerals Standard, p. 1-4). Negotiate surface management for private oil and gas minerals with the owner and operator to be as close as possible to the standards used for federal minerals. Prohibiting such development is not an alternative (Mineral and Energy- Reserved and Outstanding Rights, p. 1-6).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
55	Fluid Minerals	**GRSG PPH COA-55b.** For leases that are not yet developed in PPH, the proposed surface disturbance cannot exceed 3 percent within that Colorado MZ. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)	**Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, White River RMP:** No similar action. **Little Snake RMP:** ROD-RMP, Appendix B (of the Little Snake RMP), 3-11. 1 percent and 5 percent disturbance caps voluntary on existing leases in exchange for relaxed winter range restrictions. CSU would be applied to all new leases with priority sagebrush habitat. CSU 1 percent and 5 percent disturbance caps would be voluntary for existing leases and applied to new leases with priority sagebrush habitat. RMP-36/ 2.13. 222,910 acres are NSO leasing. NSO would be applied within 0.6-mile of GRSG lek. Routt National Forest: No similar action.
56	Fluid Minerals	(PPH) When necessary, conduct additional, effective mitigation in 1) GRSG PPH areas or-less preferably-2) GRSG PGH (dependent upon the area-specific ability to increase GRSG populations).	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, White River RMP: No similar action. Routt National Forest: No similar action.
57	Fluid Minerals	(PPH) Conduct additional, effective mitigation first within the same population area where the impact is realized, and if not possible then conduct mitigation within the same Management Zone as the impact, per 2006 WAFWA Strategy (p. 2-17).	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, White River RMP, Routt National Forest: No similar action.
58	Fluid Minerals	**GRSG PPH Notice to Lessees-58b/c.** Require unitization when deemed necessary for proper development and operation of an area to minimize adverse impacts to GRSG. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)	**Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, White River RMP, Routt National Forest:** No similar action. Roan Plateau RMP: STIPULATION GS-CSU-ROAN-13: *Parachute Creek High Value Watershed* – Before on-the-ground lease operations on top of the plateau, all lessees/leases will join a Federal Unitization Agreement approved by the BLM.

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59	Fluid Minerals	(PPH) Identify areas where acquisitions (including subsurface mineral rights) or conservation easements would benefit GRSG.	Colorado River Valley RMP: No similar action. **Grand Junction RMP:** Consider acquisition of lands that meet the following criteria: ● Private land within areas recommended as suitable for designation as wilderness; ● Private land needed for management of Wild and Scenic Rivers; ● Potential national or historic trails; ● Potential natural or RNAs; ● Potential areas for cultural or natural history designation; ● Potential ACECs; ● Private land within designated wild horse preserves; ● Private land with potential for other congressional designations; ● Threatened or endangered species habitat areas; ● Riparian habitat areas; ● Valuable recreation areas; ● Wetland areas as defined in Executive Order 11990, dated May 24, 1977; and ● Floodplain areas (100-year) as defined in Executive Order 11988, dated May 24, 1977. **Kremmling RMP:** Apply the following criteria when considering land tenure adjustments: ● Retain all public lands or interests in land (such as easements) that enhance multiple-use and sustained-yield management;

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			• Acquire lands or interests in land that complement important resource values and further management objectives. **Little Snake RMP:** Central Zone: Acquisition of lands in the area should be actively sought to protect wildlife habitat, especially GRSG. Central, East and West Zones: Acquisition areas can be identified for the public's interest. **Roan Plateau RMP:** Retain lands on top of the plateau, and acquire in-holdings atop the plateau. Acquisition of inholdings, and other lands with important resource values, would be encouraged or allowed. **White River RMP:** Acquisition of non-BLM lands may be pursued through exchange, purchase or donation, where the acquisition will serve to enhance the BLM's objectives and special emphasis programs. For purchase or donation, acquisitions will generally be limited to inholdings within designated areas. **Routt National Forest:** In land adjustment activities including land exchange, purchase, disposal, and donation, consider the following: c) Acquire lands that contain resource values identified during scoping as important in contributing toward national forest system resource management goals and objectives as stated in the forest plan. Examples include: wetlands, riparian areas, essential wildlife habitat, threatened or endangered species habitat, sensitive species habitat, significant cultural resources, timber lands, rangelands, or other areas (Real Estate-Land Adjustments Standard, p. 1-24).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
60	Fluid Minerals	(ADH) For future actions, require a full reclamation bond specific to the site in accordance with 43 CFR 3104.2, 3104.3, and 3104.5. Ensure bonds are sufficient for costs relative to reclamation (Connelly et al. 2000a; Hagen et al. 2007) that would result in full restoration of the lands to the condition it was found prior to disturbance. Base the reclamation costs on the assumption that contractors for the BLM and USFS will perform the work.	Regulatory Requirement 43 CFR 3104.2, 3104.3, and 3104.5.
61	Fluid Minerals	Where applicable and technically feasible, apply PDFs/RDFs (see this table's Fluid Minerals and Multiple Program sections) as mandatory COAs within GRSG PPH.	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, White River RMP: The range of alternatives is articulated in the specific PDF sections. **Routt National Forest:** PDFs are not included in Current Management. All PDF listed in **Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features, are required for all action alternatives.
Solid Minerals		**Objective: Manage solid mineral programs to avoid, minimize, and mitigate adverse impacts to GRSG habitat to the extent practical under the law and BLM/USFS jurisdiction.**	**Objective: No similar objective.**
Coal			
62	Solid Minerals-Coal	(ADH) Apply minimization of surface-disturbing or disruptive activities (including operations and maintenance) where needed to reduce the impacts of human activities on important seasonal GRSG habitats. Apply these measures during activity level planning. Use additional effective mitigation to offset impacts as appropriate (determined by local options/needs).	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, White River RMP, Routt National Forest: No similar action. **Roan Plateau RMP:** All environmental protection requirements of the various resources described in the plan and contained in the various stipulations would apply to coal.

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63	Solid Minerals-Coal	(PPH) *Surface mines*: Find unsuitable all surface mining of coal under the criteria set forth in 43 CFR 3461.5.	**Grand Junction RMP, Kremmling RMP:** No similar action. **Colorado River RMP:** Action: Manage approximately 28,500 acres of the federal mineral estate in CRVFO as open to consideration for coal leasing. **Little Snake RMP:** RMP, Appendix G-5 (of the Little Snake RMP) federal lands, which the surface management agency and the State jointly agree are fish and wildlife habitat for resident species of high interest to the State, and which are essential for maintaining these priority wildlife species, would be considered unsuitable. Examples of such lands that serve a critical function for the species involved include: ● Active dancing and strutting grounds for GRSG, sharp-tailed grouse, and prairie chicken ● Winter ranges most critical for deer, antelope, and elk ● Migration corridors for elk. Lands found acceptable in this RMP will be available for further consideration for leasing and/or exchange. However, all lands determined to be suitable, unsuitable, or unacceptable for further consideration for leasing and/or exchange may be reviewed and suitability determinations may be modified on the basis of new data discovered during activity planning efforts. Unsuitability criteria will apply only to surface coal mining but not to underground mining. The lands with coal resource development potential in the Little Snake coal planning area are located in the Yampa and Danforth Hills coal fields. The coal planning includes federal coal within the following townships: Sixth Principal Meridian; Township 3 North, Range 85 West; Township 3 North, Range 86 West; Township 3 North, Range 90 West

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			– Range 95 West; Township 4 North, Range 86 West – Range 95 West; Township 5 North, Range 85 West – Range 93 West; Township 6 North, Range 86 West – Range 93 West; Township 7 North, Range 87 West – Range 94 West; Township 8 North, Range 86 West – Range 94 West; and Township 9 North, Range 86 West. The coal planning area contains approximately 675,550 acres of federal coal lands or BLM surface estate. Unsuitability criteria have been applied to these lands to determine the areas unsuitable for surface mining. Results are shown in Appendix G (of the Little Snake RMP). After applying unsuitability criteria and exceptions, approximately 623,860 acres were deemed acceptable for further consideration for leasing for either surface or underground development (Map 16 [of the Little Snake RMP]). NSO stipulations for coal development will be used to protect raptor nest and roost sites and concentration areas, migratory bird habitats, floodplains, alluvial valley floors, and federally designated critical habitats for threatened or endangered plant and animal species. NSO stipulations will apply to Juniper Mountain Special Recreation Management Area (SRMA) and to Zone 1 of the Little Yampa SRMA; these areas will be acceptable for further consideration only for underground coal mining (NSO stipulation). Specific areas that have no surface occupancy stipulations for coal leasing are listed below (47,910 acres – acres are limited to the areas with coal potential, located in the southeastern portion of the LSFO): ● Raptor nest and roost sites and concentration areas (these stipulations are contained in the Coal Suitability Review in Appendix G [of the Little Snake RMP]) ● Migratory bird habitats (these stipulations are contained in the Coal Suitability Review (Appendix G [of the Little Snake RMP]) ● Floodplains (these stipulations are contained in the Coal Suitability Review in Appendix G [of the Little Snake RMP])

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			• Alluvial Valley Floors (these stipulations are contained in the Coal Suitability Review in Appendix G [of the Little Snake RMP]) • Federally designated critical habitats for threatened or endangered plant and animal species (these stipulations are contained in the Coal Suitability Review in Appendix G [of the Little Snake RMP]) • Little Yampa Canyon SRMA, Zone 1 • Juniper Mountain SRMA • The Cedar Mountain SRMA and WSR Yampa River segments1, 2, and 3 will not be available for coal leasing (3,780 acres). **Roan Plateau RMP:** Make the area available for coal leasing. All environmental protection requirements of the various resources described in the plan and contained in the various stipulations would apply to coal. **STIPULATION** GS-NSO-ROAN-24, *Threatened, Endangered, or Candidate Species Habitat* – In order to protect occupied habitat and immediately adjacent potential habitat crucial for the maintenance or recovery of species listed under the ESA or by the State of Colorado as threatened or endangered (including proposed or candidate species under the ESA), no ground-disturbing activities will be authorized within occupied habitat or immediately adjacent potential habitat necessary for maintenance or recovery of the species. **White River RMP:** The management of coal resources developed in the 1981 Coal Amendment to the White River Resource Area LUP is carried forward into this RMP. The Coal unsuitability criteria found at 43 CFR 3461 were not reapplied at the time this RMP was developed. (p 2-7). The unsuitability criteria will be reapplied at the time an application is received. (p 2-8).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			Routt National Forest: Recommend against or deny consent to the BLM for issuance of leases, permits, or coal exploration licenses where operational damages to surface resources would not be reclaimed to acceptable conditions (per forest plan direction). Operational damages to surface resources include impacts from surface-based access, product transportation, and ancillary facilities necessary to production and related operations (Mineral and Energy- Leasable Minerals Standard p. 1-4).
64	Solid Minerals--Coal	(PPH) *Sub-surface mining:* Grant no new mining leases unless all surface disturbances (appurtenant facilities) are placed outside of the GRSG PPH area. In GRSG PPH areas, place any new appurtenant facilities outside of PPH. Where new appurtenant facilities associated with the existing lease cannot be located outside the GRSG PPH area, collocate new facilities within existing disturbed areas. If this is not possible, then build any new appurtenant facilities to the absolute minimum standard necessary.	**Colorado River RMP: STIPULATION** GS-CSU-1: *Underground Coal Mines.* Apply CSU restrictions to oil and gas operations within the area of federally leased coal lands. Relocate oil and gas operations outside the area to be mined or located to accommodate room and pillar mining operations. **Grand Junction RMP:** No PPH Acceptable for Coal Leasing. **Kremmling RMP:** No similar action. **Little Snake RMP:** RMP, Map 16; Coal Leasing and Development Restrictions. Underground mining exemption criteria for new leases: ● RMP-40; Unsuitability criteria will apply only to surface coal mining but not to underground mining ● RMP, Map 16 (of the Little Snake RMP); Coal Leasing and Development Restrictions ● RMP, Appendix G-5 (of the Little Snake RMP) Criterion 12 State Resident Fish and Wildlife Federal lands, which the surface management agency and the State jointly agree are fish and wildlife habitat for resident species of high interest to the State, and which are essential for maintaining these priority wildlife species, would be considered unsuitable. Examples of such lands that serve a critical function for the species involved include:

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			• Active dancing and strutting grounds for GRSG, sharp-tailed grouse, and prairie chicken • Winter ranges most critical for deer, antelope, and elk • Migration corridors for elk. A lease may be issued if, after consultation with the State, the surface management agency determines that all or certain stipulated methods of coal mining will not have a significant long-term impact on the species being protected. A large portion of the coal planning area is critical habitat for mule deer, elk, antelope, GRSG, and sharp-tailed grouse. Colorado Division of Wildlife (now CPW) provided maps showing these severe winter ranges, concentration areas, migration routes, and production areas, which are essential to the continued maintenance of these populations. Two townships, T. 8 N., R. 90 and 91 W., are particularly important to mule deer and elk. The Colorado Division of Wildlife (now CPW) has recommended that no more than 10 percent of these townships be leased at one time. Currently, 6,420 acres (or 14 percent) have been leased by the Colorado State Land Board; therefore, no additions for federal leasing should occur, and the remaining 37,960 acres of federal coal lands should be unsuitable. All remaining adverse impacts on critical habitats for mule deer, elk, antelope, GRSG, and sharp-tailed grouse can be mitigated by requiring that the “Wildlife Habitat Replacement Stipulations” be attached to any future leases. Lands found acceptable in this RMP will be available for further consideration for leasing and/or exchange; however, all lands determined suitable, unsuitable, or unacceptable for further consideration for leasing and/or exchange may be reviewed, and suitability determinations may be modified based on new data during activity planning efforts. Unsuitability criteria apply only to surface coal mining-not underground mining. RMP G-1

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			Roan Plateau RMP: No similar action. **White River RMP:** Coal leases are issued through the competitive leasing process. Leasing ' subject to the requirements of 43 CFR 3425 - Leasing on Application. Leasing on application involves the submittal of an application, preparation of an environmental analysis document, a public hearing on the application and consultation with the Governor's Office. The unsuitability criteria will be reapplied at the time an application is received. (p2-8) The acreage identified as unsuitable for further coal leasing based on wildlife issues will be modified with updated wildlife information as coal lease applications are received. Reapplication of the coal unsuitability criteria will be completed in coordination with the Colorado Division of Wildlife. (p2-27) Underground mining exemption criteria for new leases: No similar action. Routt National Forest: No similar action.
Locatable Minerals			
65	Locatable Minerals	(PPH) Recommend withdrawal from mineral entry based on risk to the GRSG and its habitat from conflicting locatable mineral potential and development.	**Colorado River RMP, Grand Junction RMP, Kremmling RMP:** No similar action. **Little Snake RMP:** All public lands are open to mineral entry and development under the General Mining Law of 1872 except the following areas, which will be recommended for withdrawal from mineral location: ● Fly Creek SRMA ● Serviceberry SRMA ● Little Yampa Canyon SRMA

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			• Existing WSAs • All ACECs • Emerald Mountain SRMA (has been withdrawn) • Vermillion Basin **Roan Plateau RMP:** Allow mineral exploration and development activities. All lands would be available for mining claim location. **White River RMP:** BLM lands not withdrawn or segregated from mineral entry under the Mining Law of 1872 are open to mining claim location. (p2-8). Several withdrawals and reserves exist that limit the availability of lands for entry. Of the approximate 1,648,770 acres that could be available for location, 997,450 acres are currently withdrawn or unavailable to some extent. In the current RMP, the coal withdrawal of 1910, closed 366,570 acres to nonmetalliferous minerals only, as does 5,480 acres of Federal Water Reserves, and the oil shale withdrawal closed 625,400 acres to all mining claim location. If the three WSAs that were recommended to be carried forward are designated as wilderness, the Wilderness Act will withdraw those areas from location. This will add 41,250 acres to the lands that are unavailable for location. (p. 2-9). **Routt National Forest:** Mineral and Energy - Locatable Minerals (p. 1-5) Standards For other classified lands not withdrawn from operations under the general mining laws (research natural areas, national recreation areas, special interest areas such as scenic and geologic, national historical sites, and scenic and recreation segments of wild and scenic rivers): 1. Check the status of classified lands, with respect to withdrawal, before an operating plan is approved.

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			2. Provide for reasonable protection of the purposes for which the lands were classified. Reclaim disturbed lands to a condition suitable for the purposes for which the lands were classified. 1. Pursue withdrawals where required.
66	Locatable Minerals	(PPH) Make any existing claims within the withdrawal area subject to validity exams or buy out. Include claims that have been subsequently determined to be null and void in the proposed withdrawal.	Regulatory Requirement: CFR 3809.100 Routt National Forest: No similar action.
67	Locatable Minerals	(PPH) In plans of operations required prior to any proposed surface disturbing activities, include the following: ● Additional effective mitigation in perpetuity for conservation (in accordance with existing policy, WO IM 2008-204). For example, purchase private land and mineral rights or severed subsurface mineral rights within the priority area and deed to US Government. ● Consider seasonal restrictions if deemed effective	Grand Junction RMP, Kremmling RMP, Little Snake RMP, Routt National Forest: No similar action. **Colorado River RMP:** Allowable Use: **STIPULATION** GS-TL-3: *GRSG Winter and Nesting Habitat.* Prohibit surface occupancy and surface-disturbing activities during certain timeframes in grouse crucial winter habitat and nesting habitat (includes GRSG). GRSG nesting habitat is described as sagebrush stands with sagebrush plants between 30 and 100 centimeters (approximately 12 and 40 inches) in height and a mean canopy cover between 15 and 40 percent within a 2-mile radius of an active lek. Winter habitat: December 16 to March 15. Nesting habitat: March 1 to June 30. **Roan Plateau RMP:** Goal: Prevent the need for listing of proposed, candidate and sensitive species under the ESA and improve the condition of special status species and their habitats to a point where their special status recognition is no longer warranted. Promote recovery of special status species plants that may become listed. Objective: Manage listed, proposed, or candidate threatened or endangered species to comply with the provisions of the ESA and promote their recovery. Manage BLM sensitive and significant plant communities consistent with the Colorado Standards for Public Land

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			Health and with BLM policy on Special Status Species Management (BLM Manual 6840). **White River RMP:** All surface-disturbing activity associated with a mining claim will be subject to the appropriate stipulations identified in Appendix A (of the White River RMP) and the COAs contained in Appendix B (of the White River RMP). (p2-9).
68	Locatable Minerals	(PPH) Where applicable to prevent unnecessary or undue degradation, apply PDFs/RDFs (see this table's PDFs/RDFs for Locatable Minerals and Multiple Program) as mandatory COAs.	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, White River RMP: The range of alternatives is articulated in the specific PDF sections. Routt National Forest: PDFs are not included in Current Management. All PDF listed in Appendix I, Required Design Features, Preferred Design Features, and Suggested Design Features, are required for all action alternatives.
Nonenergy Leasable Minerals			
69	Nonenergy Leasable Minerals	(PPH) Close PPH to nonenergy leasable mineral leasing. This includes not permitting any new leases to expand an existing mine.	Colorado River RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, White River RMP, Routt National Forest: No similar action. Grand Junction RMP: No PPH is Open to nonenergy leasable mineral leasing.
70	Nonenergy Leasable Minerals	(PPH) For existing nonenergy leasable mineral leases, in addition to the solid minerals PDFs/RDFs, follow the same PDFs/RDFs applied to Fluid Minerals when wells are used for solution mining.	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, White River RMP: The range of alternatives is articulated in the specific PDF sections. **Routt National Forest:** PDFs are not included in Current Management. All PDF listed in **Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features, are required for all action alternatives.
Salable Mineral Materials			

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71	Salable Minerals	(PPH) Close PPH to mineral material sales.	Colorado River RMP, Kremmling RMP, Roan Plateau RMP, White River RMP, Routt National Forest: No similar action. **Colorado River RMP:** Disposal of salable minerals/mineral materials on BLM lands would be regulated under 43 CFR 3600 and subject to the stipulations for fluid minerals. **Grand Junction RMP:** Allowable Use: Close 274,300 acres to mineral material disposal (Figure 2-58, Appendix A [of the Grand Junction RMP]): ● Badger Wash hydrologic research area ● Grand Junction municipal watershed ● Jerry Creek Reservoirs ● Baxter/Douglas soil slump hazard area ● Plateau Creek soil slump hazard area ● Elk calving area ● Unaweep Seep ● Pyramid Rock ● Little Book Cliffs Wild Horse Range ● Cultural sites ● Recreation sites and VRM Class II areas ● Areas recommended for wilderness designation ● Utility corridors.

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			Little Snake RMP: RMP-40 "All public lands are open to mineral material development (1,680,820 acres) except the following areas, which will be closed to mineral material sales (257,080 acres): ● WSAs ● Vermillion Basin ● Cedar Mountain SRMA ● Irish Canyon ACEC ● Dinosaur North area (outside the WSA) ● Lookout Mountain area ● Limestone Ridge area ● Little Yampa Canyon SRMA Zone 1 ● Cold Spring Mountain area (outside the WSA) New mineral material sales within fragile soil and water areas will be subject to the performance objectives described under Soil Resources (Section 2.2 [of the Little Snake RMP]).

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72	Salable Minerals	(PPH) Restore salable mineral pits no longer in use to meet GRSG habitat conservation objectives.	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, Routt National Forest: No similar action. **White River RMP:** All disturbed sites shall be promptly reclaimed to the satisfaction of the Area Manager. Reclamation should be implemented concurrent with construction and site operations to the fullest extent possible. Final reclamation actions shall be initiated within 6 months of the termination of operations unless otherwise approved in writing by the Authorized Officer. The goal for rehabilitation of any disturbed area shall be the permanent restoration of original site conditions and productive capability. (COAs pB-17).
Split Estate Minerals			
73	Split Estate Mineral	(PPH) Where the federal government owns the mineral estate and the surface is in nonfederal ownership, apply the conservation measures applied to public lands.	Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, Routt National Forest: No similar action. **Colorado River RMP:** Allowable Use: **STIPULATION** GS-NSO-12: *Threatened or Endangered Species.* Prohibit surface occupancy and surface-disturbing activities on habitat areas for those species listed by the federal or state government as endangered or threatened and for federal proposed or candidate species. Habitat areas include occupied habitat and habitat necessary for the maintenance or recovery of the species. **STIPULATION** GS-TL-3: *GRSG Winter and Nesting Habitat.* Prohibit surface occupancy and surface-disturbing activities during certain timeframes in grouse crucial winter habitat and nesting habitat (includes GRSG). GRSG nesting habitat is described as sagebrush stands with sagebrush plants between 30 and 100 centimeters (approximately 12 and 40 inches) in height and a mean canopy cover between 15 and 40 percent within a 2-mile radius of an active lek. Winter habitat: December 16 to March 15. Nesting habitat: March 1 to June 30.

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			White River RMP: Where applicable, these stipulations would be applied to all surface disturbing activities associated with land use authorizations, permits, and leases issued on BLM administered lands. Private landowner concerns and objectives will be considered before enforcing a stipulation on split estate lands. (pA-1).
74	Split Estate Mineral	(PPH) Where the federal government owns the surface, and the mineral estate is in nonfederal ownership, apply appropriate Fluid Mineral PDFs to surface development.	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, White River RMP, Routt National Forest: No similar action.
Wildfire Suppression, Fuels Management, and Fire Rehabilitation			
Fuels Management		**Objective: Manage the fuels program to avoid GRSG habitat loss and restore damaged habitat.**	**Objective: No similar objective.**
75	Fuels Management	(PPH) Do not reduce sagebrush canopy cover to less than 15 percent (Connelly et al. 2000a; Hagen et al. 2007) unless a fuels management objective requires additional reduction in sagebrush cover to meet strategic protection of GRSG PPH and conserve habitat quality for the species. Closely evaluate the benefits of the fuel breaks against the additional loss of sagebrush cover in the future NEPA process.	Grand Junction RMP, Kremmling RMP, Routt National Forest: No similar action. Colorado River RMP: Use appropriate integrated vegetation treatments (e.g., chemical, mechanical, prescribed fire and natural fire managed for resource benefits, biological) for the control of invasive/noxious weeds. Use of herbicides would be consistent with current local, state, and BLM policy. **Little Snake RMP:** RMP-15 and 23, Goal B – Sustain the integrity of the sagebrush biome to support viable populations of GRSG and other sagebrush obligate species. **Roan Plateau RMP:** Revegetate with native plant species similar in mix and kind to the appropriate reference plant community. The type of cultural material (seeding or planting) used will depend on the attributes of the site and revegetation goals. As needed, utilize a combination of seeding grasses and forbs, and containerized nursery stock shrub and tree planting. Eradicate or control State of Colorado listed noxious weeds and other undesirable plant species within reclaimed areas and, as necessary, adjacent areas.

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			White River RMP: Restore, maintain, or enhance habitat conditions and features conducive to the maintenance or expansion of native GRSG populations. (p2-31) Habitat treatment and management guidelines will be developed during the NEPA planning and analysis of individual project proposals. Guidelines will be integrated within approved project design. GRSG habitat treatment and management objectives will be incorporated into the planning and development of future activity plans. (p2-32) Vegetation manipulations would be irregular in shape, consisting of patches, strips, and fingers that maximize edge effect. (COA, pB-15). Surface occupation and long term conversion or adverse modification of the following GRSG habitats will be avoided: 1. sagebrush stands with ≤ 50 percent canopy and ≤ 30" in height, and ≤2 miles from a lek; 2. sagebrush stands with ≤ 30 percent canopy and ≤ 30" in height >2 miles from a lek on occupied summer ranges; 3. any sagebrush stand on slopes ≤ 20 percent in defined winter concentration areas; and 4. sagebrush stands on slopes ≤ 20 percent showing evidence of winter use. (p. 2-31). **Routt National Forest:** No similar action.

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
76	Fuels Management	(PPH) Apply appropriate seasonal restrictions for implementing fuels management treatments according to the type of seasonal habitats present in a priority area.	**Colorado River RMP, Grand Junction RMP, Kremmling RMP, Roan Plateau RMP:** No similar action. Little Snake RMP: All surface disturbing activities will avoid nesting and early brood-rearing habitat with the 4-mile radius of a lek between March 1 and June 30. Section 2.6/RMP-24, Appendix B-13 (of the Little Snake RMP). **White River RMP:** COAs will be attached, as appropriate, to help mitigate the site specific impacts of an authorization. (p1-2) GRSG Nesting Habitat. This area encompasses suitable GRSG nesting habitat associated with individual leks. This stipulation will not take effect until direct and indirect impacts to suitable nesting cover exceeds 10 percent of the habitat available within 2 miles of identified leks. Further development, after this threshold has been exceeded, will not be allowed from April 15 through July 7. (Development can occur until 10 percent of the habitat associated with a lek is impacted, from then on, additional activity can occur from July 8 through April 14.) (pA-18). GRSG Winter Concentration Areas. This area encompasses sagebrush habitats that are occupied by wintering concentrations of GRSG, or represent the only habitats that remain available for use during periods of heavy snowpack. No development activity will be allowed between December 16 and March 15. The Colorado Division of Wildlife (now CPW) has indicated that these features exist on public lands within the White River Resource Area but have not yet delineated specific areas that will be subject to this timing restriction. (pA-21) **Routt National Forest:** Threatened, Endangered, Sensitive Species, and Wildlife Standards (p. 1-14). 4. In areas where tall dense cover is desired for ground-nesting birds, retain adequate residual cover from previous growing seasons since some species begin nesting in April and May before spring growth.

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			5. Some bird species prefer to nest in undisturbed cover. In areas where these species are a primary consideration, manage livestock grazing to avoid adverse impacts to nesting habitat. 8. Manage activities to avoid disturbance to sensitive species which would result in a trend toward federal listing or loss of population viability. The protection will vary depending on the species, potential for disturbance, topography, location of important habitat components, and other pertinent factors. Give special attention during breeding, young rearing, and other times which are critical to survival of both flora and fauna. 9. Avoid disturbing threatened, endangered, and proposed species (both flora and fauna) during breeding, young rearing, or at other times critical to survival by closing areas to activities. Exceptions may occur when individuals are adapted to human activity, or the activities are not considered a threat.
77	Fuels Management	(PPH) Allow no treatments in known winter range unless the treatments are designed to strategically reduce wildfire risk around or in the winter range and will maintain winter range habitat quality.	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, Routt National Forest: No similar action. White River RMP: GRSG Winter Concentration Areas. This area encompasses sagebrush habitats that are occupied by wintering concentrations of GRSG, or represent the only habitats that remain available for use during periods of heavy snowpack. No development activity will be allowed between December 16 and March 15. The Colorado Division of Wildlife (now CPW) has indicated that these features exist on public lands within the White River Resource Area but have not yet delineated specific areas that will be subject to this timing restriction. (p. A-21).

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78	Fuels Management	(PPH) Do not use fire to treat sagebrush in less than 12-inch precipitation zones (e.g., Wyoming big sagebrush or other xeric sagebrush species) (Connelly et al. 2000a; Hagen et al. 2007; Beck et al. 2009). However, if as a last resort and after all other treatment opportunities have been explored, and site specific variables allow, the use of prescribed fire for fuels breaks that would disrupt fuel continuity or enhance land health could be considered where cheatgrass is a very minor component in the understory (Brown 1982).	**Colorado River RMP, Grand Junction RMP, Kremmling RMP:** No similar action. Little Snake RMP: All surface disturbing activities will avoid nesting and early brood-rearing habitat with the 4-mile radius of a lek between March 1 and June 30. Section 2.6/RMP-24, Appendix B-13 (of the Little Snake RMP). **White River RMP:** COAs will be attached, as appropriate, to help mitigate the site specific impacts of an authorization. (p1-2) GRSG Nesting Habitat. This area encompasses suitable GRSG nesting habitat associated with individual leks. This stipulation will not take effect until direct and indirect impacts to suitable nesting cover exceeds 10 percent of the habitat available within 2 miles of identified leks. Further development, after this threshold has been exceeded, will not be allowed from April 15 through July 7. (Development can occur until 10 percent of the habitat associated with a lek is impacted, from then on, additional activity can occur from July 8 through April 14.) (pA-18). GRSG Winter Concentration Areas. This area encompasses sagebrush habitats that are occupied by wintering concentrations of GRSG, or represent the only habitats that remain available for use during periods of heavy snowpack. No development activity will be allowed between December 16 and March 15. The Colorado Division of Wildlife (now CPW) has indicated that these features exist on public lands within the White River Resource Area but have not yet delineated specific areas that will be subject to this timing restriction. (pA-21) **Routt National Forest:** Threatened, Endangered, Sensitive Species, and Wildlife Standards (p. 1-14). 4. In areas where tall dense cover is desired for ground-nesting birds, retain adequate residual cover from previous growing seasons since some species begin nesting in April and May before spring growth.

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			5. Some bird species prefer to nest in undisturbed cover. In areas where these species are a primary consideration, manage livestock grazing to avoid adverse impacts to nesting habitat. 8. Manage activities to avoid disturbance to sensitive species which would result in a trend toward federal listing or loss of population viability. The protection will vary depending on the species, potential for disturbance, topography, location of important habitat components, and other pertinent factors. Give special attention during breeding, young rearing, and other times which are critical to survival of both flora and fauna. 9. Avoid disturbing threatened, endangered, and proposed species (both flora and fauna) during breeding, young rearing, or at other times critical to survival by closing areas to activities. Exceptions may occur when individuals are adapted to human activity, or the activities are not considered a threat.
79	Fuels Management	(PPH) Monitor and control invasive vegetation post-treatment.	Grand Junction RMP, Kremmling RMP: No similar action. **Colorado River RMP:** Hold project proponents, including livestock operators, ROWs holders, and other permittees deemed necessary by the Authorized Officer, responsible for monitoring and controlling noxious weeds that result from any new facilities, improvements or other surface disturbances authorized on BLM land (e.g. roads, communication sites, pipelines, stock ponds, fences). Little Snake RMP: Monitor, prioritize, and treat noxious weeds. Section 2.4/RMP-16. **Roan Plateau RMP:** For activities creating a surface disturbance larger than 1 acre, require a weed management plan which would emphasize and detail prevention, inventory, detection, eradication, and monitoring efforts, corrective measures, and other weed control actions. ● Require weed free seed for reclamation activities.

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			• Require the use of weed free hay and feed for livestock. • Require weed control actions for all disturbances, including hose less than 1 acre in size. • Require prompt reclamation of all disturbed areas with native species. **White River RMP:** In accordance with the White River Resource Area Noxious Weed Management Plan, manage noxious weeds with particular emphasis on a coordinated, cooperative approach. Implement practices that prevent or reduce the extent and occurrence of noxious and problem weeds throughout the Resource Area. (p2-14) Three contiguous areas encompassing 497,900 acres will be designated as weed free zones upon approval of this document (see Map 2-8 [of the White River RMP]). Weed management will be emphasized in these areas through cooperation with private land owners and state and county governments. The areas will, be identified on the ground with signs. The following special conditions will be attached to use authorizations approved within these areas: 1. All construction equipment and vehicles will be cleaned prior to entering BLM Weed Free Zones. 2. All hay, straw, unprocessed feed, and seed used in BLM Weed Free Zones must be certified free of specified noxious weeds listed in Colorado Weed Free Forage Certification standards. 3. All authorized users of disturbed areas will be required to inventory for noxious weeds in both the spring and fall. (p2-14). **Routt National Forest:** Undesirable Species (p. 1-16) Standards

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			1. Control nonnative and noxious plants throughout the Forest, with priority given to designated wilderness. 2. Use only certified noxious weed free hay, seed, straw, or other materials for feed or revegetation projects on the Forest. Guidelines 1. Develop a noxious weed and pest management program that addresses awareness, prevention, inventory, planning, treatment, monitoring, reporting, and management objectives. Priorities for implementing a program for undesirable plants include: a. New invaders. b. New areas. c. Spreading or expanding infestations. d. Existing infestations.
80	Fuels Management	(PPH) Rest treated areas from grazing for two full growing seasons unless vegetation recovery dictates otherwise (Wyoming Game and Fish Department 2011).	Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, Routt National Forest: No similar action. Colorado River RMP: Prohibit livestock grazing on all seeded areas for two growing seasons. **White River RMP:** Areas proposed for vegetation manipulation would not be grazed by livestock until understory vegetation becomes well established and is able to support livestock grazing. A minimum of two complete growing seasons of rest from livestock grazing would be required to help ensure desirable vegetation regains vigor. (COA, pB-15).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
81	Fuels Management	(PPH) Require use of native plant seeds for fuels management treatment based on availability, adaptation (site potential), probability for success (Richards et al. 1998). Where probability of success or native seed availability is low, nonnative seeds may be used as long as they meet GRSG habitat objectives (Pyke 2011).	Colorado River RMP, Grand Junction RMP, Kremmling RMP: No similar action. **Little Snake RMP:** Use reclamation seed mixes, consisting of native bunchgrasses, forbs, and subspecies of big sagebrush, that are appropriate for the disturbed site and its potential. Section 2.6/RMP-24 Goal E: Maintain or improve the integrity of streams and their associated riparian values. Section 2.4/RMP-15 (of the Little Snake RMP). **Roan Plateau RMP:** Revegetate with native plant species similar in mix and kind to the appropriate reference plant community. The type of cultural material (seeding or planting) used will depend on the attributes of the site and revegetation goals. As needed, utilize a combination of seeding grasses and forbs, and containerized nursery stock shrub and tree planting. **White River RMP:** Only native plant species will be used for reseeding of disturbed areas within the Blue Mountain/Moosehead geographic reference area (G-1), within WSAs, and within designated ACECs. Native plant species will be encouraged in the remainder of the resource area for reseeding disturbed areas that are not threatened by establishment of exotic or noxious plant species. Naturalized plant species will be allowed for reseeding on "at risk" and "unhealthy" rangelands and grazeable woodlands. (p2-11). Routt National Forest: Use genetically local (at the subsection level), native plant species for revegetation efforts where technically and economically feasible. Use weed-free seed mixtures. While native perennials are becoming established, nonnative annuals or sterile perennial species may be used to prevent soil erosion (Biological Diversity Standard p. 1-8).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
82	Fuels Management	(PPH) Design post fuels management to ensure long term persistence of seeded or pre-burn native plants. This may require temporary or long-term changes in livestock grazing, wild horse and burro, and travel management, etc., to achieve and maintain the desired condition of ESR projects to benefit GRSG (Eiswerth and Shonkwiler 2006).	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, Routt National Forest: No similar action. **White River RMP:** Areas proposed for vegetation manipulation would not be grazed by livestock until understory vegetation becomes well established and is able to support livestock grazing. A minimum of two complete growing seasons of rest from livestock grazing would be required to help ensure desirable vegetation regains vigor. (COA, pB-15).
83	Fuels Management	(PPH) Design fuels management projects in PPH to strategically and effectively reduce wildfire threats in the greatest area. This may require fuels treatments implemented in a more linear versus block design (Launchbaugh et al. 2007).	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Roan Plateau RMP, White River RMP, Routt National Forest: No similar action. Little Snake RMP: Section 2.8/RMP-27; Goal A: Give first priority to protection of life or property. Identify and reduce hazardous fuels with an emphasis on urban-interface areas.
84	Fuels Management	(PPH) During fuels management project design, consider the utility of using livestock to strategically reduce fine fuels (Diamond at al. 2009), and implement grazing management that will accomplish this objective (Davies et al. 2011; Launchbaugh et al 2007). Consult with ecologists to minimize impacts to native perennial grasses consistent with the objectives and conservation measures of the grazing section.	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Roan Plateau RMP: No similar action. Little Snake RMP: Work with the Northwest Colorado Sage-Grouse working group to identify, maintain, and treat vegetation. Creation of functional blocks of sagebrush as GRSG habitat will be emphasized. Section 2.4/RMP-16. Goal B: Sustain the integrity of the sagebrush biome in order to support viable populations of GRSG. Section 2.4/RMP-15 (of the Little Snake RMP). White River RMP: Suitable GRSG habitats (see Map 2-16 [of the White River RMP]) will be enhanced by manipulating suboptimal sagebrush stands, or converting stands with undesirable composition to suitable cover types. (p2-31) **Routt National Forest:** Threatened, Endangered, Sensitive Species, and Wildlife Standards (p. 1-14).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
			4. In areas where tall dense cover is desired for ground-nesting birds, retain adequate residual cover from previous growing seasons since some species begin nesting in April and May before spring growth. 5. Some bird species prefer to nest in undisturbed cover. In areas where these species are a primary consideration, manage livestock grazing to avoid adverse impacts to nesting habitat.
Fire Operations		**Objective: Manage fire to maintain and enhance large blocks of contiguous sagebrush.**	**Objective: No similar objective.**
85	Fire Operations	(PPH) In GRSG PPH areas, prioritize suppression, immediately after life and property, to conserve the habitat.	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, Routt National Forest: No similar action. **White River RMP:** Develop suppression priorities; identify management restrictions, and determining appropriate fire suppression strategies. Utilize prescribed fire, both natural and management ignited, to protect, maintain and enhance ecosystems, economic values, and multiple use resource management programs. No wildfire situation will require the unnecessary exposure of firefighters and equipment to dangerous situations. (p. 2-55).
86	Fire Operations	(PGH) In PGH, prioritize suppression where wildfires threaten GRSG PPH.	**Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, Routt National Forest:** No similar action. **White River RMP:** Develop suppression priorities; identify management restrictions, and determining appropriate fire suppression strategies. Utilize prescribed fire, both natural and management ignited, to protect, maintain and enhance ecosystems, economic values, and multiple use resource management programs. No wildfire situation will require the unnecessary exposure of firefighters and equipment to dangerous situations. (p. 2-55).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
Emergency Stabilization and Rehabilitation (ESR)		**Objective: Use ESR to address post-wildfire threats to GRSG habitat.**	**Objective: No similar objective.**
87	ESR	(ADH) Prioritize native seed allocation for use in GRSG habitat in years when preferred native seed is in short supply. This may require reallocation of native seed from ESR (BLM) and/or Burn Area Emergency Rehabilitation (USFS) projects outside of GRSG PPH to those inside it. Use of native plant seeds for ESR or Burn Area Emergency Rehabilitation seedings is required based on availability, adaptation (site potential), and probability of success (Richards et al. 1998). Where probability of success or native seed availability is low, nonnative seeds may be used as long as they meet GRSG habitat conservation objectives (Pyke 2011). Re-establishment of appropriate sagebrush species/subspecies and important understory plants, relative to site potential, shall be the highest priority for rehabilitation efforts.	Colorado River RMP, Grand Junction RMP, Kremmling RMP: No similar action. **Little Snake RMP:** Use reclamation seed mixes, consisting of native bunchgrasses, forbs, and subspecies of big sagebrush, that are appropriate for the disturbed site and its potential. Section 2.6/RMP-24 (of the Little Snake RMP). **Roan Plateau RMP:** Revegetate with native plant species similar in mix and kind to the appropriate reference plant community. The type of cultural material (seeding or planting) used will depend on the attributes of the site and revegetation goals. As needed, utilize a combination of seeding grasses and forbs, and containerized nursery stock shrub and tree planting. **White River RMP:** Adapted forms of succulent forbs should be included in seed mixes applied to surface disturbances on GRSG brood ranges. Seed mixes will be subject to reseeding conditions established for each GRA and identified in Appendix B (of the White River RMP). Comparable or superior varieties of sagebrush should be established within occupied GRSG ranges in those instances where sagebrush conversion or removal has exceeded 500 acres. The extent and level of reestablishment effort will not exceed 20 percent of converted acreage at mature canopy densities of ≤ 15 percent. (p2-32). **Routt National Forest:** Use genetically local (at the subsection level), native plant species for revegetation efforts where technically and economically feasible. Use weed-free seed mixtures. While native perennials are becoming established, nonnative annuals or sterile perennial species may be used to prevent soil erosion (Biological Diversity Standard, p. 1-8).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
88	ESR	(ADH) Design post ESR and Burn Area Emergency Rehabilitation management to ensure long term persistence of seeded or pre-burn native plants. This may require temporary or long-term changes in livestock grazing, wild horse and burro, and travel management, etc., to achieve and maintain the desired condition of ESR and Burn Area Emergency Rehabilitation projects to benefit GRSG (Eiswerth and Shonkwiler 2006).	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, Routt National Forest: No similar action. **White River RMP:** Areas proposed for vegetation manipulation would not be grazed by livestock until understory vegetation becomes well established and is able to support livestock grazing. A minimum of two complete growing seasons of rest from livestock grazing would be required to help ensure desirable vegetation regains vigor. (COA, pB-15).
89	ESR	(ADH) Consider potential changes in climate (Miller et al. 2011) when proposing restoration seedings when using native plants. Consider collection from the warmer component of the species' current range when selecting native species (Kramer and Havens 2009).	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, White River RMP, Routt National Forest: No similar action.
Habitat Restoration		**Objective: Use habitat restoration as a tool to create and/or maintain landscapes that benefit GRSG.**	**Objective: No similar objective.**
90	Habitat Restoration	(ADH) Prioritize implementation of restoration projects based on environmental variables that improve chances for project success in areas most likely to benefit GRSG (Meinke et al. 2009). Prioritize restoration treatments and monitoring in seasonal habitats that are thought to be limiting GRSG distribution and/or abundance.	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Roan Plateau RMP, Routt National Forest: No similar action. **Little Snake RMP:** Goal C: Identify and initiate restoration and rehabilitation of sagebrush habitat while maintaining a mosaic of canopy cover and seral stages. Section 2.4/RMP-15 (of the Little Snake RMP). White River RMP: Comparable or superior varieties of sagebrush should be established within occupied GRSG ranges in those instances where sagebrush conversion or removal has exceeded 500 acres. The extent and level of reestablishment effort will not exceed 20 percent of converted acreage at mature canopy densities of ≤ 15 percent. (p2-32).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
91	Habitat Restoration	(PPH) Include GRSG habitat parameters as defined by Connelly et al. (2000), Hagen et al. (2007) or if available, State GRSG Conservation plans and appropriate local information in habitat restoration objectives. Make meeting these objectives within GRSG PPH areas a high restoration priority.	Colorado River RMP, Grand Junction RMP, Kremmling RMP, White River RMP, Roan Plateau RMP, Routt National Forest: No similar action. Little Snake RMP: Work with the Northwest Colorado Sage-Grouse working group to identify, maintain, and treat vegetation. Creation of functional blocks of sagebrush as GRSG habitat will be emphasized. Section 2.4/RMP-16 (of the Little Snake RMP).
92	Habitat Restoration	(PPH) Require the use of native seeds for restoration based on availability, adaption (ecological site potential, and probability of success (Richards et al. 1998). Where probability of success or adapted seed availability is low, nonnative seeds may be used as long as they support GRSG habitat objectives.	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Routt National Forest: No similar action. **Little Snake RMP:** Use reclamation seed mixes, consisting of native bunchgrasses, forbs, and subspecies of big sagebrush, that are appropriate for the disturbed site and its potential. Section 2.6/RMP-24 (of the Little Snake RMP). **Roan Plateau RMP:** Revegetate with native plant species similar in mix and kind to the appropriate reference plant community. The type of cultural material (seeding or planting) used will depend on the attributes of the site and revegetation goals. As needed, utilize a combination of seeding grasses and forbs, and containerized nursery stock shrub and tree planting. **White River RMP:** Adapted forms of succulent forbs should be included in seed mixes applied to surface disturbances on GRSG brood ranges. Seed mixes will be subject to reseeding conditions established for each GRA and identified in Appendix B (of the White River RMP). Comparable or superior varieties of sagebrush should be established within occupied GRSG ranges in those instances where sagebrush conversion or removal has exceeded 500 acres. The extent and level of reestablishment effort will not exceed 20 percent of converted acreage at mature canopy densities of ≤15 percent. (p2-32).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
93	Habitat Restoration	(PPH) Design post restoration management to ensure long term persistence of seeded or pre-burn native plants. This may require temporary or long term changes in livestock grazing, wild horse and burro, and travel management, etc., to achieve and maintain the desired condition of ESR projects to benefit GRSG (Eiswerth and Shonkwiler 2006).	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, Routt National Forest: No similar action. **White River RMP:** Areas proposed for vegetation manipulation would not be grazed by livestock until understory vegetation becomes well established and is able to support livestock grazing. A minimum of two complete growing seasons of rest from livestock grazing would be required to help ensure desirable vegetation regains vigor. (COA, pB-15).
94	Habitat Restoration	(PPH) Consider potential changes in climate (Miller et al. 2011) when proposing restoration seedings when using native plants. Consider collection from the warmer component of the species' current range when selecting native species (Kramer and Havens 2009).	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, White River RMP, Routt National Forest: No similar action.
95	Habitat Restoration	(ADH) Restore native (or desirable) plants and create landscape patterns which most benefit GRSG.	Colorado River RMP, Grand Junction RMP, Kremmling RMP, Little Snake RMP, Roan Plateau RMP, Routt National Forest: No similar action. **White River RMP:** Vegetation treatment widths should generally not exceed 200 feet. Treatment areas should be interspersed with equal or larger intervals of suitable cover. Cumulative adverse manipulations will not be allowed to exceed 10 percent of suitable nest habitat within 2 miles of a lek. (p. 2-32) Vegetation manipulations would be irregular in shape, consisting of patches, strips, and fingers that maximize edge effect. (COA, p. B-15).

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NTT No.	**Program Area**	**Alternative B**	**Alternative A (No Action / Current Management)**
96	Habitat Restoration	(ADH) Make reestablishment of sagebrush and desirable understory plant cover (relative to ecological site potential) the highest priority for restoration efforts.	**Colorado River Valley RMP, Kremmling RMP, Roan Plateau RMP, Routt National Forest:** No similar action. **Grand Junction RMP:** Maintain patch size of low-elevation sage-brush habitat to restore habitat connectivity and function for sage-brush obligate species. **Little Snake RMP:** Same as Alternative A. **White River RMP:** Comparable or superior varieties of sagebrush should be established within occupied GRSG ranges in those instances where sagebrush conversion or removal has exceeded 500 acres. The extent and level of reestablishment effort would not exceed 20 percent of converted acreage at mature canopy densities of <15 percent. (Table 2-6, #21).
97	Habitat Restoration	(ADH) In fire prone areas where sagebrush seed is required for GRSG habitat restoration, consider establishing seed harvest areas that are managed for seed production (Armstrong 2007) and are a priority for protection from outside disturbances.	Colorado River Valley RMP, Grand Junction RMP, Kremmling RMP: No similar action. Little Snake RMP: Same as Alternative A. White River RMP: Comparable or superior varieties of sagebrush should be established within occupied GRSG ranges in those instances where sagebrush conversion or removal has exceeded 500 acres. The extent and level of reestablishment effort would not exceed 20 percent of converted acreage at mature canopy densities of <15 percent. (Table 2-6, #21). Roan Plateau RMP: Rehabilitate areas plant communities that are not meeting desired range of conditions due to dominance by annual or weedy species, or invasive juniper. Seed mixes would emphasize forage-producing perennials that support livestock production and other commodity values. **Routt National Forest:** In PHA and within 4 miles of an active lek - Reestablish appropriate sagebrush species/subspecies and important understory plants relative to site potential. Identify priority plant species and collect seed of understory plants and sagebrush subspecies important to GRSG.

Table 2.4. Description of Alternatives B, C, and D

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat[1]				
NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
Objective: Maintain and enhance populations and distribution of GRSG by protecting and improving sagebrush habitats and ecosystems that sustain GRSG populations.				
Travel and Transportation		**Objective: Manage travel and transportation to 1) reduce mortality from vehicle collisions, 2) limit change in GRSG behavior, 3) avoid, minimize, and mitigate habitat fragmentation, 4) limit the spread of noxious weeds, and 5) limit disruptive activity associated with human access.**		
1	Travel	(PPH) Limit motorized travel to existing roads, primitive roads, and trails at a minimum.	Same as Alternative B.	Same as Alternative B.
2	Travel	(PPH) Travel management should evaluate the need for permanent or seasonal road or area closures.	Same as Alternative B.	(ADH) Identify seasonal closure areas for GRSG.
3	Travel	(PPH) Complete activity level travel plans within 5 years of the ROD. During activity level planning, where appropriate, designate routes with current administrative/agency purpose or need to administrative access only.	Same as Alternative B.	Same as Alternative B.
4	Travel	(PPH) Limit route construction to realignments of existing designated routes if that realignment has a minimal impact on GRSG habitat, eliminates the need to construct a new road, or is necessary for motorist safety	(ADH) Limit route construction to realignments of existing designated routes if that realignment has a minimal impact on GRSG habitat, eliminates the need to construct a new road, or is necessary for motorist safety. Mitigate any impacts with methods that have been demonstrated to be effective to offset the loss of GRSG habitat.	(PPH) Until completion of the relevant field office travel management plans, limit route construction to routes that will not adversely affect GRSG populations due to habitat loss or disruptive activities.

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
5	Travel	(PPH) Use existing roads or realignments as described above to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then build any new road constructed to the absolute minimum standard necessary, and add the surface disturbance to the total disturbance in the priority area. If that disturbance exceeds 3 percent for that area, then evaluate and implement additional, effective mitigation necessary to offset the resulting loss of GRSG habitat.	Same as Alternative B, using a 4-mile buffer from leks to determine road route.	(PPH) Construct new roads to the appropriate Gold Book standard and add the surface disturbance to the total disturbance in the priority area. If anthropogenic disturbance as defined in **Appendix F**, Disturbance Cap Management, exceeds 5 percent for that Colorado MZ, then make additional, effective mitigation necessary to offset the resulting loss of GRSG habitat. Disturbance Exception Criteria: Where data-based documentation is available to warrant a conclusion that GRSG populations in the applicable Colorado MZ are healthy and stable at objective levels or increasing, and that the development will not adversely affect GRSG populations due to habitat loss or disruptive activities, the authorized officer may authorize disturbance in excess of the 5 percent disturbance cap without requiring additional mitigation. In many cases, this exception will require project proponents to fund studies necessary to secure the "data-based documentation" requirement.
6	Travel	(PPH) Allow no upgrading of existing routes that would change route category (road, primitive road, or trail) or capacity unless the upgrading would have minimal impact on GRSG habitat, is necessary for motorist safety, or eliminates the need to construct a new road.	(ADH) Allow no upgrading of existing routes that would change route category (road, primitive road, or trail) or capacity unless it is necessary for motorist safety, or eliminates the need to construct a new road. Any impacts shall be mitigated with methods that have been demonstrated to be effective to offset the loss of GRSG habitat.	(PPH) Allow upgrades to existing routes after documenting that the upgrade will not adversely affect GRSG populations due to habitat loss or disruptive activities.

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
7	Travel	(PPH) Conduct restoration of roads, primitive roads and trails not designated in travel management plans. This also includes primitive route/roads that were not designated in WSAs and within lands with wilderness characteristics that have been selected for protection in previous LUPs.	Same as Alternative B.	Same as Alternative B.
8	Travel	(PPH) When reseeding roads, primitive roads and trails, use appropriate seed mixes and consider the use of transplanted sagebrush.	(ADH) When reseeding closed roads, primitive roads and trails, use appropriate native seed mixes and require the use of transplanted sagebrush.	Same as Alternative B.
--	Travel	No similar action.	(ADH) Prohibit new road construction within 4 miles of active GRSG leks, and avoid new road construction in occupied GRSG habitat.	No similar action.
Recreation		**Objective: Manage Recreation to avoid activities that 1) disrupt GRSG, 2) fragment GRSG habitat, or 3) spread noxious weeds.**		
9	Recreation	(PPH) Only allow BLM SRPs and USFS Recreation SUAs in PPH that have neutral or beneficial effects to PPH areas.	Same as Alternative B.	(PPH) Allow SRPs that will not adversely affect GRSG populations due to habitat loss or disruptive activities.
--	Recreation	No similar action.	(ADH) Seasonally prohibit camping and other nonmotorized recreation within 4 miles of active GRSG leks.	No similar action.
Lands and Realty Management		**Objective: Manage the Lands and Realty program to avoid, minimize, and mitigate the loss of habitat and habitat connectivity through the authorizations of ROWs, land tenure adjustments, proposed land withdrawals, agreements with partners, and incentive programs.**		
Rights-of-Way (ROW)				

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
10	Lands/ Realty	(PPH) Make GRSG PPH areas exclusion areas for new BLM ROW or USFS SUA permits.	(ADH) Occupied GRSG habitat areas shall be exclusion areas for new ROWs permits.	(PPH) Make GRSG PPH areas avoidance areas for new ROW permits. (PPH) Make priority GRSG habitat areas exclusion areas for large transmission lines (greater than 230 kilovolts, per guidance in BLM Instruction Memorandum 2013-118, Revised Implementation Guidance for the Interagency Transmission Memorandum of Understanding (BLM 2013b). Manage 68,000 acres as avoidance areas for large transmission lines (greater than 230 kilovolts). **GRSG PPH ROW Avoidance, Alternative D.** Areas identified as avoidance areas for new ROWs and for ROWs for large transmission lines (greater than 230 kilovolts) would be required to document that they would not adversely affect GRSG populations due to habitat loss or disruptive activities. Any new projects within PPH would be subject to the 5 percent disturbance cap as described in **Appendix F**, Disturbance Cap Management. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)
		(PPH) Within designated ROW or SUA corridors encumbered by existing ROW or SUA authorizations: new ROWs or SUAs may be collocated only if the entire footprint of the proposed project (including construction and staging), can be completed within the existing disturbance associated with the authorized ROWs or SUAs.	(ADH) Within designated ROW corridors encumbered by existing ROW authorizations: new ROWs may be collocated only if the entire footprint of the proposed project (including construction and staging), can be completed within the existing disturbance associated with the authorized ROWs.	(PPH) New ROWs may be collocated within approved ROW corridors that are encumbered by existing ROW authorizations.

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
		(PPH) Subject to valid existing rights: where new ROWs or SUAs associated with valid existing rights are required, collocate new ROWs or SUAs within existing ROWs or SUAs or where it best minimizes GRSG impacts. Use existing roads, or realignments as described above, to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then build any new road constructed to the absolute minimum standard necessary, and add the surface disturbance to the total disturbance in the priority area. If that disturbance exceeds 3 percent for that area, then evaluate and implement additional effective mitigation to offset the resulting loss of GRSG habitat.	(ADH) Subject to valid existing rights: where new ROWs associated with valid existing rights are required, collocate new ROWs within existing ROWs or where it best minimizes GRSG impacts. Use existing roads, or realignments as described above, to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then build any new road constructed to the absolute minimum standard necessary, and add the surface disturbance to the total disturbance in the priority area. If that disturbance exceeds 3 percent for that area, then make additional mitigation that has been demonstrated to be effective to offset the resulting loss of GRSG habitat.	(PPH) Only issue ROWs after documenting that the ROWs will not adversely affect GRSG populations due to habitat loss or disruptive activities (independent of disturbance cap) except where such limitation would make accessing valid existing rights impracticable. Construct new roads to the appropriate Gold Book standard and add the surface disturbance to the total disturbance in the priority area. If anthropogenic disturbance as defined in **Appendix F**, Disturbance Cap Management, exceeds 5 percent for that Colorado MZ, then make additional, effective mitigation necessary to offset the resulting loss of GRSG habitat. Disturbance Exception Criteria: Where data-based documentation is available to warrant a conclusion that GRSG populations in the applicable Colorado MZ are healthy and stable at objective levels or increasing, and that the development will not adversely affect GRSG populations due to habitat loss or disruptive activities, the authorized officer may authorize disturbance in excess of the 5 percent disturbance cap with additional effective mitigation (i.e., above and beyond the mitigation necessary to ensure that the project remains neutral to GRSG). In many cases, this exception will require project proponents to fund studies necessary to secure the "date-based documentation" requirement.
11	Lands/ Realty	(PPH) Evaluate and take advantage of opportunities to remove, bury, or modify existing power lines within GRSG PPH areas.	Same as Alternative B.	(PPH) Where it is not possible to evaluate new or existing overhead facilities or where existing facilities cannot be removed, buried, or modified, require perch deterrents.

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
12	Lands/ Realty	(PPH) Where existing leases, ROWs or SUAs have had some level of development (road, fence, well, etc.) and are no longer in use, reclaim the site by removing these features and restoring the habitat. *Planning Direction Note:* Relocate existing designated ROW corridors crossing GRSG PPH void of any authorized ROWs, outside of the PPH area. If relocation is not possible, undesignate that entire corridor during the planning process (corridor would no longer exist).	Same as Alternative B.	(PPH) Reclaim and restore ROWs per regulatory requirements (43 CFR 2805.12(i)(1); 43 CFR 2885.11(b)(9)(i)). (PPH) Designate new ROW corridors in GRSG PPH only where there is a compelling reason to do so and location of the corridor within PPH will not adversely affect GRSG populations due to habitat loss or disruptive activities.
13	Lands/ Realty	(PGH) Make PGH areas "avoidance areas" for new ROWs and/or SUAs.	No similar action.	(PGH and C) Same as Alternative B for PGH and linkage/connectivity habitat.
14	Lands/ Realty	(PGH) Where new ROWs or SUAs are necessary in PGH, collocate new ROWs or SUAs within existing ROWs and/or SUAs where possible.	No similar action.	Same as Alternative B.
Land Tenure Adjustment				
15	Lands/ Realty	(PPH) Retain public ownership of GRSG PPH. Consider exceptions where:	(PPH) Retain public ownership of priority GRSG habitat.	Same as Alternative B.
		(PPH) There is mixed ownership, and land exchanges would allow for additional or more contiguous federal ownership patterns within the GRSG PPH area.	No similar action.	Same as Alternative B.
		(PPH) Under GRSG PPH areas with minority federal ownership, include an additional, effective mitigation agreement for any disposal of federal land. As a final preservation measure, consideration should be given to	No similar action.	(PPH) In isolated federal parcels, allow disposal of tracts that are not capable of altering GRSG populations (no leks, etc.).

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
		pursuing a permanent conservation easement.		
16	Lands/ Realty	(PPH) Where suitable conservation actions cannot be achieved, seek to acquire state and private lands with intact subsurface mineral estate by donation, purchase or exchange in order to best conserve, enhance, or restore GRSG habitat.	(ADH) BLM and USFS will strive to acquire important private lands in BLM-designated ACECs and USFS GRSG Special Areas. Acquisition will be prioritized over easements.	(ADH) No similar action, but consider GRSG habitat values in acquisitions. For example: Identify key GRSG habitats on private or state land, adjacent to existing BLM/USFS land, where acquisition and protection by BLM/USFS could substantially benefit the local GRSG population. This could be accomplished via purchase, exchange, or donation to satisfy mitigation requirements.
Proposed Land Withdrawals				
17	Lands/ Realty	(PPH) Propose lands within GRSG PPH areas for mineral withdrawal.	Same as Alternative B.	No similar action.
18	Lands/ Realty	(PPH) In PPH, do not recommend withdrawal proposals not associated with mineral activity unless the land management is consistent with GRSG conservation measures. (For example; in a proposed withdrawal for a military training range buffer area, manage the buffer area with GRSG conservation measures.)	(ADH) Do not approve withdrawal proposals not associated with mineral activity unless the land management is consistent with GRSG conservation measures. (For example, in a proposed withdrawal for a military training range buffer area, manage the buffer area with GRSG conservation measures that have been demonstrated to be effective.)	No similar action.
18a	Lands/ Realty	No similar action.	(ADH) ROWs will be amended to require features that enhance GRSG habitat security. (ADH) Existing designated corridors in BLM ACECs and USFS Special Areas may be accessed for maintenance.	No similar action.
Wind Energy Development				
18b	Wind	No similar action.	(ADH) Do not site wind energy development in occupied GRSG habitat (Jones 2012).	No similar action.
18c	Wind	No similar action.	(ADH) Site wind energy development at least 5 miles from active GRSG leks.	No similar action.

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
Industrial Solar				
18d	Solar	No similar action.	(ADH) Industrial solar projects will be prohibited in ACECs/Zoological Areas and occupied habitats.	No similar action.
Range Management		Objectives: Manage the Range Management program to 1) maintain residual herbaceous cover to reduce predation during nesting, 2) avoid GRSG habitat changes due to herbivory, 3) avoid direct effects of herbivores on GRSG, such as trampling of nests and eggs, 4) avoid altering GRSG behavior due to the presence of herbivores, 5) avoid impacts to GRSG and GRSG behavior from structures associated with grazing management, and 6) maintain and develop agreements with partners that are consistent with before-stated Range Management objectives.		
19	Range	(PPH) Within GRSG PPH, incorporate GRSG habitat objectives and management considerations into all BLM and USFS grazing allotments through Allotment Management Plans or permit renewals and/or USFS Annual Operating Instructions.	Same as Alternative B.	(ADH) Same as Alternative B, except apply to ADH.
20	Range	(ADH) Work cooperatively on integrated ranch planning within GRSG habitat so operations with deeded/BLM and/or USFS allotments can be planned as single units.	Same as Alternative B.	Same as Alternative B.
21	Range	(PPH) Prioritize completion of land health assessments (USFS may use other analyses) and processing grazing permits within GRSG PPH areas. Focus this process on allotments that have the best opportunities for conserving, enhancing or restoring habitat for GRSG. Utilize BLM Ecological Site Descriptions (USFS may use other methods) to conduct land health assessments to determine if standards of range-land health are being met.	Same as Alternative B.	(ADH) Same as Alternative B, but apply to ADH. Consider GRSG habitat requirements in conjunction with all resource values managed by the BLM, and give preference to GRSG habitat unless site specific circumstances warrant an exemption.

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
22	Range	(ADH) Conduct land health assessments that include (at a minimum) indicators and measurements of structure/condition/composition of vegetation specific to achieving GRSG habitat objectives (Doherty et al. 2011). If local/state seasonal habitat objectives are not available, use GRSG habitat recommendations from Connelly et al. 2000a and Hagen et al. 2007.	Same as Alternative B.	Same as Alternative B.
--	Range	No similar action.	(ADH) Retire grazing allotments within all GRSG habitat.	No similar action.
Implementing Management Actions after Land Health and Habitat Evaluations				
23	Range	(PPH) Develop specific objectives to conserve, enhance or restore PPH based on BLM Ecological Site Descriptions (USFS may use other methods) and assessments (including within wetlands and riparian areas). If an effective grazing system that meets GRSG habitat requirements is not already in place, analyze at least one alternative that conserves, restores or enhances GRSG habitat in the NEPA document prepared for the permit renewal (Doherty et al. 2011b; Williams et al. 2011).	No similar action.	(ADH) Develop specific objectives - through NEPA analysis conducted in accordance with the permit/lease renewal process - to conserve, enhance, or restore GRSG habitat. Base benchmarks on Ecological Site/Range Site Descriptions. When existing on Ecological Site/Range Site Descriptions have not been developed, or are too general to serve adequately as benchmarks, identify and document local reference sites for areas of similar potential that exemplify achievement of GRSG habitat objectives and use these sites as the benchmark reference. Establish measurable objectives related to GRSG habitat from baseline monitoring data, ecological site descriptions, or land health assessments/evaluations.
24	Range	(ADH) Manage for vegetation composition and structure consistent with ecological site potential and within the reference state to achieve GRSG seasonal habitat objectives.	(ADH) Manage for vegetation composition and structure consistent with ecological site potential and within the reference state to achieve GRSG habitat objectives.	(ADH) Manage for vegetation composition and structure consistent with ecological site potential and within the reference state subject to successional stage objectives.

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
25	Range	(ADH) Implement management actions (grazing decisions, Annual Operating Instructions [USFS only], Allotment Management Plan/Conservation Plan development, or other agreements) to modify grazing management to meet seasonal GRSG habitat requirements (Connelly et al. 2011). Consider singly, or in combination, changes in: 1. Season or timing of use; 2. Numbers of livestock (includes temporary non-use or livestock removal); 3. Distribution of livestock use; 4. Intensity of use; and 5. Type of livestock (e.g., cattle, sheep, horses, llamas, alpacas and goats) (Briske et al. 2011).	(ADH) Implement management actions (grazing decisions, Allotment Management Plan/Conservation Plan development, or other plans or agreements) to modify grazing management to meet seasonal GRSG habitat requirements (Connelly et al. 2011). Consider singly, or in combination, changes in: 1. Season, or timing, and/or frequency of livestock use; 2. Numbers/AUMs of livestock (includes temporary non-use or livestock removal); 3. Distribution of livestock use; 4. Intensity of livestock use; and 5. Type of livestock (e.g., cattle, sheep, horses, llamas, alpacas and goats) (Briske et al. 2011).	(ADH) Include terms and conditions on grazing permits and leases that assure plant growth requirements are met and residual forage remains available for GRSG hiding cover. Specify as necessary: 1. Season or timing of use; 2. Numbers of livestock (include temporary non-use or livestock removal); 3. Distributions of livestock use; 4. Intensity of use (utilization or stubble height objectives); 5. Kind of livestock (e.g., cattle, sheep, horse, llama, alpaca, and goat); 6. Class of livestock (e.g., yearlings versus cow/calf pairs).
26	Range	(PPH) During drought periods, prioritize evaluating effects of the drought in GRSG PPH areas relative to their needs for food and cover. Since there is a lag in vegetation recovery following drought (Thurow and Taylor 1999), ensure that post-drought management allows for vegetation recovery that meets GRSG needs in GRSG PPH areas.	(ADH) During drought periods, prioritize evaluating effects of drought in GRSG habitat areas relative to their biological needs, as well as drought effects on ungrazed reference areas. Since there is a lag in vegetation recovery following drought (Thurow and Taylor 1999), ensure that post-drought management allows for vegetation recovery that meets GRSG needs in GRSG habitat areas based on GRSG habitat objectives.	(ADH) Develop drought contingency plans at the appropriate landscape unit that provide for a consistent/appropriate BLM/USFS response. Plans should establish policy for addressing ongoing drought and post-drought recovery for GRSG habitat objectives.
Riparian Areas and Wet Meadows				

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
27	Range	(PPH) Manage riparian areas and wet meadows for proper functioning condition or other similar methodology (USFS only) within GRSG PPH.	Same as Alternative B.	Same as Alternative B, but apply to ADH.
28	Range	(ADH) Manage wet meadows to maintain a component of perennial forbs with diverse species richness relative to site potential (i.e., reference state) to facilitate brood rearing. Also conserve or enhance these wet meadow complexes to maintain or increase amount of edge and cover within that edge to minimize elevated mortality during the late brood rearing period (Hagen et al. 2007; Kolada et al. 2009; Atamian et al. 2010).	(ADH) Within GRSG habitats, manage wet meadows to maintain a component of perennial forbs with diverse species richness and productivity relative to site potential (i.e., reference state) to facilitate brood rearing. At least 6 inches of stubble height must remain on all riparian/meadow area herbaceous species at all times. Also conserve or enhance these wet meadow complexes to maintain or increase the amount of edge and cover within that edge to minimize elevated mortality during the late brood-rearing period (Hagen et al. 2007; Kolada et al. 2009; Atamian et al. 2010).	(ADH) Within ADH, manage wet meadows to maintain diverse species richness, including a component of perennial forbs, relative to site potential (i.e., reference state).
29	Range	(ADH) Where riparian areas and wet meadows meet proper functioning condition or meet standards using other similar methodology (USFS only), strive to attain reference state vegetation relative to the ecological site description. For example: Within GRSG PPH, reduce hot season grazing on riparian and meadow complexes to promote recovery or maintenance of appropriate vegetation and water quality. Utilize fencing/herding techniques or seasonal use or livestock distribution changes to reduce pressure on riparian or wet meadow vegetation used by GRSG in the hot season (summer) (Aldridge and	Same as Alternative B.	(ADH) Establish permit/lease terms and conditions (Line 19) in conjunction with grazing strategies to ensure that the timing and level of utilization results in wet meadows with diverse species richness, including a component of perennial forbs, relative to site potential (i.e., reference state).

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
		Brigham 2002; Crawford et al. 2004; Hagen et al. 2007).		
30	Range	(PPH) Authorize new water development for diversion from spring or seep source only when GRSG PPH would benefit from the development. This includes developing new water sources for livestock as part of an Allotment Management Plan/Conservation Plan to improve GRSG habitat.	(ADH) Authorize no new water developments for diversion from spring or seep sources within GRSG habitat.	(ADH) Authorize new water development only after determining that the project will not adversely impact GRSG from habitat loss. Ensure that adequate long-term grazing management is in effect before authorizing water developments that may increase levels of use or change season of use. Give specific consideration to adjacent or downstream wetland habitat when a project entails a diversion from a spring or seep.
31	Range	(PPH) Analyze springs, seeps and associated pipelines to determine if modifications are necessary to maintain the continuity of the predevelopment riparian area within GRSG PPH. Make modifications where necessary, considering impacts to other water uses when such considerations are neutral or beneficial to GRSG.	(ADH) Analyze springs, seeps and associated water developments to determine if modifications are necessary to maintain the continuity of the predevelopment riparian area within GRSG habitats. Make modifications where necessary, including dismantling water developments.	(PPH) Analyze springs, seeps and associated pipelines to determine if modifications are necessary to maintain the continuity of the predevelopment riparian area. If necessary to maintain GRSG populations or reverse a downward population trend caused by habitat loss, modify or decommission the project to restore the applicable wetland habitat.
--	Range	No similar action.	(ADH) Avoid grazing and trailing within lekking, nesting, brood-rearing, and winter habitats during periods of the year when these habitats are utilized by GRSG.	No similar action.
Treatments to Increase Forage for Livestock/Wild Ungulates				

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
32	Range	(PPH) Only allow treatments that conserve, enhance or restore GRSG habitat (this includes treatments that benefit livestock as part of an Allotment Management Plan/Conservation Plan to improve GRSG habitat).	(ADH) Ensure that vegetation treatments create landscape patterns which most benefit GRSG. Only allow treatments that are demonstrated to benefit GRSG and retain sagebrush height and cover consistent with GRSG habitat objectives (this includes treatments that benefit livestock as part of an Allotment Management Plan/Conservation Plan to improve GRSG habitat).	(PPH–Sagebrush Ecosites) Retain in sagebrush habitat, for each Colorado MZ, a minimum of 70 percent of the ecological sites capable of supporting 12 percent canopy cover of Wyoming Sagebrush or 15 percent canopy cover of Mountain Sagebrush. Manage for a total disturbance cap of less than 30 percent, to include all loss of sagebrush from all causes including anthropogenic disturbance, wildfire, plowed field agriculture, and vegetation treatments. This cap is applied to PPH that supports sagebrush ecosites in the Colorado MZ. Sites capable of supporting sagebrush habitat will count against the cap until they have recovered to at least 12 percent canopy cover in Wyoming big sagebrush and 15 percent in mountain big sagebrush dominated areas (Bohne et al. 2007). Note: • Only mappable stands of cheatgrass and Pinyon/ Juniper encroachment will count against the disturbance cap. • Irrigated meadows do not count against the cap. • On a site by site basis, independent of cap management issues, do not allow treatments with the potential to adversely affect GRSG populations.

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
33	Range	(PPH) Evaluate the role of existing seedings that are currently composed of primarily introduced perennial grasses in and adjacent to GRSG PPH to determine if they should be restored to sagebrush or habitat of higher quality for GRSG. If these seedings are part of an Allotment Management Plan/ Conservation Plan or if they provide value in conserving or enhancing the rest of the PPH, then no restoration would be necessary. Assess the compatibility of these seedings for GRSG habitat or as a component of a grazing system during the land health assessments (or other analyses [USFS only]) (Davies et al. 2011). For example: Some introduced grass seedings are an integral part of a livestock management plan and reduce grazing pressure in important sagebrush habitats or serve as a strategic fuels management area.	(ADH) Evaluate the role of existing seedings that are currently composed of primarily introduced perennial grasses in and adjacent to GRSG habitat to determine if they should be restored to sagebrush or habitat of higher quality for GRSG. If these seedings provide value in conserving or enhancing GRSG habitats, then no restoration would be necessary. Assess the compatibility of these seedings for GRSG habitat during the land health assessments.	Same as Alternative B.
--	Range	No similar action.	(ADH) Any vegetation treatment plan must include pretreatment data on wildlife and habitat condition, establish non-grazing exclosures, and include long-term monitoring where treated areas are monitored for at least 3 years before grazing returns. Continue monitoring for 5 years after livestock are returned to the area, and compare to treated, ungrazed exclosures, as well as untreated areas.	No similar action.
Structural Range Improvements and Livestock Management Tools				

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
34	Range	(PPH) Design any new structural range improvements and location of supplements (salt or protein blocks) to conserve, enhance, or restore GRSG habitat through an improved grazing management system relative to GRSG objectives. Structural range improvements, in this context, include but are not limited to: cattle guards, fences, exclosures, corrals or other livestock handling structures; pipelines, troughs, storage tanks (including moveable tanks used in livestock water hauling), windmills, ponds/reservoirs, solar panels and spring developments. Potential for invasive species establishment or increase following construction must be considered in the project planning process and monitored and treated post-construction.	(ADH) Avoid all new structural range developments in occupied GRSG habitat unless independent peer-reviewed studies show that the range improvement structure benefits GRSG. Salt and supplement will not be used within occupied habitat. Structural range developments, in this context, include but are not limited to cattle guards, fences, exclosures, corrals or other livestock handling structures; pipelines, troughs, storage tanks (including moveable tanks used in livestock water hauling), windmills, ponds/reservoirs, solar panels and spring developments. Potential for invasive species establishment or increase following construction must be considered in the project planning process and monitored and treated post-construction. Consider the comparative cost of changing grazing management instead of constructing additional range developments.	(ADH) Design new range improvement projects to enhance livestock distribution and to control the timing and intensity of utilization. Examples of structural range improvement projects are cattle guards, fences, corrals, pipelines, troughs, storage tanks, windmills, ponds/reservoirs, solar panels, and spring developments. Include a plan to monitor and control invasive plant species following any related ground disturbance. Place mineral or salt supplements away from water sources and leks in locations that enhance livestock distribution.
35	Range	(PPH) When developing or modifying water developments, use applicable PDFs or RDFs (see this table's PDFs/RDFs) to mitigate potential impacts from West Nile virus (Clark et al. 2006; Doherty 2007; Walker et al. 2007b; Walker and Naugle 2011).	Same as Alternative B.	(PPH) Where conditions create the potential for impacts from West Nile virus, use PDFs/RDFs to mitigate the potential impacts. See this table's PDFs/RDFs.

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
36	Range	(PPH) Evaluate existing structural range improvements and location of supplements (salt or protein blocks) to make sure they conserve, enhance or restore GRSG habitat.	Same as Alternative B.	(PPH) Evaluate existing structural range improvements to determine if modifications are necessary to maintain GRSG populations or reverse a downward population trend caused by habitat loss. Modify or decommission projects as necessary. Place mineral and salt supplements away from water sources and leks in locations that enhance livestock distribution.
37	Range	(PPH) To reduce outright GRSG strikes and mortality, remove, modify or mark fences in high risk areas within GRSG PPH based on proximity to lek, lek size, and topography (Christiansen 2009; Stevens 2011).	(ADH) Remove, modify or mark fences in areas of moderate or high risk of GRSG strikes within GRSG habitat based on proximity to lek, lek size, and topography (Christiansen 2009; Stevens 2011).	(ADH) Mark fences in high risk areas (Christiansen 2009; Stevens 2011). (PPH) Where marking fences does not reduce fence-related GRSG mortality, modify fences. Where modification does not reduce GRSG mortality and the fence-related mortality is sufficient to adversely affect GRSG populations, remove fences.
38	Range	(PPH) Monitor for, and treat invasive species associated with existing range improvements (Gelbard and Belnap 2003; Bergquist et al. 2007).	Same as Alternative B.	Same as Alternative B, but apply to ADH.
--	Range	No similar action.	(ADH) Any vegetation treatment plan must include pretreatment data on wildlife and habitat condition, establish non-grazing exclosures, and include long-term monitoring where treated areas are monitored for at least 3 years before grazing returns. Continue monitoring for 5 years after livestock are returned to the area, and compare to treated, ungrazed exclosures, as well as untreated areas.	No similar action.
Retirement of Grazing Privileges				

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
39	Range	(ADH) Maintain retirement of grazing privileges as an option in priority GRSG areas when the current permittee is willing to retire grazing on all or part of an allotment. Analyze the adverse impacts of no livestock use on wildfire and invasive species threats (Crawford et al. 2004) in evaluating retirement proposals. *Planning direction note:* Each planning effort will identify the specific allotment(s) where retirement of grazing privileges is potentially beneficial.	Same as Alternative B. *Planning direction note:* In each planning process, identify grazing allotments where permanent retirement of grazing privileges would be potentially beneficial to GRSG.	(ADH) When a permittee or lessee voluntarily relinquishes grazing preference, consider conversion of the allotment to a reserve allotment (grass bank) that will remain available for use on a temporary, nonrenewable basis for the benefit of GRSG habitat. Authorize temporary nonrenewal permits in reserve allotments to meet resource objectives elsewhere such as rest or deferment due to fire.
--	Range	No similar action.	(ADH) Encourage partners to monitor effects of retiring grazing permits in GRSG habitat.	No similar action.
Wild Horse Management		**Objective: Manage wild horses in a manner designed to 1) avoid reductions in grass, forb and shrub cover, 2) avoid increasing unpalatable forbes and invasive plants such as cheatgrass.**		
40	Wild Horses	(PPH) Manage wild horse and burro population levels within established appropriate management levels.	Same as Alternative B.	(ADH) Same as Alternative B, except apply to ADH.
41	Wild Horses	(ADH) Prioritize gathers in GRSG PPH, unless removals are necessary in other areas to prevent catastrophic environmental issues, including herd health impacts.	Same as Alternative B.	(ADH) Same as Alternative B, but consider GRSG habitat requirements in conjunction with all resource values managed by the BLM, and give preference to GRSG habitat unless site specific circumstances warrant an exemption.
42	Wild Horses	(PPH) Within PPH, develop or amend BLM HMA Plans and USFS Wild Horse Territory Plans to incorporate GRSG habitat objectives and management considerations for all BLM HMAs and USFS Wild Horse Territories.	Same as Alternative B.	Same as Alternative B. When developing HMA Plans, apply all appropriate conservation measures from the Range program, including, but not limited to utilization of forage and structural range improvements.

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
43	Wild Horses	(PPH) For all BLM HMAs and USFS Wild Horse Territories within GRSG PPH, prioritize the evaluation of all appropriate management levels based on indicators that address structure/condition/composition of vegetation and measurements specific to achieving GRSG habitat objectives.	No similar action.	Same as Alternative B, but consider GRSG habitat requirements in conjunction with all resource values managed by the BLM, and give preference to GRSG habitat unless site-specific circumstances warrant an exemption.
44	Wild Horses	(ADH) Coordinate with other resources (Range, Wildlife, and Riparian) to conduct land health assessments to determine existing structure/condition/composition of vegetation within all BLM HMAs and USFS Wild Horse Territories.	Same as Alternative B.	Same as Alternative B.
45	Wild Horses	(PPH) When conducting NEPA analysis for wild horse and burro management activities, water developments or other rangeland improvements for wild horses in GRSG PPH, address the direct and indirect effects to GRSG populations and habitat. Implement any water developments or rangeland improvements using the criteria identified for domestic livestock identified above in priority habitats.	Same as Alternative B.	Same as Alternative B.
Fluid Minerals Management		Objective: Manage fluid minerals to avoid, minimize, and mitigate 1) direct disturbance, displacement, or mortality of GRSG, 2) direct loss of habitat, or loss of effective habitat through fragmentation, and 3) cumulative landscape-level impacts.		
Unleased Fluid Minerals				

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
46	Fluid Minerals	(PPH) Close GRSG PPH areas to fluid mineral leasing. Upon expiration or termination of existing leases, do not accept nominations/expressions of interest for parcels within priority areas.	(ADH) Close occupied habitat areas to fluid mineral leasing. No new leases or permits will be issued. Upon expiration or termination of existing leases, do not accept nominations/expressions of interest for parcels within occupied habitat.	**GRSG PPH NSO-46d.** Apply NSO stipulation for fluid mineral leasing in PPH. **GRSG ADH NSO-46d.** Apply NSO stipulation for fluid mineral leasing in ADH within a minimum distance of 0.6-mile from active leks. **GRSG ADH TL-46d.** Within ADH, prohibit surface occupancy within a minimum of 4 miles from active leks during lekking, nesting, and early brood rearing. **Ecological Sites that Support Sagebrush in PPH CSU-46d.** Surface disturbance within ecological sites that support sagebrush in PPH would not exceed 5 percent within the corresponding Colorado MZ. See **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations and **Appendix F**, Disturbance Cap Management.
		(PPH) Allow geophysical exploration within GRSG PPH areas to obtain information for existing federal fluid mineral leases or areas adjacent to state or fee lands within GRSG PPH areas. Allow geophysical operations only using helicopter-portable drilling, wheeled or tracked vehicles on existing roads, or other approved methods conducted in accordance with seasonal timing limitations and other restrictions that may apply. Geophysical exploration shall be subject to seasonal restrictions that preclude activities in breeding, nesting, brood-rearing, and winter habitats during their season of use by GRSG.	(ADH) Allow geophysical exploration within occupied GRSG habitat areas to obtain exploratory information for areas outside of and adjacent to occupied GRSG habitat areas. Only allow geophysical operations by helicopter-portable drilling methods and in accordance with seasonal timing restrictions and/or other restrictions that may apply. Geophysical exploration shall be subject to seasonal restrictions that preclude activities in breeding, nesting, brood rearing and winter habitats during their season of use by GRSG.	Same as Alternative B.
Leased Fluid Minerals				

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
47	Fluid Minerals	(PPH) Apply the following conservation measures through LUP implementation decisions (e.g., approval of an Application for Permit to Drill, and Sundry Notice) and upon completion of the environmental record of review (43 CFR 3162.5), include appropriate documentation of compliance with NEPA. In this process evaluate, among other things: 1. Whether the conservation measure is "reasonable" (43 CFR 3101.1-2) with the valid existing rights; and 2. Whether the action is in conformance with the approved LUP. (see row for NTT 49 below)	(ADH) Apply the following conservation measures as COAs at the project and well permitting stages, and through LUP implementation decisions and upon completion of the environmental record of review (43 CFR 3162.5), include appropriate documentation of compliance with NEPA. In this process evaluate, among other things: 1. Whether the conservation measure is "reasonable" (43 CFR 3101.1-2) with the valid existing rights; and 2. Whether the action is in conformance with the approved LUP.	**GRSG PPH COA-47-51d.** Prohibit surface occupancy or disturbance within 4 miles of a lek during lekking, nesting, and early brood rearing. **GRSG Ecological Sites that Support Sagebrush in PPH COA-47-51d.** Limit permitted disturbances to 5 percent in any Colorado MZ. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)
48	Fluid Minerals	(PPH) Provide the following conservation measures as terms and conditions on an approved LUP: (see row for NTT 49 below)	Same as Alternative B.	**GRSG PPH COA-47-51d.** Prohibit surface occupancy or disturbance within 4 miles of a lek during lekking, nesting, and early brood rearing. **GRSG Ecological Sites that Support Sagebrush in PPH COA-47-51d.** Limit permitted disturbances to 5 percent in any Colorado MZ. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
49	Fluid Minerals	**GRSG PPH COA-47-51b/c.** The operator/lessee is required to conduct site-specific review of proposed projects prior to approval of Applications for Permit to drill. For leases within PPH, the following COAs would apply: ● Preclude new surface occupancy on existing leases within PPH. ● If the lease is entirely within PPH, do not allow surface occupancy of any portion within 4 miles around the lek and limit permitted disturbances to one per section with no more than 3 percent surface disturbance in that section. ● If the entire lease is within the 4-mile lek perimeter, limit permitted disturbances to one per section with no more than 3 percent surface disturbance in that section. Require any development to be placed at the most distal part of the lease from the lek, or depending on topography and other habitat aspects, in an area that is demonstrably less harmful to GRSG, such as based on topography or vegetation. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)	Same as Alternative B.	**GRSG PPH COA-47-51d.** Prohibit surface occupancy or disturbance within 4 miles of a lek during lekking, nesting, and early brood rearing. **GRSG Ecological Sites that Support Sagebrush in PPH COA-47-51d.** Limit permitted disturbances to 5 percent in any Colorado MZ. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
50	Fluid Minerals	**GRSG PPH COA-47-51b/c.** The operator/lessee is required to conduct site-specific review of proposed projects prior to approval of Applications for Permit to drill. For leases within PPH, the following COAs would apply: ● Preclude new surface occupancy on existing leases within PPH. ● If the lease is entirely within PPH, do not allow surface occupancy of any portion within 4 miles around the lek and limit permitted disturbances to one per section with no more than 3 percent surface disturbance in that section. ● If the entire lease is within the 4-mile lek perimeter, limit permitted disturbances to one per section with no more than 3 percent surface disturbance in that section. Require any development to be placed at the most distal part of the lease from the lek, or depending on topography and other habitat aspects, in an area that is demonstrably less harmful to GRSG, such as based on topography or vegetation. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)	Same as Alternative B.	**GRSG PPH COA-47-51d.** Prohibit surface occupancy or disturbance within 4 miles of a lek during lekking, nesting, and early brood rearing. (See **Table 2.5**, Existing Habitat Timing Limitations by Field Office.) **GRSG Ecological Sites that Support Sagebrush in PPH COA-47-51d.** Limit permitted disturbances to 5 percent in any Colorado MZ. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
51	Fluid Minerals	**GRSG PPH COA-47-51b/c.** The operator/lessee is required to conduct site-specific review of proposed projects prior to approval of Applications for Permit to drill. For leases within PPH, the following COAs would apply: ● Preclude new surface occupancy on existing leases within PPH. ● If the lease is entirely within PPH, do not allow surface occupancy of any portion within 4 miles around the lek and limit permitted disturbances to one per section with no more than 3 percent surface disturbance in that section. ● If the entire lease is within the 4-mile lek perimeter, limit permitted disturbances to one per section with no more than 3 percent surface disturbance in that section. Require any development to be placed at the most distal part of the lease from the lek, or depending on topography and other habitat aspects, in an area that is demonstrably less harmful to GRSG, such as based on topography or vegetation. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)	Same as Alternative B.	**GRSG PPH COA-47-51d.** Prohibit surface occupancy or disturbance within 4 miles of a lek during lekking, nesting, and early brood rearing. (See **Table 2.5**, Existing Habitat Timing Limitations by Field Office.) **GRSG Ecological Sites that Support Sagebrush in PPH COA-47-51d.** Limit permitted disturbances to 5 percent in any Colorado MZ. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
52	Fluid Minerals	**GRSG PPH COA-52b/d.** Apply a seasonal restriction on exploratory drilling in PPH to prohibit surface-disturbing activities during the lekking, nesting and early brood-rearing season. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)	**GRSG ADH COA-52c.** Apply a seasonal restriction on exploratory drilling that prohibits surface-disturbing activities during the lekking, nesting, and early brood-rearing season in ADH. This seasonal restriction shall also apply to related activities that are disruptive to GRSG, including vehicle traffic and other human presence. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)	Same as Alternative B.
53	Fluid Minerals	(PPH) BLM/USFS should closely examine the applicability of categorical exclusions in PPH. If extraordinary circumstances review is applicable, the BLM/USFS should determine whether those circumstances exist.	Same as Alternative B.	Same as Alternative B.
54	Fluid Minerals	**GRSG PPH Notice to Lessees-54b/c.** For leases within PPH, complete Master Development Plans in lieu of single-well Applications for Permit to Drill processing for all but wildcat wells. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)	Same as Alternative B.	**GRSG PPH Notice to Lessees-54d.** Within PPH, complete Master Development Plans instead of single-well Applications for Permit to Drill for all but exploratory wells. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)
55	Fluid Minerals	**GRSG PPH COA-55b.** For leases that are not yet developed in PPH, the proposed surface disturbance cannot exceed 3 percent within that Colorado MZ. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)	**GRSG ADH COA-55c.** For leases that are not yet developed in ADH, the purposed surface disturbance cannot exceed 3 percent for that entire Colorado MZ. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)	GRSG PPH COA-55d. For leases that are not yet developed, the proposed surface disturbance cannot exceed 5 percent for ecological sites that support sagebrush in PPH for that Colorado MZ. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
56	Fluid Minerals	(PPH) When necessary, conduct additional, effective mitigation in 1) GRSG PPH areas or-less preferably-2) PGH (dependent upon the area-specific ability to increase GRSG populations).	(ADH) When necessary, conduct additional, effective mitigation in occupied habitat (dependent upon the area-specific ability to increase GRSG populations).	Same as Alternative B.
57	Fluid Minerals	(PPH) Conduct additional, effective mitigation first within the same population area where the impact is realized, and if not possible then conduct mitigation within the same Colorado Management Zone as the impact, per 2006 WAFWA Strategy (p. 2-17).	(ADH) Conduct additional, effective mitigation first within the same population area where the impact is realized, and if not possible then conduct mitigation within the same Colorado Management Zone as the impact, per 2006 WAFWA Strategy (p. 2-17).	Same as Alternative B.
58	Fluid Minerals	**GRSG PPH Notice to Lessees-58b/c.** Require unitization when deemed necessary for proper development and operation of an area to minimize adverse impacts to GRSG. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)	Same as Alternative B.	**GRSG PPH Notice to Lessees-58d**. Encourage unitization within Colorado MZs when necessary for proper development and operation of an area or to facilitate more orderly (i.e., phased and/or clustered) development as a means of minimizing adverse impacts to GRSG. (Refer to **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.)
59	Fluid Minerals	(PPH) Identify areas where acquisitions (including subsurface mineral rights) or conservation easements would benefit GRSG.	Same as Alternative B.	No similar action.

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60	Fluid Minerals	(ADH) For future actions, require a full reclamation bond specific to the site in accordance with 43 CFR 3104.2, 3104.3, and 3104.5. Ensure bonds are sufficient for costs relative to reclamation (Connelly et al. 2000a; Hagen et al. 2007) that would result in full restoration of the lands to the condition it was found prior to disturbance. Base the reclamation costs on the assumption that contractors for the BLM and USFS will perform the work.	Same as Alternative B.	Same as Alternative B.
--	Fluid Minerals	No similar action.	(ADH) Prohibit the construction of evaporation or infiltration reservoirs to hold coalbed methane wastewater.	No similar action.
--	Fluid Minerals	No similar action.	(ADH) Agencies will explore options to amend, cancel, or buy out leases in ACECs/Zoological Areas and occupied habitats.	No similar action.
--	Fluid Minerals	No similar action.	(ADH) Include conditions that require relinquishment of leases/authorizations if doing so will: 1) mitigate the impact of a proposed development, or 2) mitigate the unanticipated impacts of an approved development.	No similar action.
--	Fluid Minerals	No similar action.	(ADH) No waivers will be issued.	No similar action.
--	Fluid Minerals	No similar action.	(ADH) Any oil, gas, geothermal activity will be conducted to maximize avoidance of impacts, based on evolving scientific knowledge of impacts.	No similar action.
61	Fluid Minerals	Where applicable and technically feasible, apply PDFs/RDFs (see this table's Fluid Minerals and Multiple Program sections) as mandatory COAs within GRSG PPH.	The range of alternatives is articulated in the specific PDF/RDF sections.	
Solid Minerals		**Objective: Manage solid mineral programs to avoid, minimize and mitigate adverse impacts to GRSG habitat to the extent practical under the law and BLM/USFS jurisdiction.**		

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Coal				
62	Solid Minerals-Coal	(ADH) Apply minimization of surface-disturbing or disruptive activities (including operations and maintenance) where needed to reduce the impacts of human activities on important seasonal GRSG habitats. Apply these measures during activity level planning. Use additional effective mitigation to offset impacts as appropriate (determined by local options/needs).	Same as Alternative B.	(ADH) *Existing Coal Leases:* During the term of the lease, encourage the lessee to voluntarily follow PDFs (**Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features) to reduce and mitigate any adverse impacts to GRSG.
63	Solid Minerals-Coal	(PPH) *Surface mines*: Find unsuitable all surface mining of coal under the criteria set forth in 43 CFR 3461.5.	Same as Alternative B.	(ADH) *New Surface coal mine Leases:* Apply the requirements of 43 CFR 3461 to determine unsuitability. Find unsuitable all surface mining of coal under the criteria set forth in 43 CFR 3461.5 to ensure that the specific Lek instance or reference is adequately addressed. Where practicable, limit permitted disturbances as defined in **Appendix F**, Disturbance Cap Management, to 5 percent in any Colorado MZ. Where disturbance exceeds 5 percent in any Colorado MZ make additional, effective mitigation necessary to offset the resulting loss of GRSG habitat. Disturbance Cap Exception Criteria: Where data-based documentation is available to warrant a conclusion that GRSG populations in the applicable Colorado GRSG MZ are healthy and stable at objective levels or increasing, and that the development will not adversely affect GRSG populations due to habitat loss or disruptive activities, the authorized officer may authorize disturbance in excess of the 5 percent disturbance cap without requiring additional mitigation. In many cases, this

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				exception will require project proponents to fund studies necessary to secure the "data-based documentation" requirement.
64	Solid Minerals-Coal	(PPH) *Sub-surface Mining:* Grant no new mining leases unless all surface disturbances (appurtenant facilities) are placed outside of the GRSG PPH area. In GRSG PPH areas, place any new appurtenant facilities outside of PPH. Where new appurtenant facilities associated with the existing lease cannot be located outside the GRSG PPH area, collocate new facilities within existing disturbed areas. If this is not possible, then build any new appurtenant facilities to the absolute minimum standard necessary.	Same as Alternative B.	(ADH) *New Underground Coal Mines Leases:* Grant no new mining leases unless all surface disturbances (appurtenant facilities) are placed outside of the GRSG PPH area [see 43 CFR 3461.1 (a) and (b)]. Also see Part 3460: Environment, Subpart 3461: Federal Lands Review: Unsuitability for Mining, 3461.1. Where practicable, limit permitted disturbances as defined in **Appendix F**, Disturbance Cap Management, to 5 percent in any Colorado MZ. Where disturbance exceeds 5 percent in any Colorado MZ make additional, effective mitigation necessary to offset the resulting loss of GRSG habitat. Disturbance Cap Exception Criteria: Where data-based documentation is available to warrant a conclusion that GRSG populations in the applicable Colorado GRSG MZ are healthy and stable at objective levels or increasing, and that the development will not adversely affect GRSG populations due to habitat loss or disruptive activities, the authorized officer may authorize disturbance in excess of the 5 percent disturbance cap without requiring additional mitigation. In many cases, this exception will require project proponents to fund studies necessary to secure the "data-based documentation" requirement.
		No similar action.	No similar action.	(ADH) Underground mining exemption criteria for new leases: 1. Federal lands with coal deposits that would be mined by underground mining methods

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				shall not be assessed as unsuitable where there would be no surface coal mining operations, as defined in 43 CFR 3400.0-5 (mm) of this title, on any lease, if issued. 2. Where underground mining will include surface operations and surface impacts on federal lands to which a criterion applies, the lands shall be assessed as unsuitable unless the surface management agency find that a relevant exception or exemption applies. See 43 CFR 3461.1(b). Where practicable, limit permitted disturbances as defined in **Appendix F**, Disturbance Cap Management, to 5 percent in any Colorado MZ. Where disturbance exceeds 5 percent in any Colorado MZ make additional, effective mitigation necessary to offset the resulting loss of GRSG habitat.
--	Solid Minerals-Coal	No similar action.	No similar action.	(PPH) See 43 CFR 3461.4 (a) and (b) Exploration. Authorized exploration activities may be conducted only if the authorized officer reviews any application for an exploration license on such lands to ensure that any exploration does not harm any value for which the area has been assessed as unsuitable and determines that the exploration will not adversely affect GRSG populations due to habitat loss or disruptive activities or that the impact can be fully mitigated. Where practicable, limit permitted disturbances as defined in **Appendix F**, Disturbance Cap Management, to 5 percent in any Colorado MZ. Where disturbance exceeds 5 percent in any Colorado MZ make additional, effective mitigation necessary to offset the resulting loss of GRSG habitat.

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				Disturbance Cap Exception Criteria: Where data-based documentation is available to warrant a conclusion that GRSG populations in the applicable Colorado GRSG MZ are healthy and stable at objective levels or increasing, and that the development will not adversely affect GRSG populations due to habitat loss or disruptive activities, the authorized officer may authorize disturbance in excess of the 5 percent disturbance cap without requiring additional mitigation. In many cases, this exception will require project proponents to fund studies necessary to secure the "data-based documentation" requirement.
--	Solid Minerals - Coal	No similar action.	No similar action.	(PPH) *Underground mining – lease renewals:* ● Require that all surface mining appurtenant facilities for underground mining be located outside of PPH (unless the lessee establishes that that such location is not technically feasible). ● If surface mining facilities must be located in PPH, require the facilities be located in areas of existing disturbance and to have the smallest footprint possible utilizing design strategies to minimize disturbance such as those identified in the PDF section of this table. ● Apply as conditions of lease renewal all appropriate conservation measures, PDFs, and mitigation designed to avoid, minimize impacts to GRSG.

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				(ADH) *Surface mining – lease renewals/ readjustments:* Apply as conditions of lease renewal all appropriate conservation measures, PDFs, and mitigation designed to avoid, minimize impacts to GRSG.
--	Solid Minerals-Coal	No similar action.	No similar action.	(ADH) Recommend or require as appropriate during all relevant points of the coal leasing and authorization process, minimization of surface-disturbing or disrupting activities (including operations and maintenance) where needed to reduce the impacts of human activities on important seasonal GRSG habitats. Apply these measures during activity level planning (jurisdiction is managed by the State.) The Office of Surface Mining or a delegated State Regulatory authority under the Surface Mining Control and Reclamation Act of 1977authorizes surface disturbance activities of active coal mining operations on federal mineral estate. The BLM/USFS coordinates with the Surface Mining Control and Reclamation Act of 1977regulatory authority in overseeing coal leasing and permitting on federal lands. The resource recovery and protection plan for which BLM/USFS recommends approval to the Secretary integrates the reclamation plan recommended by the Surface Mining Control and Reclamation Act of 1977regulatory authority for active coal mines on federal mineral estate. Approval of coal mining plans on lands containing leased federal coal is reserved to the Secretary of the Interior. 30 CFR 740.4. BLM and USFS issue coal leases and exploration licenses for right of entry to promote development of minerals on federal lands. See the following in regards to BLM exploration: 43 CFR 3461.4. Exploration.

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				States with delegated authority on federal lands from the Office of Surface Mining may have their own GRSG guidance in association with state wildlife agencies and such guidance may differ from state to state.
		No similar action.	No similar action.	(ADH) (a) Assessment of any area as unsuitable for all or certain stipulated methods of coal mining operations pursuant to Section 522 of the Surface Mining Control and Reclamation Act of 1977 (30 USC 1272) and the regulations of this subpart does not prohibit exploration of such area under 43 CFR 3410 and 43 CFR 3480. 43 CFR 3461.4(a)
		No similar action.	No similar action.	(ADH) (b) An application for an exploration license on any lands assessed as unsuitable for all or certain stipulated methods of coal mining shall be reviewed by the BLM/USFS to ensure that exploration does not harm any value for which the area has been assessed as unsuitable. 43 CFR 3461.4(b)
Locatable Minerals				
65	Locatable Minerals	(PPH) Recommend withdrawal from mineral entry based on risk to the GRSG and its habitat from conflicting locatable mineral potential and development.	Same as Alternative B.	No similar action.
66	Locatable Minerals	(PPH) Make any existing claims within the withdrawal area subject to validity exams or buy out. Include claims that have been subsequently determined to be null and void in the proposed withdrawal.	Same as Alternative B.	(PPH) In accordance with 43 CFR 3809.100, require validity exams for mining claims within withdrawn areas.

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67	Locatable Minerals	(PPH) In plans of operations required prior to any proposed surface disturbing activities, include the following: ● Additional effective mitigation in perpetuity for conservation (in accordance with existing policy, BLM Washington Office Instruction Memorandum 2008-204). For example, purchase private land and mineral rights or severed subsurface mineral rights within the priority area and deed to US Government. ● Consider seasonal restrictions if deemed effective	Same as Alternative B.	(PPH) In plans of operations required prior to any proposed surface disturbing activities include as appropriate effective mitigation for conservation in accordance with existing policy (BLM Washington Office Instruction Memorandum 2008-204). (PPH) Apply seasonal restrictions if deemed necessary to prevent unnecessary or undue degradation.
68	Locatable Minerals	(PPH) Where applicable to prevent unnecessary or undue degradation, apply PDFs/RDFs/SDFs (see **Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features) as mandatory COAs.	The range of alternatives is articulated in **Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features.	
Nonenergy Leasable Minerals				
69	Nonenergy Leasable Minerals	(PPH) Close PPH to nonenergy leasable mineral leasing. This includes not permitting any new leases to expand an existing mine.	Same as Alternative B.	(PPH) Consider allowing expansion of existing nonenergy mineral leases. Where practicable, limit permitted disturbances, as defined in **Appendix F**, Disturbance Cap Management, to 5 percent in any Colorado MZ. Where disturbance exceeds 5 percent in any Colorado MZ make additional, effective mitigation necessary to offset the resulting loss of GRSG habitat. Disturbance Cap Exception Criteria: Where data-based documentation is available to warrant a conclusion that GRSG populations in the applicable Colorado GRSG MZ are healthy and stable at objective levels or increasing, and that the development will not adversely

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				affect GRSG populations due to habitat loss or disruptive activities, the authorized officer may authorize disturbance in excess of the 5 percent disturbance cap without requiring additional mitigation. In many cases, this exception will require project proponents to fund studies necessary to secure the "data-based documentation" requirement.
70	Nonenergy Leasable Minerals	(PPH) For existing nonenergy leasable mineral leases, in addition to the solid minerals PDFs/RDFs, follow the same PDFs/RDFs applied to Fluid Minerals when wells are used for solution mining.	The range of alternatives is articulated in **Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features.	
Salable Mineral Materials				
71	Salable Minerals	(PPH) Close PPH to mineral material sales.	Same as Alternative B.	(PPH) Consider allowing existing mineral material sale sites to continue operations. Consider allowing expansion of existing mineral material sales sites. Where practicable, limit permitted disturbances, as defined in **Appendix F**, Disturbance Cap Management, to 5 percent in any Colorado MZ. Where disturbance exceeds 5 percent in any Colorado MZ make additional, effective mitigation necessary to offset the resulting loss of GRSG habitat. Disturbance Cap Exception Criteria: Where data-based documentation is available to warrant a conclusion that GRSG populations in the applicable Colorado GRSG MZ are healthy and stable at objective levels or increasing, and that the development will not adversely affect GRSG populations due to habitat loss or disruptive activities, the authorized officer may authorize disturbance in excess of the 5 percent disturbance cap without requiring additional mitigation. In many cases, this exception will require project proponents to

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				fund studies necessary to secure the "data-based documentation" requirement.
72	Salable Minerals	(PPH) Restore salable mineral pits no longer in use to meet GRSG habitat conservation objectives.	Same as Alternative B.	(ADH) Restore salable mineral pits no longer in use to meet GRSG habitat conservation objectives. Require reclamation/restoration of GRSG habitat as a viable long term goal to improve the GRSG habitat. (See **Appendix G**, Surface Reclamation Plan, for guidelines for reclamation in ecological sites that support sagebrush.)
Mineral Split Estate		**Objective: Utilize federal authority to protect GRSG habitat on split estate lands to the extent provided by law.**		
73	Split Estate Minerals	(PPH) Where the federal government owns the mineral estate and the surface is in nonfederal ownership, apply the conservation measures applied to public lands.	Same as Alternative B.	(PPH) Where the federal government owns the mineral estate and the surface is in nonfederal ownership, apply conservation measures to the developer (lessee) of the mineral as allowable.
74	Split Estate Minerals	(PPH) Where the federal government owns the surface, and the mineral estate is in non-federal ownership, apply appropriate Fluid Mineral PDFs to surface development.	Same as Alternative B.	(PPH) Where the federal government owns the surface, and the mineral estate is in non-federal ownership, apply appropriate PDFs to surface development.
Wildfire Suppression, Fuels Management and Fire Rehabilitation				
Fuels Management		**Objective: Manage the fuels program to avoid GRSG habitat loss and restore damaged habitat.**		
75	Fuels Management	(PPH) Do not reduce sagebrush canopy cover to less than 15 percent (Connelly et al. 2000a; Hagen et al. 2007) unless a fuels management objective requires additional reduction in sagebrush cover to meet strategic protection of GRSG PPH and conserve habitat quality for the species. Closely evaluate the benefits of the fuel breaks against the additional loss of sagebrush cover in the future NEPA process.	(ADH) Design and implement fuels treatments with an emphasis on protecting existing sagebrush ecosystems. Do not reduce sagebrush canopy cover to less than 15 percent (Connelly et al. 2000a; Hagen et al. 2007) unless a fuels management objective requires additional reduction in sagebrush cover to meet strategic protection of occupied GRSG habitat and conserve habitat quality for the species. Closely evaluate the benefits of the fuel break against the additional loss of sagebrush cover in the environmental assessment process.	(PPH) Do not reduce sagebrush canopy cover to less than 15 percent (Connelly et al. 2000a; Hagen et al. 2007) unless a vegetation management objective requires additional reduction in sagebrush cover to meet strategic protection of GRSG PPH and conserve habitat quality for the species.

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76	Fuels Management	(PPH) Apply appropriate seasonal restrictions for implementing fuels management treatments according to the type of seasonal habitats present in a priority area.	(ADH) Apply appropriate seasonal restrictions for implementing fuels management treatments according to the type of seasonal habitats present.	(PPH) Apply appropriate seasonal restrictions for implementing vegetation management treatments according to the type of seasonal habitats present in a Colorado MZ. See **Table 2.5,** Existing Habitat Timing Limitations by Field Office.
77	Fuels Management	(PPH) Allow no treatments in known winter range unless the treatments are designed to strategically reduce wildfire risk around or in the winter range and will maintain winter range habitat quality.	(ADH) Allow no fuels treatments in known winter range unless the treatments are designed to strategically reduce wildfire risk around or in the winter range and will maintain winter range habitat quality.	(ADH) Retain in sagebrush habitat, for each Colorado MZ, a minimum of 70 percent of the ecological sites capable of supporting 12 percent canopy cover of Wyoming Sagebrush or 15 percent canopy cover of Mountain Sagebrush. Manage for a total disturbance cap of less than 30 percent, to include all loss of sagebrush from all causes including anthropogenic disturbance, wildfire, plowed field agriculture, and vegetation treatments. This cap is applied to ADH in the entire Colorado MZ. Sites capable of supporting sagebrush habitat will count against the cap until they have recovered to at least 12 percent canopy cover in Wyoming big sagebrush and 15 percent in mountain big sagebrush dominated areas (Bohne et al., 2007). Note: ● Only mappable stands of cheatgrass and Pinyon/ Juniper encroachment will count against the disturbance cap. ● Irrigated meadows do not count against the cap. ● On a site by site basis, independent of cap management issues, do not allow treatments with the potential to adversely affect GRSG populations.

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
78	Fuels Management	(PPH) Do not use fire to treat sagebrush in less than 12-inch precipitation zones (e.g., Wyoming big sagebrush or other xeric sagebrush species) (Connelly et al. 2000a; Hagen et al. 2007; Beck et al. 2009). However, if as a last resort and after all other treatment opportunities have been explored, and site specific variables allow, the use of prescribed fire for fuels breaks that would disrupt fuel continuity or enhance land health could be considered where cheatgrass is a very minor component in the understory (Brown 1982).	(ADH) Do not use fire to treat sagebrush in less than 12-inch precipitation zones (e.g., Wyoming big sagebrush or other xeric sagebrush species) (Connelly et al. 2000a; Hagen et al. 2007; Beck et al. 2009). However, if as a last resort and after all other treatment opportunities have been explored and site specific variables allow, the use of prescribed fire for fuel breaks that would disrupt the fuel continuity across the landscape could be considered, in stands where cheatgrass is a very minor component in the understory (Brown 1982).	(ADH) Do not use fire to treat sagebrush in less than 12-inch precipitation zones (e.g., Wyoming big sagebrush or other xeric sagebrush species) (Connelly et al. 2000a; Hagen et al. 2007; Beck et al. 2009). However, if as a last resort and after all other treatment opportunities have been explored, and site specific variables allow, the use of prescribed fire or natural ignition fire for fuels breaks that would disrupt fuel continuity or enhance land health could be considered where cheatgrass is a very minor component in the understory (Brown 1982).
79	Fuels Management	(PPH) Monitor and control invasive vegetation post-treatment.	No similar action.	(ADH) Same as Alternative B, except apply to ADH.
80	Fuels Management	(PPH) Rest treated areas from grazing for two full growing seasons unless vegetation recovery dictates otherwise (Wyoming Game and Fish Department 2011).	No similar action.	(ADH) Same as Alternative B, except apply to ADH.
81	Fuels Management	(PPH) Require use of native plant seeds for fuels management treatment based on availability, adaptation (site potential), probability for success (Richards et al. 1998). Where probability of success or native seed availability is low, nonnative seeds may be used as long as they meet GRSG habitat objectives (Pyke 2011).	No similar action.	(ADH) Require use of native plant seeds for vegetation treatments based on availability, adaptation (site potential), probability for success (Richards et al. 1998), and the vegetation management objectives for the area covered by the treatment. Where probability of success or native seed availability is low, use species that meet soil stability and hydrologic function objectives as well as vegetation and GRSG habitat objectives (Pyke 2011).

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat[1]				
NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
82	Fuels Management	(PPH) Design post fuels management to ensure long term persistence of seeded or pre-burn native plants. This may require temporary or long-term changes in livestock grazing, wild horse and burro, and travel management, etc., to achieve and maintain the desired condition of ESR projects to benefit GRSG (Eiswerth and Shonkwiler 2006).	(ADH) Design post fuels management projects to ensure long term persistence of seeded or pre-treatment native plants, including sagebrush. This may require temporary or long-term changes in livestock grazing management, wild horse and burro management, travel management, or other activities to achieve and maintain the desired condition of the fuels management project (Eiswerth and Shonkwiler 2006). Lands will be managed to be in the good or better ecological condition to help minimize adverse impacts of fire. Any fuels treatments will focus on interfaces with human habitation or significant existing disturbances.	Same as Alternative B.
83	Fuels Management	(PPH) Design fuels management projects in PPH to strategically and effectively reduce wildfire threats in the greatest area. This may require fuels treatments implemented in a more linear versus block design (Launchbaugh et al. 2007).	No similar action.	(ADH) Design vegetation treatments in GRSG habitats to strategically facilitate firefighter safety, reduce wildfire threats, and extreme fire behavior. This may involve spatially arranging new vegetation treatments with past treatments, vegetation with fire-resistant serial stages, natural barriers, and roads in order to constrain fire spread and growth. This may require vegetation treatments to be implemented in a more linear versus block design (Launchbaugh et al. 2007).

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat[1]				
NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
84	Fuels Management	(PPH) During fuels management project design, consider the utility of using livestock to strategically reduce fine fuels (Diamond at al. 2009), and implement grazing management that will accomplish this objective (Davies et al. 2011; Launchbaugh et al 2007). Consult with ecologists to minimize impacts to native perennial grasses. consistent with the objectives and conservation measures of the grazing section.	No similar action.	Same as Alternative B, except apply to ADH.
	Fuels Management	No similar action.	(ADH) Lands will be managed to be in the good or better ecological condition to help minimize adverse impacts of fire.	No similar action.
	Fuels Management	No similar action.	(ADH) Any fuels treatments will focus on interfaces with human habitation or significant existing disturbances.	No similar action.
Fire Operations			**Objective: Manage fire to maintain and enhance large blocks of contiguous sagebrush.**	
85	Fire Operations	(PPH) In GRSG PPH areas, prioritize suppression, immediately after life and property, to conserve the habitat. See **Appendix O** GRSG Wildland Fire & Invasive Species Assessment.	Same as Alternative B.	(PPH) Prioritize suppression immediately after firefighter and public safety. Consider GRSG habitat requirements in conjunction with all resource values managed by the BLM and USFS, and give preference to GRSG habitat unless site specific circumstances warrant an exemption. See **Appendix O** GRSG Wildland Fire & Invasive Species Assessment.
86	Fire Operations	(PGH) In PGH, prioritize suppression where wildfires threaten PPH .See **Appendix O** GRSG Wildland Fire & Invasive Species Assessment.	No similar action.	(PGH) Prioritize suppression immediately after firefighter and public safety. Consider GRSG habitat requirements in conjunction with all resource values managed by the BLM and USFS, and give preference to GRSG habitat unless site specific circumstances warrant an exemption. See **Appendix O** GRSG Wildland Fire & Invasive Species Assessment.

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat[1]				
NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
Emergency Stabilization and Rehabilitation (ESR)		**Objective: Use ESR to address post-wildfire threats to GRSG habitat.**		
87	ESR	(ADH) Prioritize native seed allocation for use in GRSG habitat in years when preferred native seed is in short supply. This may require reallocation of native seed from ESR (BLM) and/or Burn Area Emergency Rehabilitation (USFS) projects outside of GRSG PPH to those inside it. Use of native plant seeds for ESR or Burn Area Emergency Rehabilitation seedings is required based on availability, adaptation (site potential), and probability of success Richards et al. 1998). Where probability of success or native seed availability is low, nonnative seeds may be used as long as they meet GRSG habitat conservation objectives (Pyke 2011). Re-establishment of appropriate sagebrush species/subspecies and important understory plants, relative to site potential, shall be the highest priority for rehabilitation efforts.	Same as Alternative B.	(ADH) Require use of native plant seeds for vegetation treatments based on availability, adaptation (site potential), probability for success (Richards et al. 1998), and the vegetation management objectives for the area covered by the treatment. Where attempts to use native seeds have failed, or native seed availability is low, use species that meet soil stability and hydrologic function objectives as well as vegetation and GRSG habitat objectives (Pyke 2011).
88	ESR	(ADH) Design post-fire ESR and Burn Area Emergency Rehabilitation management to ensure long term persistence of seeded or pre-burn native plants. This may require temporary or long-term changes in livestock grazing, wild horse and burro, and travel management, etc., to achieve and maintain the desired condition of ESR and Burn Area Emergency Rehabilitation projects to benefit GRSG (Eiswerth and Shonkwiler 2006).	Same as Alternative B.	Same as Alternative B.

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat[1]				
NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
89	ESR	(ADH) Consider potential changes in climate (Miller et al. 2011) when proposing restoration seedings when using native plants. Consider collection from the warmer component of the species' current range when selecting native species (Kramer and Havens 2009).	Same as Alternative B.	No similar action.
--	ESR	No similar action.	(ADH) Establish and strengthen networks with seed growers to assure availability of native seed for ESR projects.	No similar action.
--	ESR	No similar action.	(ADH) Post fire recovery must include establishing adequately sized exclosures (free of livestock grazing) that can be used to assess recovery.	No similar action.
--	ESR	No similar action.	(ADH) Livestock grazing should be excluded from burned areas until woody and herbaceous plants achieve GRSG habitat objectives.	No similar action.
--	ESR	No similar action.	(ADH) Where burned GRSG habitat cannot be fenced from other unburned habitat, the entire area (i.e., allotment/pasture) should be closed to grazing until recovered.	No similar action.
--	ESR	No similar action.	(ADH) Mowing of grass will be used in any fuel break fuels reduction project (roadsides or other areas).	No similar action.
Habitat Restoration			**Objective: (1) Use habitat restoration as a tool to create and/or maintain landscapes that benefit GRSG; and (2) Use Integrated Vegetation Management to control, suppress, and eradicate, where possible, noxious and invasive species per BLM Handbook H-1740-2.**	

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
90	Habitat Restoration	(ADH) Prioritize implementation of restoration projects based on environmental variables that improve chances for project success in areas most likely to benefit GRSG (Meinke et al. 2009). Prioritize restoration treatments and monitoring in seasonal habitats that are thought to be limiting GRSG distribution and/or abundance.	(ADH) Prioritize implementation of restoration projects based on environmental variables that improve chances for project success in areas most likely to benefit GRSG (Meinke et al. 2009). Prioritize restoration in seasonal habitats that are thought to be limiting GRSG distribution and/or abundance and where factors causing degradation have already been addressed (e.g., changes in livestock management).	(ADH) When planning restoration treatments in GRSG habitat, identify seasonal habitat availability and prioritize treatments in areas that are thought to be limiting GRSG distribution and/or abundance, in accordance with the Prioritization section of the narrative for Alternative D.
91	Habitat Restoration	(PPH) Include GRSG habitat parameters as defined by Connelly et al. (2000b), Hagen et al. (2007) or if available, State GRSG Conservation plans and appropriate local information in habitat restoration objectives. Make meeting these objectives within GRSG PPH areas a high restoration priority.	(ADH) Include GRSG habitat objectives in habitat restoration projects. Make meeting these objectives within occupied GRSG habitat the highest restoration priority.	Same as Alternative B.
92	Habitat Restoration	(PPH) Require the use of native seeds for restoration based on availability, adaption (ecological site potential, and probability of success (Richards et al. 1998). Where probability of success or adapted seed availability is low, nonnative seeds may be used as long as they support GRSG habitat objectives.	Same as Alternative B.	(ADH) Require use of native plant seeds for vegetation treatments based on availability, adaptation (site potential), probability for success (Richards et al. 1998), and the vegetation management objectives for the area covered by the treatment. Where probability of success or native seed availability is low, use species that meet soil stability and hydrologic function objectives as well as vegetation and GRSG habitat objectives (Pyke 2011).

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat[1]				
NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
93	Habitat Restoration	(PPH) Design post restoration management to ensure long term persistence of seeded or pre-burn native plants. This may require temporary or long term changes in livestock grazing, wild horse and burro, and travel management, etc., to achieve and maintain the desired condition of ESR projects to benefit GRSG (Eiswerth and Shonkwiler 2006).	Same as Alternative B.	Same as Alternative B.
94	Habitat Restoration	(PPH) Consider potential changes in climate (Miller et al. 2011) when proposing restoration seedings when using native plants. Consider collection from the warmer component of the species' current range when selecting native species (Kramer and Havens 2009).	Same as Alternative B.	No similar action.
95	Habitat Restoration	(ADH) Restore native (or desirable) plants and create landscape patterns which most benefit GRSG.	(ADH) Exotic seedings will be rehabbed, interseeded, restored to recover sagebrush in areas to expand occupied habitats.	(ADH) Retain in sagebrush habitat, for each Colorado MZ, a minimum of 70 percent of the ecological sites capable of supporting 12 percent canopy cover of Wyoming Sagebrush or 15 percent canopy cover of Mountain Sagebrush. Manage for a total disturbance cap of less than 30 percent, to include all loss of sagebrush from all causes including anthropogenic disturbance, wildfire, plowed field agriculture, and vegetation treatments. This cap is applied to ADH in the entire Colorado MZ. Sites capable of supporting sagebrush habitat will count against the cap until they have recovered to at least 12 percent canopy cover in Wyoming big sagebrush and 15 percent in mountain big sagebrush dominated areas (Bohne et al., 2007). Note:

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NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
				• Only mappable stands of cheatgrass and Pinyon/ Juniper encroachment will count against the disturbance cap. • Irrigated meadows do not count against the cap. • On a site by site basis, independent of cap management issues, do not allow treatments with the potential to adversely affect GRSG populations.
96	Habitat Restoration	(ADH) Make reestablishment of sagebrush and desirable understory plant cover (relative to ecological site potential) the highest priority for restoration efforts.	No similar action.	Same as Alternative B, but consider GRSG habitat requirements in conjunction with all resource values managed by the BLM/USFS, and give preference to GRSG habitat unless site specific circumstances warrant an exemption.
97	Habitat Restoration	(ADH) In fire prone areas where sagebrush seed is required for GRSG habitat restoration, consider establishing seed harvest areas that are managed for seed production (Armstrong 2007) and are a priority for protection from outside disturbances.	Same as Alternative B.	Same as Alternative B. Work with local plant material centers and/or groups to establish seed harvest areas and local seed stocks.
--	Habitat Restoration	No similar action.	(ADH) Composition, function, and structure of native vegetation communities will be consistent with the reference state of the appropriate Ecological Site Description and will provide for healthy, resilient, and recovering GRSG habitat components.	No similar action.
--	Habitat Restoration	No similar action.	(ADH) Avoid sagebrush reduction/treatments to increase livestock or big game forage in occupied habitat and include plans to restore high-quality habitat in areas with invasive species.	No similar action.

(PPH) = Preliminary Priority Habitat, (PGH) = Preliminary General Habitat, (C) = Linkage/Connectivity Habitat, (ADH) = All Designated Habitat[1]				
NTT No.[2]	**Program Area**	**Alternative B**	**Alternative C**	**Alternative D**
--	Habitat Restoration	No similar action.	(ADH) Ensure that soil cover and native herbaceous plants are at their Ecological Site Description potential to help protect against invasive plants.	No similar action.
Areas of Critical Environmental Concern (ACECs)/Zoological Areas				
--	ACECs	No similar action.	(P) Designate all PPH as the Sage-grouse Habitat ACEC/Zoological Area.	No similar action.

[1]All Designated Habitat (ADH) includes Preliminary Priority Habitat (PPH), Preliminary General Habitat (PGH), and Linkage/Connectivity (C) Habitat.

[2]NTT is the "National Technical Team" as it relates to the "Report on National Greater Sage-Grouse Conservation Measures" released on December 21, 2011 (NTT 2011).

The Oil Shale and Tar Sands Programmatic EIS (March 2013) excludes from oil shale leasing all core/preliminary priority GRSG habitat (PPH in Colorado). Note that in Preliminary General Habitat (PGH), the management actions for fluid minerals also pertain to oil shale resources through all alternatives. Decisions for leasable fluid minerals also apply to uranium.

Table 2.5. Existing Habitat Timing Limitations by Field Office

Field Office[1]	Lek Habitat No Surface Occupancy	Nesting/Early Brood-rearing Habitat Timing Limitation	Winter Habitat Timing Limitation
BLM Statewide[2]	0.60-mile radius of lek	March 1 – July 15 (4-mile radius of lek)	December 1 –March 15
Colorado River Valley	0.25-mile radius of lek	March 1 – June 30 (2-mile radius of lek)	December 16 – March 15
Grand Junction	None	None	None
Kremmling	0.25-mile radius of active lek	March 1 – June 30 (2-mile radius of lek)	December 16 – March 15
Little Snake	0.60-mile radius of lek	March 1 – June 30 (4-mile radius of lek)	December 16 – March 15
White River	0.25-mile radius of identified lek	April 15 – July 8 (2-mile radius of lek)	December 16 – March 15
Routt National Forest	None	March 1 – June 30	None
[1]NSO and timing stipulations are taken out of each Field Office's or National Forest's existing LUPs including: Glenwood Springs Resource Area RMP (BLM 1984a); Grand Junction Resource Area RMP (BLM 1987); Kremmling Resource Area RMP (BLM 1984b); Little Snake ROD and Approved RMP (BLM 2011); White River Resource Area RMP (BLM 1997); Routt National Forest Land and Resource Management Plan (USFS1998).			
[2]Statewide NSO and timing stipulations developed to provide consistency throughout BLM Field Offices. State-wide developed NSO and timing stipulations can be applied as a COA through project-specific analysis.			

2.9. Comparison of Alternatives Alleviation of USFWS-Identified Threats

Table 2-6, Comparison of Alleviated Threats by Alternative (in Order of USFWS Importance) (Acres), summarizes the four alternatives by USFWS-identified threat. Acreages cited under Alternative A include all acres currently identified/designated in existing RMPs/LUPAs. There is no identified PPH, PGH, or linkage/connectivity habitat associated with this alternative. Acreage values for Alternatives B, C and D include only identified GRSG habitats classified as PPH, PGH, or linkages/connectivity habitat (ADH).

Table 2.6. Comparison of Alleviated Threats by Alternative (in Order of USFWS Importance) (Acres)

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D
Oil and Gas Development				
Areas closed to fluid mineral leasing	100,200	1,347,400	2,473,000	100,200
Areas open to mineral leasing with NSO stipulation	350,300	0	0	1,315,700
ROW avoidance areas	127,600	127,600	127,6000	930,500
ROW exclusion areas	25,600	930,500	1,702,800	25,6000
Infrastructure				

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D
ROW avoidance areas	127,600	127,600	127,600	930,500
ROW exclusion areas	25,600	930,500	1,702,800	25,600
Avoidance areas for large transmission lines (greater than 230 kilovolts)	0	0	0	67,000
Exclusion areas for large transmission lines (greater than 230 kilovolts)	0	0	0	881,700
Travel management open areas	202,600	202,600	202,600	202,600
Travel management limited areas	1,472,100	921,600	921,600	921,600
Travel management closed areas	52,600	52,600	52,600	52,600
Invasive Species				
Weed control priority areas	Weed infestations are not considered a top threat in Northwest Colorado (see USFWS 2013, pages 48-50).			
Wildfire				
Suppression priority areas	0	930,500	930,500	930,500
Wildfire is not considered a top threat in Northwest Colorado (see USFWS 2013, pages 48-50).				
Grazing				
Areas closed to livestock grazing	0	0	1,702,800	0
Areas available for livestock grazing	1,702,800	1,702,800	0	1,702,800
Wild horse and burro herd areas	199,700	199,700	199,700	199,700
Wild horse and burro HMAs	276,500	276,500	276,500	276,500
Agriculture/Urbanization				
Areas identified for retention	Across all action alternatives, the BLM/USFS would take advantage of opportunities to consolidate GRSG habitat. Although agriculture and urbanization have been identified as threats in Northwest Colorado, the BLM/USFS has limited management authority over those types of activities. The Colorado Department of Natural Resources' Colorado Greater Sage-Grouse Conservation Plan: The Colorado Package (**Appendix N**) identifies those actions included in the conservation strategy in the 2008 Greater Sage Grouse Conservation Plan. The Colorado Department of Natural Resources Package includes a list of those actions (including actions tied to agriculture and urbanization) and their associated responsible parties, implementation and effectiveness to date. The action alternatives are in agreement with the following conservation objectives/options identified in the Conservation Objectives Team Report specific to infrastructure: ● Limit urban and exurban development in GRSG habitats and maintain intact native sagebrush plant communities (objective). ● Acquire and manage GRSG habitat to maintain intact ecosystems (option). See page 4-71 for a complete analysis of land tenure on GRSG.			
Areas identified for disposal				
Areas identified for acquisition				
Disease				
See RDFs and SDFs for a description of features designed to reduce the threat of West Nile Virus (**Appendix H**, Required Design Features, Preferred Design Features, and Suggested Design Features).				
Coal Mining				
Areas identified as unsuitable for coal mining	1,670,800	1,485,200	1,485,200	1,485,200
Areas identified as acceptable for coal mining	1,521,900			
Areas identified as unacceptable for coal mining	610,500			

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D
Weather				
There is no resource program in an RMP for addressing this threat to GRSG and its habitat.				
Predation				
See RDFs and SDFs for Lands and Realty and Minerals for a description of features designed to reduce the threat of predation (**Appendix H**, Required Design Features, Preferred Design Features, and Suggested Design Features).				
Prescribed Fire				
Areas suitable for prescribed fire use	Prescribed fire is not considered a top threat in Northwest Colorado (see USFWS 2013, pages 48-50).			
Areas unsuitable for prescribed fire use	Prescribed fire is not considered a top threat in Northwest Colorado (see USFWS 2013, pages 48-50).			
Human				
ROW avoidance areas	127,600	127,600	127,6000	930,500
ROW exclusion areas	25,600	930,500	1,702,800	25,6000
Areas closed to fluid mineral leasing	100,200	1,347,400	2,473,000	100,200
Areas open to mineral leasing with NSO stipulation	350,300	0	0	1,315,700
Conifer Invasion				
Areas prioritized for vegetation treatments	Areas prioritized for vegetation treatments are not mapped in Northwest Colorado. These areas would be mapped at the site-specific project analysis level.			
Water Development				
Identify number, type, and location of range water developments	The BLM has no way of knowing how many and of what type and location range water developments would be built. West Nile Virus is not considered a top threat to GRSG in Northwest Colorado (see USFWS 2013, pages 48-50).			
Hard Rock Mining				
Areas closed to mineral material disposal	104,200	1,347,400	1,347,400	104,200
Areas open to mineral material disposal	1,588,300	778,100	778,100	1,588,300
Areas closed to nonenergy leasable minerals	11,200	1,347,400	1,347,400	11,200
Areas open to nonenergy leasable minerals	2,258,300	1,027,500	1,027,500	2,258,300
Areas open to locatable mineral exploration or development	2,148,100	945,800	945,800	2,148,100
Hunting				
There is no resource program in an RMP for addressing this threat to GRSG and its habitat.				
Climate Change				
There is no resource program in an RMP for addressing this threat to GRSG and its habitat.				
Contaminants				
There are no management actions in this RMPA for addressing this threat to GRSG and its habitat.				
Source: BLM 2013				

2.10. Resource Management and Monitoring Protocol

A timely, cost-effective, scientifically valid, and publicly accepted approach to monitoring the effectiveness of land management decisions and practices is an integral piece of the Draft EIS. The tables in **Appendix E**, Disturbance Cap Management, represent current disturbance in each Colorado MZ and are based on existing acres as evaluated based on the assumptions for analysis attached to each table. Each alternative would require more-refined, site-specific information in order to implement that alternative.

If the decision on this document includes a cap on disturbance, the BLM would anticipate developing a data management system to track the disturbance caps, similar to other web-based tracking systems developed in Wyoming (e.g., the Jonah Infill data management system). The data management system would be used to inventory, prioritize, and track disturbance data within the decision area, including those projects that cross field office boundaries.

The BLM Land Use Planning Handbook (H-1601-1; BLM 2005a) directs that RMPs should be periodically evaluated (at a minimum of every 5 years). Evaluation is the process of reviewing the RMP and determining whether decisions and NEPA analysis are still valid and whether the RMP is being implemented. Specifically, RMPs are evaluated to determine if: 1) decisions remain relevant to current issues; 2) decisions are effective in achieving (or making progress toward achieving) desired outcomes; 3) any decisions need to be revised; 4) any decisions need to be dropped from further consideration; and 5) any areas require new decisions. Data collected as part of the RMP will help to inform the plan evaluation.

2.10.1. Monitoring for the Greater Sage-grouse Planning Strategy

The BLM's planning regulations, specifically 43 CFR 1610.4-9, require that land use plans establish intervals and standards for monitoring based on the sensitivity of the resource decisions. Land use plan monitoring is the process of tracking the implementation of land use plan decisions (implementation monitoring) and collecting data/information necessary to evaluate the effectiveness of land use plan decisions (effectiveness monitoring). For GRSG, these types of monitoring are also described in the criteria found in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (50 CFR Vol. 68, No. 60). One of the Policy for Evaluation of Conservation Efforts When Making Listing Decisions criteria evaluates whether provisions for monitoring and reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort are provided.

A guiding principle in the BLM National Sage-grouse Conservation Strategy (US Department of the Interior 2004) is that "the Bureau is committed to sage-grouse and sagebrush conservation and will continue to adjust and adapt our National Sage-grouse Strategy as new information, science, and monitoring results evaluate effectiveness over time." In keeping with the WAFWA Sage-grouse Comprehensive Conservation Strategy (Stiver et al. 2006) and the Greater Sage-grouse Conservation Objectives: Final Report (USFWS 2013), the BLM and Forest Service will monitor implementation and effectiveness of conservation measures in GRSG habitats.

On March 5, 2010, USFWS' 12-Month Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered were posted as a Federal Register notice (75 *Federal Register* 13910-14014, March 23, 2010). This notice stated:

"…the information collected by BLM could not be used to make broad generalizations about the status of rangelands and management actions. There was a lack of consistency across the range in how questions were interpreted and answered for the data call, which limited our ability to use the results to understand habitat conditions for sage-grouse on BLM lands."

Standardization of monitoring methods and implementation of a defensible monitoring approach (within and across jurisdictions) will resolve this situation. The BLM, Forest Service, and other conservation partners use the resulting information to guide implementation of conservation activities.

Monitoring strategies for GRSG habitat and populations must be collaborative, as habitat occurs across jurisdictional boundaries (52 percent on BLM-administered lands, 31 percent on private lands, 8 percent on National Forest System lands, 5 percent on state lands, 4 percent on tribal and other federal lands) (75 *Federal Register* 13910, March 23, 2010), and state fish and wildlife agencies have primary responsibility for population level wildlife management, including population monitoring. Therefore, population efforts will continue to be conducted in partnership with state fish and wildlife agencies. The BLM and Forest Service are finalizing a monitoring framework that will be included in the Proposed RMPA/Final EIS. This framework will describe the process that the BLM and Forest Service will use to monitor implementation and effectiveness of RMP/LUP decisions. The monitoring framework will include methods, data standards, and intervals of monitoring at broad and mid scales; consistent indicators to measure and metric descriptions for each of the scales (see Habitat Assessment Framework and Assessment, Inventory, and Monitoring core indicators); analysis and reporting methods; and the incorporation of monitoring results into adaptive management. The need for fine-scale and site-specific habitat monitoring may vary by area depending on existing conditions, habitat variability, threats, and land health. Indicators at the fine and site scales will be consistent with the Habitat Assessment Framework; however, the values for the indicators could be adjusted for regional conditions. The major components of the monitoring framework are in **Appendix M**, Monitoring Framework.

More specifically, the framework will discuss how the BLM and Forest Service will monitor and track implementation and effectiveness of planning decisions (e.g., tracking of waivers, modifications, and site-level actions). The two agencies will monitor the effectiveness of RMP/LUP decisions in meeting management and conservation objectives. Effectiveness monitoring will include monitoring disturbance in habitats, as well as landscape habitat attributes. To monitor habitats, the BLM and Forest Service will measure and track attributes of occupied habitat, priority habitat, and general habitat at the broad scale, and attributes of habitat availability, patch size, connectivity, linkage/connectivity habitat, edge effect, and anthropogenic disturbances at the mid-scale. Disturbance monitoring will measure and track changes in the amount of sagebrush in the landscape and changes in the anthropogenic footprint, including change energy development density. The framework will also include methodology for analysis and reporting for field offices, states, ranger districts, BLM districts, National Forests, and Forest regions, including geospatial and tabular data for disturbance mapping (e.g., geospatial footprint of new permitted disturbances) and management actions effectiveness.

The monitoring data will provide the indicator estimates for adaptive management. The BLM and Forest Service will adjust management decisions through an adaptive management process.

2.10.2. Adaptive Management

Adaptive Management is a decision process that promotes 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. Careful monitoring of these outcomes both advances scientific understanding and helps with adjusting resource management directions as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. On February 1, 2008, the DOI published its Adaptive Management Implementation Policy (522 DM 1). The adaptive management strategy presented within this EIS complies with this policy.

In relation to the BLM/FS's National Greater Sage-grouse Planning Strategy, adaptive management will help identify if sage grouse conservation measures presented in this EIS contain the needed level of certainty for effectiveness. If principles of adaptive management are incorporated into the conservation measure in the plan (to ameliorate threats to a species), then there is a greater likelihood that a conservation measure or plan will be effective in reducing threats to that species. The following provides the BLM/FS adaptive management strategy for the Northwest Colorado subregion.

Adaptive Management and Monitoring

This EIS contains a monitoring framework plan (Appendix J) which includes an effectiveness monitoring component. The agencies intend to use the data collected from the effectiveness monitoring to identify any changes in habitat conditions related to the goals and objectives of the plan and other range-wide conservation strategies (U.S. Department of the Interior 2004; Stiver et al. 2006; U.S. Fish and Wildlife Service 2013). When available from WAFWA and/or state wildlife agencies, information about population trends will be considered with effectiveness monitoring data (taking into consideration the lag effect response of populations to habitat changes [Garton et al. 2011]). The information collected through the Monitoring Framework Plan outlined in Appendix J will be used by the BLM/FS to determine when adaptive management hard and soft triggers (discussed below) are met.

Adaptive Management Plan

The BLM and FS will develop an adaptive management plan to provide certainty that unintended negative impacts to sage grouse will be addressed before consequences become severe or irreversible and to provide regulatory certainty to the FWS that appropriate action will be taken by the BLM and FS. This adaptive management plan will:

- identify science based soft and hard adaptive management triggers applicable to each population or subpopulation within the planning area,
- address how the multiple scale data from the Monitoring Framework Plan (Appendix J) will be used to gauge when adaptive management triggers are met, and
- charter an adaptive management working group to assist with responding to soft adaptive management triggers.

Adaptive Management Triggers

Adaptive management triggers are essential for identifying when potential management changes are needed in order to continue meeting sage grouse conservation objectives. The BLM/FS will use a continuum of trigger points (soft and hard triggers), which will enhance BLM's and FS's ability to effectively manage sage-grouse habitat. The soft and hard triggers that will be delineated in the adaptive management plan will (at a minimum):

- be based upon the best available science,
- tied to the populations/demographics,
- take into account the importance of various seasonal habitat types, and
- not be limited to a single time "window".

Soft triggers indicate when the BLM/FS will consider adjustments to resource/resource use management. An adaptive management working group will help identify the causal factors as to what prompted the soft adaptive management trigger. The group will also provide recommendations to the appropriate BLM/FS authorizing official (decision maker) regarding the applicable management response to address this trigger (e.g. effective mitigation, restoration, reclamation, and in some instances, a land use plan amendment or revision). When organizing the adaptive management working group, the BLM and FS will invite participation from BLM, FS, FWS, local governments, and applicable state fish and game agencies.

Hard triggers indicate when the BLM/FS will take immediate action to stop the continued deviation from conservation objectives. These actions could include one or more of the following (which may require subsequent NEPA:

- Temporary closures (as directed under BLM Instruction Memorandum No. 2013-035),
- Immediate implementation of interim management policies and procedures through the BLM/FS directives system, and
- Initiation of a new LUP Amendment to consider changes to the existing LUP decisions.

Chapter 3. Affected Environment

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3.1. Introduction

This chapter documents the existing conditions and trends of resources in the planning area that may be affected by implementing any of the proposed alternatives described in **Chapter 2**, Alternatives. The affected environment provides the context for assessing the potential impacts described in **Chapter 4**, Environmental Consequences. For this LUPA/EIS, the planning area is the entire Northwest Colorado sub-region, which contains BLM-administered and Forest-Service-administered lands, as described in **Chapter 1**, Introduction.

The planning area is the geographic area within which the BLM and USFS will make decisions during this planning effort. The planning area boundary includes all lands regardless of jurisdiction. Lands addressed in the LUP amendments will be public lands (including split estate lands) managed by the BLM and USFS in GRSG habitats. Any decisions in the LUP amendments will apply only to federal lands administered by *either* the BLM *or* the USFS.

To augment this planning document at a biologically meaningful scale for GRSG, a Baseline Environmental Report (BER) of GRSG was produced by USGS for BLM and USFS (Manier et al. 2013). The BER is a science support document that provides information to put planning units and issues into the context of the larger WAFWA GRSG Management Zones. The BER examines each threat identified in USFWS listing decision published on March 15, 2010. For each threat, the report summarizes the current, scientific understanding of various impacts to GRSG populations and habitats. When available, patterns, thresholds, indicators, metrics, and measured responses that quantify the impacts of each specific threat are reported. Data from the BER are presented throughout this chapter to illuminate the location (e.g., PPH and PGH), magnitude, and extent of the threats within each WAFWA Management Zone that comprises the planning area.

Because the BER focuses on threats to GRSG at the WAFWA Management Zone (or "range-wide") scale, it provides biologically meaningful data for larger-scale analyses, such as the cumulative effects analysis for GRSG in **Chapter 5**, Cumulative Effects.

Chapter 3, Affected Environment, also presents data that are available at a finer scale than used in the BER's larger-scale, WAFWA Management Zone focus. These fine-scale, local data are incorporated into the affected environment discussion to complement the BER's biologically meaningful data, characterize the relative contributions of threats in the planning area versus the WAFWA Management Zones, and to set the stage for the cumulative effects analysis for GRSG (**Chapter 5**, Cumulative Effects). Unless specifically described as WAFWA Management Zone (or referred to as the Wyoming Basin or the Colorado Plateau Management Zone), references to management zones throughout Chapter 3 describe the affected environment in the Colorado MZs in the planning area, as described in **Chapter 1**, Introduction.

Acreage figures and other numbers used are approximate projections; readers should not infer that they reflect exact measurements or precise calculations. Acreages were calculated using GIS technology, and there may be slight variations in total acres between resources.

3.1.1. Organization of Chapter 3

This chapter contains sections describing the biological, physical, cultural, and human resources of the planning area and follows the order of topics addressed as follows:

- Fish and Wildlife

- Special Status Species (GRSG and Other Special Status Species of Issue)
- Lands and Realty
- Vegetation (Forest, Rangelands, Riparian and Wetlands, and Weeds)
- Wildland Fire Ecology and Management
- Minerals - Leasable (Oil and Gas, Oil Shale, Coalbed Natural Gas, Carbon Dioxide, Geothermal Resources, Sodium, Uranium, Coal)
- Minerals - Locatable
- Minerals - Salable
- Travel Management
- Recreation
- Range Management
- Wild Horse and Burro Management
- Special Designations (ACEC, Wilderness Areas, Wilderness Study Areas, Inventoried Roadless Areas, Wild and Scenic Rivers, National Scenic and Historic Trails, Scenic Byways, Watchable Wildlife Areas, Special Interest Areas)
- Water Resources
- Soil Resources
- Air Quality and Climate Change
- Visual Resources
- Lands with Wilderness Characteristics
- Soundscapes
- Cultural Resources
- Paleontological Resources
- Social and Economic Conditions (Including Environmental Justice)

Each resource section in this chapter contains a discussion of existing conditions and trends:

- Existing conditions describe the location, extent, and current condition of the resource in the planning area in general and on BLM-administered and National Forest System lands. Conditions for a resource can vary depending on the resource. The Northwest Colorado sub-region planning area contains approximately 15 million acres, regardless of land status, including approximately 8.5 million acres of public lands managed by the five BLM field offices and the Routt National Forest. Within the Northwest Colorado sub-region planning area, the decision area includes GRSG habitat. In the decision area there are approximately 1.7 million acres of BLM-administered surface lands and approximately 20,000 acres of Routt

National Forest lands (totaling approximately 2.9 million acres of federal mineral estate and surface acres). For each resource, a general description of the existing conditions is provided for the Northwest Colorado sub-region planning area, regardless of land status. This is done to provide a regional context for the resource. Then, a more detailed description of the existing conditions is provided for the BLM-administered and National Forest System lands managed according to the BLM and USFS LUPs being amended by this LUPA/EIS. This is done to provide an area-specific description of the existing conditions for the resource. When possible, greater emphasis is placed on describing the existing conditions of the resource as it pertains to GRSG and their habitat.

- Trends identify the degree and direction of resource change between the present and some point in the past. If there is change, the degree and direction of resource change is characterized as moving toward or away from the current desired condition based on the indicators, and the reasons for the change are identified. Similar to indicators, trends can also be described in quantitative or qualitative terms. Identifying the trends is done to provide an understanding of how BLM and USFS management influences the desired condition of the resource over time. It can be difficult to analyze trends for certain resources, because changes to the resource often occur due to factors beyond the control of the BLM and USFS.

The BLM and USFS reviewed the LUPs being amended under this LUPA/EIS and other relevant information sources (such as LUP amendments, maps, and state GRSG conservation assessments) for existing conditions and trends for the resources listed above with respect to GRSG and their habitat. This affected environment information is summarized below and, where appropriate, noted when the information is incorporated by reference.

3.2. Fish and Wildlife

This section describes the existing conditions of fish and wildlife resources within the planning area, including aquatic and terrestrial animal species and their habitats. The planning area lies within three EPA Level III Ecoregions: Southern Rockies, Wyoming Basin, and Colorado Plateaus. Although CPW and USFWS are directly responsible for the management of fish and wildlife species, the BLM and USFS are responsible for land management. Therefore, on BLM-administered and Routt National Forest lands in the decision area, these agencies are directly responsible for the management of habitat for fish and wildlife species and indirectly responsible for the health of fish and wildlife populations that are supported by these habitats. In addition, the BLM and USFS are mandated by the ESA, the BLM is mandated by BLM Land Use Planning Handbook (BLM 2005), and the USFS is mandated by USFS Manual 2670, to ensure that special status species are protected. This mandate is reinforced through a Memorandum of Agreement with USFWS, USFS, and National Marine Fisheries Service (BLM et al. 2000).

The fish and wildlife habitats present in the planning area are primarily characterized in the soil, water, and vegetation existing conditions discussions in **Sections 3.16**, **3.15**, and **3.5**, respectively. The discussions of aquatic and terrestrial habitat in this section identify attributes of these resources that are particularly important to their role in providing fish and wildlife habitat (**Table 3.1,** Fish and Wildlife Species of Primary Interest in the Planning Area). Special status species are described in **Section 3.3**, Special Status Species.

Table 3.1. Fish and Wildlife Species of Primary Interest in the Planning Area

Species	Rationale for Priority Designation
Birds	
Eagles (bald and golden)	High interest, protected by law, apex predators
Other raptors (prairie falcon, red-tailed hawk, goshawk, owls)	High interest, protected by law, apex predators
Upland game birds (GRSG)	Economic and recreational value
Great blue heron	Protected by law, uses concentrated nesting areas
Ducks, geese, and other waterfowl	Economic and recreational value
Migratory birds	High interest, protected by law
Mammals	
Elk	High interest, economic and recreational value
Mule deer	High economic and recreational value
Pronghorn antelope	High economic and recreational value
Bighorn sheep	High economic and recreational value
Moose	High interest, economic and recreational value
Black bear	High interest, economic and recreational value; apex predators
Mountain lion	High interest, economic and recreational value, apex predators
River otter	High interest, protected by law
White-tailed prairie dog	High interest, association with federally listed black-footed ferret
Aquatic Wildlife	
Cold water fish (sport and native)	Economic and recreational value, protected by law
Warm water fish (sport and native)	Economic and recreational value, protected by law

BLM

Wildlife and Terrestrial Habitat

BLM-administered lands within the planning area sustain an abundance and diversity of wildlife (including insects, birds, and mammals) and wildlife habitat. These lands provide a permanent or seasonal home for numerous species of amphibians, reptiles, birds (including migratory birds protected under the Migratory Bird Treaty Act), and mammals. Wildlife populations are found in areas where their basic needs (such as food, shelter, water, reproduction, and movement) are met. The area in which the needs of a particular population are met is referred to as habitat. Plants or animals that have been officially listed, proposed for listing, or are candidates for listing as threatened or endangered under provisions of the ESA, as well as those listed by a state in a category implying potential endangerment or extinction, and those designated by a BLM State Director as sensitive are discussed in **Section 3.3**, Special Status Species. This section will focus on those species that are less specialized and can use a wider range of habitats.

Several features make certain habitats better for wildlife than others. In turn, the more of these features that are present, the greater the diversity of wildlife species that is likely to be present. These features include:

- Structure: shape, height, density, and diversity of the vegetation and other general features of the terrain
- Vertical layers: layers of vegetation (such as herbaceous, shrub, and forest canopy)
- Horizontal zones: vegetation and other habitat features that vary across an area
- Complexity: an integration of vertical layers and horizontal zones

- Edge: the area where two types of vegetative communities meet (such as a forest and shrub community)
- Special features: unique habitat features needed for survival or reproduction, including snags (dead trees), water, and rock outcrops (Cooperrider 1986) BLM-administered lands within the planning area are important habitat for many types of wildlife. Wildlife and their habitat are impacted by a variety of land uses, such as timber harvesting, grazing, recreation, as well as by natural events, such as wildfire and insects. The BLM is indirectly responsible for the health and well-being of fish and wildlife populations that are supported by the habitats under the management of the BLM. The BLM works cooperatively with the USFWS and the CPW in order to manage wildlife habitats on BLM-administered lands.

Standards for Public Land Health

One method the BLM uses in order to measure the health of the land that it manages is through land health assessments. These assessments follow several standards that the BLM developed in response to public concern about livestock grazing management on western public lands. Standards for Public Land Health describe conditions needed in order to sustain public land health, and relate to all uses of the public lands. Standards, based upon their associated indicators, are applied on a landscape scale and relate to the potential of the landscape. See **Appendix K**, BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado.

Guidelines for Livestock Grazing Management

Guidelines are the management tools, methods, strategies, and techniques, such as best management practices, designed to maintain or achieve healthy public lands as defined by the standards. Currently, the only guidelines developed in concert with the Resource Advisory Councils for the BLM Colorado are livestock grazing management guidelines. See **Appendix K**, BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado.

Proper Functioning Condition

Another method used to evaluate habitat is to assess the proper functioning condition of streams and water bodies. Many surveys using the proper functioning condition protocol have been conducted as part of land health assessments on various landscapes within the planning area.

Aquatic Resources

Fish and other aquatic resources are critical resources to humans and, as such, have influenced the development, status, and success of social and economic systems in the western US. Aquatic organisms, such as insects and aquatic invertebrates, provide food for fish. The health of fish and other aquatic organisms is often indicative of the health of the watershed.

USFS

Wildlife Species on the Routt National Forest are categorized into four main categories as it related to this analysis:

- Sensitive Species
- Threatened and Endangered Species

- Management Indicator Species (MIS)
- Other wildlife species

Sensitive Species

Sensitive species are a special status species for the USFS. The USFS has developed policy regarding the designation of plant and animal species (USFS Manual 2670.32; Region 2 USFS Manual Supplement 2670-2011-1). In the Rocky Mountain Region, species are identified as USFS Sensitive, and are included on a comprehensive list, using eight evaluation criteria to determine the merits of sensitive status for a particular species (USFS Manual 2672.11, Region 2 USFS Manual Supplement No. 2600-2003-1, Exhibit 02). The Regional Forester's list was last updated in 2011 (Holifield 2011). All candidate species are automatically placed on the USFS Sensitive species list. As such, because GRSG is a candidate species, it also is a USFS Sensitive species. Sensitive species are addressed in **Appendix L**, USFS Wildlife Specialist Report, and are not further discussed in this section.

Threatened and Endangered Species

Threatened and Endangered Species are a special status species which have been listed by USFWS under the ESA. A Biological Assessment will be prepared for the preferred alternative with the Final EIS. Threatened and Endangered Species are not further addressed in this section.

Management Indicator Species

The NFMA directs the USFS to select certain plants, communities, and vertebrate or invertebrate species to manage for maintenance and improvement of habitat. Requirements to identify and utilize MIS in the decision area and project-level planning were identified under NFMA planning regulations in 1982-219.19(a) (1). MIS are species that respond to habitat changes, are scarce or unique, are of high economic interest, or are listed as federal or state threatened or endangered species. By monitoring and assessing population trends of MIS, managers can determine if management actions are affecting species populations. MIS are also included in **Appendix L**, USFS Wildlife Specialist Report.

Other Wildlife Species

These are not conservation priority species with a 'special status,' but are those that may be related to this specific analysis. For this analysis the focus is on elk. The Routt National Forest Plan contains management direction specifically related to elk and deer. GRSG habitat overlaps with designated elk and deer winter range on the Routt National Forest (see **Figure 3-1**, Elk Winter Range, and **Figure 3-2**, Mule Deer Winter Range), and issues were raised during scoping regarding the potential impacts that elk may be having on GRSG habitat.

During the scoping process, commenters were interested in the USFS (and the BLM) addressing the issue of competition for resources (i.e., habitat and food) with other wildlife (e.g., the increasing numbers of elk in Colorado). In recent years, competition between livestock and wildlife, or more specifically, wild ungulates such as moose (*Alces alces*), deer (*Odocoileus* spp.), and elk (*Cervus elaphus*) has become an increasing concern by the public as well as range conservationists and wildlife biologists. Little scientific evidence has been collected on whether competition is occurring between species such as GRSG and elk and the direct and indirect effects on the resource when combined with livestock grazing. It is the USFS' responsibility to adjust livestock numbers according to wildlife use, so that allowable use criteria are not exceeded. The

Routt National Forest Plan (USFS 1998) Range Standards state, "remove livestock from the grazing unit or allotment when further utilization on key areas will exceed allowable-use criteria in the forest plan or allotment management plan."

Competition begins to occur when the food resources are in short supply and one species may decline due to the limited food resources. In the drier west, the spatial configuration of cover types leads to wild and domestic ungulates, as well as other wildlife species congregating in the same areas where there is desirable forage and cover. At the landscape level, competition may be causing site-level resource impacts in these areas such that community types may shift in succession. Resource competition may include community types that are converted to a different ecotype. A specific example is the introduction of noxious weeds into habitats that displace important resources for a species such as GRSG, thus impacting their life history requirements.

Aquatic organisms include fish and amphibians that reside in streams and water bodies as well as wetlands and riparian areas. The Routt National Forest includes the headwaters of the North Platte, Yampa, and upper Colorado River basins. Elkhead Creek and Slater Creek Watersheds are within PGH in the California and Slater Parks areas. These areas support many priority aquatic resources, including several designated sensitive species, such as Colorado River cutthroat trout, mountain sucker, boreal toad, and northern leopard frog.

3.2.1. Indicators

Management Indicator Species

According to the Routt National Forest Plan Amendment #4 (USFS 2007), terrestrial MIS for the Routt National Forest include the six fish and wildlife species found in **Table 3.2**, Routt National Forest Management Indicator Species in the Decision Area. At the project and plan level, management indicators are selected that best represent the issues, concerns, and opportunities.

Table 3.2. Routt National Forest Management Indicator Species in the Decision Area

Common Name of MIS	Management Issue	Species Present in Analysis Area?	Habitat Present in Analysis Area?	Species selected for MIS analysis?
Golden-crowned Kinglet	Spruce-fir timber management	No	No	No
Northern goshawk	Lodgepole pine timber management	No	No	No
Vesper sparrow	Rangeland residual forage	Yes	Yes	Yes
Wilson's warbler	Herbivory in riparian areas	Yes	Yes	Yes
Colorado River cutthroat trout and brook trout	Aquatic habitat conditions	Yes	Yes	Yes

3.2.2. Existing Conditions

Conditions of the Planning Area

Within the planning area, the BLM manages over 1.7 million acres of fish and wildlife habitat, and the USFS manages just over 20,000 acres. The presence and interspersion of many habitat types support a large number of wildlife species. The discussion of fish and wildlife populations and habitat addresses the entire planning area, not just the BLM-administered or Routt National Forest lands (decision area), because fish and wildlife are mobile and may readily cross these boundaries, mule deer, pronghorn (*Antilocapra americana*), bighorn sheep (*Ovis canadensis canadensis*, *O. c. nelsoni*, and *O. c. mexicana*), mountain lion (*Felis concolor*), raptors, and many nongame species, including, but not limited to, migratory birds, are among the species that use habitat in the planning area. The diversity and populations of fish and wildlife throughout the planning area provide considerable recreational opportunity and economic benefit.

A group of species that are of primary interest to the BLM and USFS for environmental planning within the planning area are presented in **Table 3.1,** Fish and Wildlife Species of Primary Interest in the Planning Area. These species are of management concern to one or more agencies, such as the BLM, USFS, CPW, and USFWS, because they are game, rare, or keystone species. Therefore, they require consideration in management activities and may affect land management decisions. A keystone species is one whose presence and role within an ecosystem has a disproportionate effect on other organisms within the system.

Conditions on BLM-Administered Lands

Wildlife

A variety of terrestrial wildlife species use the vegetation types discussed in **Section 3.5**, Vegetation. The key terrestrial wildlife species within the planning area are primarily herptiles (reptile and amphibians), birds, and mammals. However, many terrestrial invertebrate species also exist, and adequate populations of terrestrial invertebrates are assumed when populations of the vertebrate groups that prey on invertebrates are healthy. The land health assessments, Rocky Mountain Bird Observatory, Colorado Natural Heritage Program, and GIS data maintained by CPW provide information on terrestrial wildlife distribution in the planning area. In addition, CPW maintains statistics on big game harvests, recreational use days, and population trends. The general conditions of key terrestrial and aquatic life within the decision area are summarized below.

<u>Reptiles</u>

Several species of reptiles exist within the planning area, mostly in lower elevations and in dryer habitats, such as semi-desert shrub, sagebrush, greasewood, and pinyon-juniper. Species found in the planning area include bull/gopher snake (*Pituophis catenifer*), sagebrush lizard (*Sceloporus graciosus*), prairie/plateau lizard (*Sceloporus undulates*), smooth green snake (*Liochlorophis vernalis*), western terrestrial garter snake (*Thamnophis elegans*), and milk snake (*Lampropeltis triangulum*). Other reptiles in the planning area include collared lizard (*Crotaphytus collaris*), tree lizard (*Urosaurus ornatus*), side blotched lizard (*Uta stansburiana*), short-horned lizard (*Phrynosoma hernandesi*), plateau striped whiptail (*Cnemidophorus velox*), western whiptail (*Cnemidophorus tigris*), desert striped whipsnake (*Masticophis taeniatus*), western blackneck garter snake (*Thamnophis cyrtopsis*), wandering garter snake (*Thamnophis elegans vagrans*), western yellow-belly racer (*Coluber constrictor*), corn snake (*Elaphe guttata*), Mesa Verde night

snake (*Hypsiglena torquata loreala*), Utah blackhead snake (*Tantilla planiceps*), and prairie rattlesnake (*Crotalus viridis*).

Waterfowl and Shorebirds

The numerous streams, rivers, reservoirs, ponds, associated riparian areas, and wetlands vegetation provide excellent habitat for a wide variety of waterfowl and shorebirds. Canada geese (*Branta canadensis*), mallards (*Anas platyrhynchos*), pintail (*Anas acuta*), gadwall (*Anas strepera*), green-winged teal (*Anas crecca carolinensis)*, American wigeon (*Anas americana*), and other waterfowl species winter along many of the major rivers within the planning area. Waterfowl production also occurs throughout the planning area. Important foraging areas include private lands in agricultural areas and within the river corridors.

Wading birds such as great blue heron (*Ardea herodias*), cattle egret (*Bubulcus ibis*), snowy egret (*Egretta thula*), and white-faced ibis (*Plegadis chihi*) are found throughout the planning area. Great blue heron foraging and breeding areas are primarily along rivers, streams, and ponds throughout the planning area. Killdeer (*Charadrius vociferus*), American avocet (*Recurvirostra americana*), willet (*Tringa semipalmata*), and Wilson's phalarope (*Phalaropus tricolor*) are also commonly found within the planning area.

Upland Game Birds

Species common to the planning area include dusky grouse (*Dendragapus obscurus*; formerly known as blue grouse), Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*), and Merriam's turkey (*Meleagris gallopavo merriami*). Dusky grouse are widely distributed throughout the higher elevation woodlands and mixed mountain shrub, aspen, and coniferous forest habitats above 7,200 feet in the planning area. Turkeys use a variety of habitats, including riparian areas, mixed mountain shrub, and pinyon-juniper woodlands. Small flocks of chukar (*Alectoris chukar*) can also be found in the western portion of the planning area. Gunnison Sage-Grouse (*Centrocercus minimus*) and GRSG (*Centrocercus urophasianus*) exist in the decision area. GRSG occupy the sagebrush-dominant rangelands at lower elevations throughout the planning area and are discussed further in **Section 3.3**, Special Status Species.

Raptors

Raptors serve as important indicators of overall ecosystem health because they are keystone species at the top of the food web. Raptors are found throughout the planning area and include bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), peregrine falcon (*Falco peregrinus*), prairie falcon (*Falco mexicanus*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*B. swainsoni*), ferruginous hawk (*B. regalis*), osprey (*Pandion haliaetus*), northern harrier (*Circus cyaneus*), great-horned owl (*Bubo virginianus*), burrowing owl (*Athene cunicularia*), and flammulated owl (*Otus flammeolus*).

The BLM has particular management interest in concentrations of raptors, particularly bald eagles and golden eagles. Active nests of all species of raptors are protected under the Migratory Bird Treaty Act. Bald and golden eagles are also protected under the Bald and Golden Eagle Protection Act. Red-tailed hawks, golden eagles, Cooper's hawk (*Accipiter cooperii*), and sharp-shinned hawk (*A. striatus*) are the most common raptor species breeding and nesting in the planning area. Other raptors known to nest in the area include American kestrel (*Falco sparverius*), Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*A. striatus*), and prairie falcons. Accipiters, such as the Cooper's hawk, goshawk, and sharp-shinned hawk, are primarily woodland nesting

species and are common in the forested areas. Precipitous rock formations and large trees provide suitable nesting habitat for these species. The numerous songbirds and small mammal populations provide the primary prey base.

Cavity-Nesting Birds

Cavity nesting species are those species of birds that excavate nesting holes. These birds create cavities from decaying or dead trees or cavities created by other species. Historically, dead or decaying trees (called snags) have been considered undesirable by forest managers. They are now, however, being recognized as important components to forested areas. Some 85 species of birds are considered cavity nesters, including migratory birds, raptors, and waterfowl (Scott et al. 1977). Some of the cavity nesters known within the planning area include the tree swallow (*Tachycineta bicolor*), barn owl (*Tyto alba*), and the common goldeneye (*Bucephala clangula*). The Lewis's woodpecker (*Melanerpes lewis*) also exists in the planning area and inhabits open pine forests, burn areas, cottonwoods in riparian areas, and pinyon-juniper forests (Johnsgard 1986).

Migratory Birds

The planning area supports a wide variety of migratory bird species during the summer and winter, or as they migrate through the area. The habitat diversity provided by the broad expanses of sagebrush, mixed mountain shrub, aspen, pinyon-juniper woodlands, other types of coniferous forests, riparian areas, and wetlands support many species. The most abundant species found within the planning area include the mourning dove (*Zenaida macroura*), common nighthawk (*Chordeiles minor*), horned lark (*Eremophila alpestris*), sage thrasher (*Oreoscoptes montanus*), green-tailed towhee (*Pipilo chlorurus*), sage sparrow (*Amphispiza belli*), and Brewer's sparrow (*Spizella breweri*).

Other migratory bird species found within the planning area include, but are not limited to, dusky flycatcher (*Empidonax oberholseri*), plain titmouse (*Baeolophus inornatus*), house wren (*Troglodytes aedon*), loggerhead shrike (*Lanius ludovicianus*), black-crowned night-heron (*Nycticorax nycticorax*), yellow warbler (*Dendroica petechia*), Cassin's finch (*Carpodacus cassinii*), Grace's warbler (*Dendroica graciae*), juniper titmouse (*Baeolophus ridgwayi*), and pinyon jay (*Gymnorhinus cyanocephalus*).

Sandhill cranes use areas within the planning area as a migratory stopover in the fall and spring. Ponds and reservoirs managed by the BLM provide a migratory stopover for sandhill cranes. Long-billed curlew (*Numenius americanus*) occasionally nests in the desert areas near the Utah border.

Big Game Species

The three primary big game species in the planning area are elk, mule deer (*Odocoileus hemionus*), and pronghorn antelope. Bighorn sheep and moose exist in more limited numbers throughout the planning area, and their habitat is not as extensively managed. Important big game ranges in relation to PPH and PGH are identified in **Table 3.3**, Big Game Ranges in PPH and PGH on BLM-Administered Lands. Mule deer severe winter range in relation to PPH and PGH on leased or unleased federal mineral estate are identified in **Table 3.4**, Acres of Mule Deer Winter Range on Federal Mineral Estate.

Table 3.3. Big Game Ranges in PPH and PGH on BLM-Administered Lands

Species/Range	PPH (Acres)	ADH (Acres)
Elk		
Summer Range	712,200	1,522,200
Severe/Critical Winter Range	1,025,500	1,723,800
Mule Deer		
Summer Range	1,868,200	3,254,300
Severe/Critical Winter Range	561,000	1,134,600
Pronghorn		
Summer Range	1,920,400	2,896,500
Severe/Critical Winter Range	310,300	425,100
Source: BLM 2013		

Table 3.4. Acres of Mule Deer Winter Range on Federal Mineral Estate

Location	Leased		Unleased	
	Mule Deer Winter Range		Mule Deer Winter Range	
	PPH	ADH	PPH	ADH
CRVFO	0	100	16,600	26,600
GJFO	0	3,000	0	1,400
KFO	14,100	14,100	45,600	55,900
LSFO	115,400	187,900	232,800	473,400
WRFO	17,500	98,900	3,000	59,800
Roan Plateau	0	0	0	0
Routt National Forest	10	10	500	500
Total	**147,010**	**304,010**	**298,500**	**617,600**

Source: BLM 2013

Note: Mule Deer Winter Range includes Mule Deer Critical Winter Range, Mule Deer Severe Winter Range, and Mule Deer Winter Concentration Areas.

Areas not available for mineral leasing (i.e., WSAs) are not included.

Habitat supporting elk and mule deer throughout the planning area are quite varied and include forested and shrublands, especially mountain shrub. Summer habitats tend to be more forested areas and occupy higher elevations. Production occurs in the best habitats within summer concentration areas and occurs in both forested areas and shrublands, with cover sometimes provided by trees and sometimes by topography. The White River herd is the largest of the elk herds in the planning area, with an estimated population range between 34,000 and 38,000 elk (CPW 2011a).

Elk and mule deer migrate to lower elevation sagebrush-dominant ridges and south-facing slopes in the winter. BLM-administered lands provide most of the winter range available to elk and mule deer in the planning area. Critical winter ranges for elk, mule deer, and pronghorn antelope are essential to the survival of these species in the planning area. In several areas, large concentrations of big game species are degrading winter habitats.

Severe winter range is defined as that part of the winter range where 90 percent of the individuals are located when annual snowpack is at its maximum or temperatures are at a minimum in the two worst winters out of ten CPW 2011). Critical winter range is defined as the winter habitat which is used during the most extreme portion of the winter (CPW 2011). There are several herds of mule deer whose range spans most of the planning area except for areas of high human concentrations. Mule deer occupy nearly all public lands during part of the year, with winter use being the most

significant. During the winter, mule deer depend on the sagebrush steppe and mountain shrub habitats for survival. Winter concentrations of mule deer are observed in sagebrush habitats along the Colorado and Eagle Rivers.

Pronghorn antelope are present on BLM-administered lands in diffuse regions throughout the planning area. Pronghorn use habitat including sagebrush-dominant ridges and valleys as well as lower elevation desert areas. Their overall range consists primarily of salt desert and sagebrush shrublands and lowland grassland. The general distribution migrates to loweMoose and bighorn sheep are present in more limited numbers within the planning area. Moose were introduced to Colorado by CPW in the late 1970s near North Park in willow and lodgepole pine habitat at an elevation of 8,850 to 9,350 feet. Since then, animals from this population have been reported in several adjacent areas, including Middle Park, the upper reaches of the Laramie and Cache la Poudre rivers, and Rocky Mountain National Park. Other sightings have been reported in South Park, near Leadville, near Gunnison, near Yampa, and west of Denver. In the east, moose occupy Routt National Forest, moving to higher elevations in the summer. Moose also move from these areas downstream along the Yampa River and up Elkhead Creek, where the headwaters have been designated as a moose concentration area. The habitat supporting moose in the planning area includes sagebrush, saltbush, and mountain shrub shrublands, as well as some willow, pinyon-juniper woodlands, and aspen forests.r elevations in winter. Concentration areas, including those used during winter, are found especially in saltbush, but also in sagebrush and mountain shrub habitats.

Moose and bighorn sheep are present in more limited numbers within the planning area. Moose were introduced to Colorado by CPW in the late 1970s near North Park in willow and lodgepole pine habitat at an elevation of 8,850 to 9,350 feet. Since then, animals from this population have been reported in several adjacent areas, including Middle Park, the upper reaches of the Laramie and Cache la Poudre rivers, and Rocky Mountain National Park. Other sightings have been reported in South Park, near Leadville, near Gunnison, near Yampa, and west of Denver. In the east, moose occupy Routt National Forest, moving to higher elevations in the summer. Moose also move from these areas downstream along the Yampa River and up Elkhead Creek, where the headwaters have been designated as a moose concentration area. The habitat supporting moose in the planning area includes sagebrush, saltbush, and mountain shrub shrublands, as well as some willow, pinyon-juniper woodlands, and aspen forests.

The planning area contains both desert bighorn sheep (south of the Colorado River and west of the Gunnison River) and Rocky Mountain bighorn sheep (east of the Gunnison River and north of the Colorado River). Desert bighorn sheep is a BLM Sensitive species and is discussed in **Section 3.3**, Special Status Species. Bighorn sheep herds are widely scattered throughout the planning area and prefer high-visibility habitat. The habitat supporting use areas is primarily pinyon-juniper woodlands and adjacent sagebrush and mountain shrub habitat. Topography and rock cover play the most important role in the locations used within these habitats.

Bighorn sheep have been reintroduced into the Red Canyon area in North Park and may use portions of Sheep Mountain. Bighorn sheep are found primarily on National Forest System- and National Park Service-administered lands within Rocky Mountain National Park. However, this species is known to use BLM-administered lands in certain areas. The Battlement Mesa herd (Rocky Mountain Bighorn sheep unit S24) is found northwest of the town of Mesa, Colorado, and ranges across both BLM-administered and National Forest System lands. It is one of 34 native, indigenous herds in the State of Colorado and is one of the few low-elevation herds still persisting in native habitat. The Battlement Mesa population is approximately 50 individuals (Duckett 2012).

Other Key Mammal Species

Several other key mammal species are found within the planning area, such as the black bear (*Ursus americanus*), mountain lion, river otter (*Lutra canadensis*), white-tailed prairie dog *(Cynomys leucurus)*, coyotes (*Canis latrans*), bobcats (*Lynx rufus*), and red fox (*Vulpes vulpes*). These species are found within all habitat types, with coyotes being the most habitat-general species.

The habitats supporting black bear use areas are primarily pinyon-juniper woodland and aspen and coniferous forests. Habitat for mountain lion is found throughout the planning area where high densities and concentrations of mule deer are located. White-tailed prairie dogs are present in the lower elevations of the planning area. This sensitive species is described further in **Section 3.3**, Special Status Species. White-tailed prairie dog towns provide potential habitat for black-footed ferrets and are confined to shrublands, and almost exclusively to saltbush habitats, although a few colonies have been mapped in sagebrush or mountain shrub habitats.

An undetermined number of small mammals reside within the planning area, including ground squirrels, mice, chipmunks, rabbits, skunks, and raccoons. Many of these small mammals provide the main prey for raptors and larger carnivores.

Numerous bats use the abandoned mines and natural caves in the planning area. The Townsend's big-eared bat (*Corynorhinus townsendii*) is known to exist in the planning area. Common species observed include the silver-haired bat (*Lasionycteris noctivagans*), followed by the big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*), and long-legged bat (*Macrophyllum macrophyllum*) (Chung-MacCoubrey 2008).

Fish and Aquatic Wildlife

Aquatic habitats in the planning area consist of both lentic (still, as in ponds and lakes) and lotic (moving, as in streams and rivers) systems. Not all of the perennial aquatic habitats support fish, but it is very likely that most of the perennial waters support some abundance of aquatic insects. Amphibians are scattered across the landscape and may exist either exclusively or seasonally in a variety of aquatic habitat types. Within these aquatic systems, the diversity of habitats and differing elevations in which aquatic systems reside dictate the presence of a diverse array of fish and amphibian species. Within these aquatic systems, the diversity of habitats and differing elevations dictate the presence of a diverse array of fish and amphibian species.

Cold Water and Native Fish Species

Higher elevation waters located generally above 5,200 feet support cold water fishes, consisting primarily of brook trout (*Salvelinus fontinalis*), rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), and cutthroat trout (*Oncorhynchus clarkii*). The primary cold water game fish species include cutthroat, rainbow, brook, and brown trout. Of the five trout species found within the planning area, two are native species: the Colorado River cutthroat trout (*Salmo clarki pleuriticus*) and the greenback cutthroat trout. The greenback cutthroat trout is federally threatened, and the Colorado River cutthroat trout is listed as a BLM Sensitive Species. These species are discussed further in **Section 3.3**, Special Status Species. Other native fishes within the planning area include mountain whitefish (*Prosopium williamsoni*) and mottled sculpin (*Cottus bairdi*).

Several large reservoirs throughout the planning area provide important recreational fisheries for rainbow trout, lake trout (*Salvelinus namaycush*), and kokanee salmon (*Oncorhynchus nerka*). Other sport fish found in the reservoirs include, but are not limited to, brown trout, cutthroat trout, northern pike, and splake (*Salvelinus namaycush x Salvelinus fontinalis*). Most of these sport fish populations are maintained by CPW stocking programs.

Warm Water Fish Species

Waters generally below 6,500 feet support primarily cool water and warm water fishes, including nonnative northern pike (*Esox lucius*), yellow perch (*Perca flavescens*), smallmouth bass (*Micropterus dolomieu*), largemouth bass (*Micropterus salmoides*), black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), common carp (*Cyprinus carpio*), and walleye (*Stizostedion vitreum*). Additional nonnative fish that may exist in the planning area include red shiner (*Cyprinella lutrensis*), fathead minnow (*Pimephales promelas*), and plains topminnow (*Fundulus sciaticus*).

Native warm water fish within the planning area include black bullhead (*Ameiurus melas*), channel catfish (*Ictalurus punctatus*), green sunfish (*Lepomis cyanellus*), Johnny darter (*Etheostoma nigrum*), long-nose dace (*Rhinichthys cataractae*), bluehead sucker (*Catostomus discobolus*), flannelmouth sucker (*Catostomus latipinnis*), roundtail chub (*Gila robusta*), razorback sucker, creek chub (*Semotilus atromaculatus*), Colorado pikeminnow, plains killifish (*Fundulus zebrinus*), bonytail chub, and humpback chub. Speckled dace (*Rhinichthys osculus*) are the most widely distributed native non-game fish, found regularly in most perennial streams within the planning area. The long-nose sucker (*Catostomus catostomus*) and white sucker (*Catostomus commersonii*) are found in warm and cool water habitats and are also considered invasive, nonnative, or competitive species within the planning area. Special status fish species are discussed further in **Section 3.3**, Special Status Species.

Amphibians

Many species of amphibians are found within the planning area including the western chorus frog (*Pseudacris triseriata*), wood frog, Woodhouse's toad (*Bufo woodhousii*), boreal toad, northern leopard frog, and tiger salamanders (*Ambystoma tigrinum*). For a more complete discussion of special status amphibian species refer to **Section 3.3**, Special Status Species.

High elevation areas within the planning area contain sufficient aquatic habitat to support boreal toads. Lower elevation amphibians include the Great Basin spade-foot toad (*Spea intermontana*).

Conditions on National Forest System Lands

Routt National Forest

Wildlife

Terrestrial wildlife species on the Routt National Forest portion of the analysis area include many of the common mammals, birds, reptiles and amphibians addressed in the BLM wildlife section.

The species highlighted in section include the Routt National Forest MIS and elk.

Terrestrial Management Indicator Species

Vesper Sparrow (Poocetes gramineus). Vesper sparrow was selected as an MIS to represent issues associated with rangeland residual forage. Vesper sparrows are primarily summer residents on the

Routt National Forest and use shrublands and grass/forb habitats within or near the planning area for breeding. Vesper sparrow habitat does overlap with mapped GRSG habitat within both PPH and PGH. In selecting the vesper sparrow as an MIS for the 1997 Revision of the Routt National Forest Plan (USFS 1998), no concern existed for species viability or viability of local populations and "viability" was neither a rationale nor motivation for its inclusion on the USFS MIS list. All MIS selected in the 1997 Revision were chosen because they "reflect the habitat needs for the majority of the species inhabiting the Routt National Forest" (USFS 1998). The vesper sparrow was carried forward in the 2007 Plan Amendment of the Routt National Forest, because it was considered as an appropriate MIS and monitoring of this species will likely answer specific questions to management issues (USFS 2007).

Vesper sparrow breeds in grasslands, open shrublands mixed with grasslands, and open pinyon-juniper woodlands. Vesper sparrows have two broods per nesting season with three to six eggs per clutch (Kingery 1998). This species seeks a narrow set of habitat conditions within its nesting range (middle to high elevation sagebrush and grassland habitats) and subtle changes in these conditions (reductions in residual grass and forbs) can impact essential nesting habitat components (Kingery 1998).

In migration, this sparrow is found in open riparian and agricultural areas (Natural Diversity Information Source 2011a). Breeding Bird Atlas (Kingery 1998) data show that, in Colorado, the densest populations inhabit middle- to high-elevation sagebrush. The Atlas also shows that montane grasslands support high population densities, as do lower-elevation sagebrush grasslands in northwestern Colorado. Sparsely or patchily distributed shrubs with a good grass cover make the best habitat (Kingery 1998). This sparrow is rarely above timberline in late summer and fall. It appears that this species is occasionally present in these areas during the winter as described by the Colorado Natural Diversity Information Source website (Natural Diversity Information Source 2011a).

Wilson's Warbler (Wilsonia pusilla). The 2007 Routt National Forest Plan Amendment of the Routt National Forest identifies the Wilson's warbler as an indicator species for the "herbivory in riparian areas" management issue (USFS 2007). The Routt National Forest Plan identifies the Wilson's warbler as a MIS associated with the "riparian/wetland" habitat complex (USFS 1998). Wilson's warblers are summer residents on the Routt National Forest and use riparian and wetland habitats during their breeding season from about late May to mid-August. Though Wilson's warblers are known for nesting in high elevation riparian/willow habitats, this warbler can be found as low as 6,000 feet in elevation (Kingery 1998). Uncontrolled livestock grazing in riparian areas and degradation of willow shrub riparian systems may adversely affect this species. In selecting the Wilson's warbler as an MIS for the 1997 Revision of the Routt National Forest Plan (USFS 1998), no concern existed for species viability or viability of local populations and "viability" was neither a rationale nor motivation for its inclusion on the Forest MIS list. All MIS selected in the 1997 Revision were chosen because they "reflect the habitat needs for the majority of the species inhabiting the Routt National Forest" (USFS 1998). The Wilson's warbler was carried forward in the 2007 Plan Amendment of the Routt National Forest, because it was considered as an appropriate MIS and monitoring of this species will likely answer specific questions to management issues (USFS 2007).

The Wilson's warbler was selected for this analysis to assess if changes to livestock grazing within riparian areas under the NTT direction or other alternatives influence the habitats of riparian dependent species, which may include the GRSG. Grazing and browsing by wild and domestic ungulates can have impacts on riparian vegetation that are important to GRSG. If

managed improperly, grazing by domestic and wild ungulates can affect streams and can adversely impact the stream bank leading to long-term changes in stream and associated riparian communities. Grazing impacts on riparian systems has been identified as a problem in local areas on the Routt National Forest but has not been identified broadly. The Wilson's warbler, a riparian dependent species, was selected to evaluate if riparian habitats are being maintained in a proper functioning condition.

The Wilson's warbler breeds in willow thickets of lakeshores, stream banks, and wet meadows. These warblers nest in willow and alder thickets of stream banks, lake shores, and wet meadows. They may be the most common breeding birds in Colorado's montane and subalpine willow habitats (Andrews and Righter 1992). Wilson's warblers arrive on their breeding grounds in late May and lay eggs soon after. Most young leave their nests by mid-July. Fall migration begins in mid-August (Rocky Mountain Bird Observatory 2011). Migration occurs in riparian forests, shrublands, and wooded urban areas (Natural Diversity Information Source 2011b). Winter range includes northern Mexico south to Panama (Rocky Mountain Bird Observatory 2011).

The Wilson's warbler is an insectivorous species and is part of the gleaning guild. This warbler displays foraging behavior and habitat selection where high populations of insects are present. Because the Wilson's warbler is an active searcher for gleaning perches, this warbler has a narrow range of preferences in habitat structure (Eckhardt 1979). For foraging, the Wilson's warbler prefers larger, more open shrubs surrounded by smaller shrubs (Ruth and Stanley 2002).

According to the Colorado Breeding Bird Atlas, the high altitude habitat of the Wilson's warbler has few threats other than grazing, thus both species' populations appears to be secure where appropriate management of grazing has been implemented (Kingery 1998).

Other Wildlife: Elk. The elk and deer winter range on the Routt National Forest is likely the most heavily used area by wildlife as well as domestic livestock. Approximately 1,300 acres of PPH and 400 acres of PGH overlap Management Area 5.41-Elk and Deer Winter Range on the Routt National Forest. **Table 3.5**, Big Game Ranges on PPH and PGH on the Routt National Forest, includes Routt National Forest critical big game ranges present in GRSG PPH and PGH. Critical big game ranges are used in the spring, fall, and winter and may not have a chance to recover especially in heavy snow years when deer and elk are unable to move out of the wintering grounds.

Heavy snow years and cool weather in the spring may also affect GRSG habitat quality when wild and domestic ungulates are moving onto the Forest at about the same time. The cool weather delays the initiation of plant growth and does not provide the time for plants to grow or recover from last year's use before the ungulates begin use. In drier snow years, the wild ungulates can move onto the decision area prior to livestock and can have an influence on forage and habitat attributes important to GRSG. It is the USFS' responsibility to adjust livestock numbers according to wildlife use so that allowable use criteria are not exceeded. The Routt National Forest Plan (USFS 1998) Range Standards state, "remove livestock from the grazing unit or allotment when further utilization on key areas will exceed allowable-use criteria in the forest plan or allotment management plan."

Important big game ranges in relation to PPH and PGH are identified in **Table 3.5**, Big Game Ranges on PPH and PGH on the Routt National Forest.

Table 3.5. Big Game Ranges on PPH and PGH on the Routt National Forest

Species/Range	Total (Acres)	PPH (Acres)	PGH (Acres)
Designated Deer and Elk Winter Range	1,700	1,300	400
Source: Query of USFS GIS Database, Medicine Bow Routt National Forest, 2013			

Fish and Aquatic Wildlife

The condition of aquatic organisms varies by the different geographic areas that contain GRSG habitat within the Routt National Forest. Streams in the Forest occupy a variety of settings ranging from steep narrow valleys with narrow floodplains and riparian areas to broad, low gradient valleys in the lower reaches. Water resources in areas with steep headwater stream channels provide little habitat for fish and amphibians. Drainages with active roads, livestock grazing, and logging are associated with marginal aquatic habitat and populations. Conversely, streams with more moderate gradients and broad floodplains provide more aquatic and riparian habitat.

Native fish species thought to have historically occupied streams in the Routt National Forest include Colorado River cutthroat trout, mountain sucker, speckled dace, and mottled sculpin. Colorado River cutthroat trout are part of CPW's Elkhead Creek conservation population (CPW Fish Management Unit YP-6) which comprises 41 miles of interconnected habitat. Nonnative white sucker are also present in the larger streams. Nonnative brook trout currently occupy all perennial streams. Little Muddy Creek is thought to contain a healthy population of brook trout, and the North Platte River contains healthy populations of nonnative brook, brown, and rainbow trout. Habitat protection and restoration projects are ongoing within the Routt National Forest.

Wetlands are associated with beaver ponds along the streams in the Routt National Forest providing an abundance of suitable habitat for amphibians. Three native amphibians are found in the planning area: Western chorus frog, northern leopard frog, and boreal toad. Western chorus frogs are widely distributed in appropriate moist habitats across the Forest, including ponds, ephemeral pools and wet areas, marshes, wet meadows and lake margins. Northern leopard frogs are found primarily in beaver ponds. Breeding populations of boreal toad exist near the north end of California Park and in the Lake Agnes area.

Aquatic Management Indicator Species

Colorado River Cutthroat Trout (Oncorhynchus clarki pleuriticus). The Colorado River cutthroat trout range includes colder headwaters of the Green and Colorado rivers that include the Yampa River drainage in Colorado, Utah, and Wyoming (Young 1995). Recent work by Hirsch et al. (2006) estimates that Colorado River cutthroat trout occupy 13 percent and potentially up to 14 percent of their historical range in the mountainous regions of the Colorado River Basin identified by Benhke (1992).

Colorado River cutthroat trout have been documented on the Routt National Forest (December 2012 NRIS Wildlife database). This includes two sites within the analysis area-along multiple streams in PGH in the California Park area of the Hahns Peak/Bears Ears Ranger District, and along one stream north of Toponas on the Yampa Ranger District. The Yampa River Basin has 53 conservation populations identified in 79 streams or 339 miles of stream and has the third highest number of conservation populations (Upper Green River Basin has 76 populations, ranked 1st and Upper Colorado has 75 populations, ranked 2nd).

Colorado River cutthroat trout thrive in cold, clean water environments within high elevation streams and lakes that have well-vegetated stream banks for cover and bank stability. The decline of Colorado River cutthroat trout is attributed to the following threats: replacement by brown, rainbow, and brook trout, hybridization with rainbow trout, over harvest, and habitat fragmentation or alteration from livestock overgrazing, logging, mining, and water diversions (Behnke 1992, Young 1995).

*Brook Trout (Salvelinus fontinalis).*Brook trout are nearly ubiquitous in most Routt National Forest watersheds. At the broadest scale, none of the common trout species (brook, brown, or rainbow) are native to Region 2. However, these desired nonnative game fish have been stocked repeatedly for more than 100 years throughout most of the Rocky Mountain Region. They are now widely distributed, commonly captured and generally abundant in the Rocky Mountain Region as a whole. These fish occur in both stocked and wild (naturally reproducing) populations, although the distribution of species varies locally by habitat type and elevation as a result of minor ecological differences. Brook trout are capable of living under a wide variety of conditions from high to low elevation, often at very high densities.

The primary threats to brook trout populations are negative factors that lower survival of large juveniles and small adults. Introduced brook trout have contributed to the decline of native fishes, amphibians, and invertebrates. In areas identified for Colorado River cutthroat trout restoration, brook trout are targeted for eradication. Methods such as depletion-removal electrofishing have significantly reduced populations and recruitment, but did not totally eradicate brook trout.

3.2.3. Trends

Trends on BLM-Administered Lands

For most fish and wildlife species, habitat loss and fragmentation have been and remain the primary cause for declining populations. Some of these species have also suffered from historic efforts to extirpate them, and some suffer competition or predation from species that have expanded their range or that have been introduced. Management efforts by the BLM, USFS, USFWS, CPW, and others have reversed the downward trend for a number of these populations, but few populations are near their historic levels.

Wildlife

Certain wildlife species are of high interest to the CPW due to their economic and recreational values. As a result, the CPW maintains accurate population estimates for these species including general trends for wildlife and aquatic species. CPW also maintains population estimates for other wildlife, such as GRSG, due to the current interest in this species, and because its numbers are relatively easy to estimate each year as compared with other species (CPW 2004) General trend information for wildlife species that depend upon habitat managed by the BLM for at least part of their annual life cycle is discussed below.

<u>Reptiles</u>

No trend data are available at this time.

<u>Waterfowl and Shorebirds</u>

In the planning area, waterfowl populations have been high during wet years and low during dry years. Despite these fluctuations, the population trend within the planning area is believed to be stable.

Upland Game Birds

Generally dusky grouse and turkey populations are believed to be stable in Colorado. The trends for GRSG and Columbian sharp-tailed grouse are discussed further in **Section 3.3**, Special Status Species.

Raptors

In general, raptors that tolerate disturbance in the environment tend to have increasing populations while those species that require large patches of undisturbed habitat are declining (NatureServe 2012). The wide variety of habitats available within the planning area offers nesting and hunting habitat for these species. Population trends for raptors appear stable throughout the planning area.

Numerous active golden eagle nest sites have been documented on private and public lands within the planning area. Population levels throughout the planning area appear stable, as golden eagles can be readily observed in many vegetative types, especially during spring and summer. In addition to breeding season, some golden eagles remain in the area year-round.

Cavity-Nesting Birds

No trend data are available at this time.

Migratory Birds

Population trends for migratory birds vary by species and largely depend on associated habitat types. Habitat conditions for these species are relatively intact throughout the planning area and associated migratory bird populations are generally stable. However, populations of some migratory species are declining because of habitat loss and fragmentation within the planning area. Obligate bird species expected to be found in the sagebrush habitat type have been documented in sufficient numbers to indicate a stable or increasing trend.

Big Game Species

The CPW classifies all of the species described below as big game animals. Big game species are important due to the high level of public interest in them for their recreational value. The recreational opportunities provided by big game animals found within the planning area equate to high economic value to the CPW, as well as contribute to the economy of local communities.

Elk populations are stable to increasing within the planning area according to data maintained by CPW. Elk herd numbers are greater than long-term objectives within the KFO planning area. It is assumed that these stable/increasing trends are similar throughout the GRSG planning area.

Mule deer populations are stable to declining throughout the planning area. Mule deer are well below the carrying capacity of their habitat and below population objectives established by the CPW.

Pronghorn numbers steadily increased within the planning area since 1984. However, recent CPW surveys suggest pronghorn numbers are stable to declining within the planning area. Pronghorn numbers are within the range of CPW management objectives in the planning area.

Moose were introduced into southeast North Park in the late 1970s, and this population has continued to expand their range. These populations are increasing and are within the population objective range.

Rocky Mountain Bighorn sheep are believed to be stable at this time within the planning area. It is likely that populations of this species will continue to increase, assuming ongoing reintroduction efforts are successful.

Other Key Mammal Species

Black bear and mountain lion population estimates are generally deficient due to the difficulty in counting them accurately. In two reports, one by Martens (2006) and the other by Yost (2006), biologists for the CPW indicated that populations of these species are stable and likely increasing. The distribution and abundance of other small mammal and non-game populations in the planning area are unknown, poorly documented, or studies have been confined to a small geographic area.

Fish and Aquatic Wildlife

Fish Species

The CPW is the lead agency responsible for fisheries management of public waters in the State of Colorado. While some areas within the planning area are stocked by CPW, other areas are managed as wild self-sustaining fisheries. The population of cold water sport fish varies greatly across the planning area, however fish survey and management reports generally indicate a stable to increasing population.

Declines in populations are generally localized and largely due to a number of factors including alteration of habitat, water quality impairment, disease, hybridization, flow reductions resulting from water diversions and other water-depleting activities, and nonnative predatory sport fish.

Amphibians

No trend data are available at this time.

Trends on National Forest System Lands

Routt National Forest

Wildlife

Most wildlife species occur at desired population levels. Those species of concern are considered priorities for conservation and these include those classified as threatened, endangered, or sensitive. USFS Sensitive species are addressed in **Appendix L**, USFS Wildlife Specialist Report. Species identified as indicators for this analysis include MIS and elk.

Management Indicator Species

Vesper Sparrow (Pooecetes gramineus). Several sources of information are available and are useful for estimating current population trend and abundance for vesper sparrows on the Routt National Forest. These data reflect different landscape scales and include results that have been gathered over large geographic areas (i.e., the southern Rocky Mountains) as well as locally.

Though Breeding Bird Survey (BBS) (1966-2009) and Christmas Bird Count data indicate widespread and severe declines in eastern North America, the vesper sparrow appears relatively secure and stable in western North America, with declines in some regions (Sauer et al. 2011, NatureServe 2011a). Since 1990, there has been a positive population trend for vesper sparrow within the Colorado BBS region (Sauer et al. 2011). According to Kingery (1998), the vesper sparrow ranks 21 out of the 32 most abundant bird species in Colorado (and 21 out of 264 known breeding birds in the state). Kingery (1998) estimated that the vesper sparrow population ranges between 176,985 and 1,137,179 breeding pairs.

Based on the Breeding Evidence map in Kingery's (1998) Colorado Breeding Bird Atlas; this bird is well distributed and common within suitable habitat on the Routt National Forest. Natural Diversity Information Source (Natural Diversity Information Source 2011a) records also indicate that this bird is considered "common" for all of the counties that overlap the Routt National Forest, including Garfield, Grand, Jackson, Moffat, Rio Blanco, and Routt.

Existing habitat conditions for vesper sparrows across the Routt National Forest are well-suited to sustaining current populations of these birds. Though numbers may be variable on private lands where human encroachment and habitat alteration/conversion continues, vesper sparrow habitat appears to be improving on National Forest System lands. Within PPH and PGH, suitable habitat does exist within the various MZs that intersect with the Routt National Forest.

Collectively, available population and habitat information suggests vesper sparrows on the Routt National Forest have a population trend that is currently stable but likely is increasing. In addition, the vesper sparrow is widely distributed on the Forest and is well-distributed throughout all shrubland and grassland areas in Colorado. BBS suggest that populations are increasing slightly in Colorado as well as across the southern Rocky Mountain region (Sauer et al. 2011). Conservation measures for the GRSG would likely benefit the vesper sparrow.

Wilson's Warbler (Wilsonia pusilla). Several sources of information are available and are useful for estimating current population trend and abundance for Wilson's warblers on the Routt National Forest. These data reflect different landscape scales and include results that have been gathered over large geographic areas (i.e., the southern Rocky Mountains) as well as locally. While none of these data are independently adequate to estimate Wilson's warbler population trend and abundance, and some information may even be contradictory, collectively the information affords a basis for making credible inferences about population trend and abundance for these warblers on the Forest.

The Wilson's warbler experienced a significant population increase in western North America between 1978 and 1988 (NatureServe 2011b). However, conflicting information apparently exists at the state level, in which NatureServe (2011b) describes them as apparently secure within Colorado whereas the Rocky Mountain Bird Observatory Partners in Flight (2011) describes them as significantly declining. Kingery (1998) estimated their population in Colorado to range between 60,483 and 379,676 breeding pairs, thereby ranking it as the 53rd most common bird out of 264 breeding birds in Colorado.

Sauer et al. (2011) have analyzed bird count data gathered between 1966 and 2007 from BBS transects across North America. The results of their analyses are available at the continental scale and at other geographic scales as well.

Across the Southern Rockies BBS Region, data has been collected nearly every spring on each of 41 BBS routes region-wide. Data derived from these surveys from 1966-2007 imply a

significantly decreasing trend and since 1980, the trend is decreasing even more rapidly (Sauer et al. 2011).

Other estimates of Wilson's warbler abundance estimates have been derived for each county in Colorado through collaboration of the Colorado Division of Wildlife, Colorado State University, and the Colorado Natural Heritage Program. As a result of this collaborative effort, the Colorado Natural Diversity Information Source website (Natural Diversity Information Source 2011b) identifies the Wilson's warbler abundance as common (observed daily; 25 to 100 per day in appropriate season and habitat) for the counties of Garfield, Grand, Rio Blanco, and Routt. The warbler is considered fairly common (observed daily; 10 to 25 per day in appropriate season and habitat) for Jackson and Moffat counties. Additionally, raw data associated with this monitoring program is included in the Rocky Mountain Bird Observatory database. A query of the Rocky Mountain Bird Observatory database for this species provided positive (increasing) populations trend information on observations of Wilson's warbler from monitoring transects located on the Routt National Forest (Rocky Mountain Bird Observatory 2011).

The net status of habitat conditions on the Routt National Forest is uncertain. Kingery (1998) suggests that "the higher elevation habitats would seem to face few threats other than grazing pressure, so the species, at least in Colorado, appears secure." Though rangeland management practices have improved over the last 50 years such that impacts to willow and riparian habitats should have lessened over time, elk populations have increased in the same timeframe. Therefore, the riparian/willow habitats of the Wilson's warbler may be suppressed, because elk will hedge and trample willows (Baker et al. 2005).

The information presented here has some conflicting estimates on trend. The Wilson's warbler appears to be common in the Colorado (53rd most common out of 264 breeding bird species) (Kingery 1998) and Rocky Mountain Bird Observatory trend estimates suggest that this warbler is increasing. BBS suggest a declining trend within the southern Rocky Mountain region and the State of Colorado (Sauer et al. 2011). On the Routt National Forest, Wilson's warblers are found in their preferred habitats when surveyed for, thus suggesting that this warbler is common on the planning unit. Trend and abundance information will need to be collected to verify the status of the Wilson's warbler through the continued implementation of the Routt National Forest standardized survey. Conservation measures for the GRSG would likely benefit the Wilson's warbler.

Colorado River Cutthroat Trout (Oncorhynchus clarki pleuriticus). Several sources of information are available and are useful for estimating current population trend and abundance for Colorado River cutthroat trout. The data used for Colorado River cutthroat trout is from various sources which include conservation plans, CPW stocking reports, and survey data from within the project area. While none of these data are independently adequate to estimate Colorado River cutthroat trout population trend and abundance, and some information may even be contradictory, collectively the information affords a basis for making credible inferences about population trend and abundance for Colorado River cutthroat trout.

Behnke (1992) reported that pure Colorado River cutthroat trout populations were thought to occupy less than 1 percent of their historical range. More recent work by Hirsch et al. (2006) estimates that Colorado River cutthroat trout occupy 13 percent and potentially up to 14 percent of their historical range in the mountainous regions of the Colorado River Basin identified by Benhke 1992). The recent information update by Hirsch et al. (2006) identified 3,022 miles of occupied stream habitat in 42 4th level HUC's. Of the 3,022 miles, 224 miles were outside of historical habitats identified by Behnke (1992), which adds an additional 1 percent, thus it is

estimated that up to 14 percent of historical habitat is occupied by Colorado River cutthroat trout. The additional information was concluded to be the result of the establishment of an interagency Colorado River cutthroat trout Conservation Team in 1999. As the Colorado River cutthroat trout team focused their efforts many more populations were discovered or re-located. Through this effort "conservation populations" were identified based on genetic purity or if Colorado River cutthroat trout displayed unique life history traits and ecological characteristics in the presence of hybridization. A "core conservation population" is a conservation population that is greater than 99 percent pure, and representative of the historic genome of native cutthroat trout. Of occupied habitat, 285 Colorado River cutthroat trout conservation populations were identified (Hirsch et al. 2006). The Yampa River Basin has 53 conservation populations identified in 79 streams or 339 miles of stream. The Yampa River Basin has the third highest number of conservation populations (Upper Green River Basin has 76 populations, ranked 1st and Upper Colorado has 75 populations, ranked 2nd).

Within the state of Colorado, the cutthroat trout is a game species that can be caught, but fishing regulations often require cutthroat to be released. Many cutthroat waters, specifically identified in the cutthroat conservation require fishing by artificial flies and lures and all cutthroat must be returned to the water immediately (CPW 2007). These restrictions are designed to protect the growing number of cutthroat streams and lakes included in conservation and recovery actions. CPW manages fisheries and stocking of approximately 173 lakes across the Routt National Forest. CPW is actively stocking mountain lakes on the Routt National Forest with an average of 58,000 cutthroats per year. There are several lakes that are managed as a pure cutthroat fishery. Many of the lakes are stocked at high numbers so that the cutthroat can successfully compete with the nonnative trout. Although the cutthroat trout are stocked at high numbers, competition, replacement, or hybridization probably is occurring.

To provide for plausible replacement or hybridization occurring in these lakes, additional data was provided on the number of cutthroat lakes with other trout species present. Few lakes on the Routt National Forest are stocked by the CPW with brook or rainbow trout, because rainbow or brook trout populations can complicate restoration efforts for re-establishing native cutthroat trout populations.

For the preparation of the Forest Plan Revision (USFS 1998), 606 miles of streams were analyzed for four trout species: cutthroat, brook, brown, or rainbow trout. Of the 606 miles, 197 miles had cutthroat trout present (Routt National Forest 1996). Of the 197 miles of cutthroat streams, 37 miles had presence of brook trout, 3.5 miles had brown trout, and 7 miles had rainbow trout. Overall, 24 percent of the cutthroat streams have the presence of other trout species which suggests that replacement or hybridization is likely occurring.

There is uncertainty on how to define viability or stability among researchers for Colorado River cutthroat trout populations (Colorado River Cutthroat Trout Coordination Team 2006). Some small, isolated populations of Colorado River cutthroat trout have been stable for many years while other populations are at risk of decline. Hirsch et al. (2006) provided measures of population health which includes population connectivity, disease risk, genetic purity, population estimate, habitat condition, and presence of nonnatives for each conservation population. Hirsch et al. (2006) is the first comprehensive attempt at assessing population viability or stability for Colorado River cutthroat trout populations. Until further understanding and agreement is reached by the Colorado River Cutthroat Trout Conservation Team on how to assess population viability and stability, a collective population trend across the Routt National Forest will not be provided.

Brook Trout (Salvelinus fontinalis). Several sources of information are available and are useful for estimating current population trend and abundance for brook trout. The data used for brook trout is from various sources which include CPW stocking reports and survey data from within the analysis area. While none of these data are independently adequate to estimate brook trout population trend and abundance, and some information may even be contradictory, collectively the information affords a basis for making credible inferences about population trend and abundance for brook trout.

Globally and nationally, the conservation status is G5 ~ Secure and N5 ~ Secure, respectively (NatureServe 2006). NatureServe (2006) does not have a conservation status rank for Colorado, because it is not a suitable target for conservation activities. Within the state of Colorado, the brook trout is a game species and can be harvested (CPW 2007). The daily bag limit is 4 and possession limit is up to 8. In addition to the 4 bag/8 possession limit, brook trout that are 8 inches or less, the daily bag and possession limit is 10 brook trout. The brook trout was first introduced into Colorado in the late 1800's (CPW 2006). In the early 1900's, state and federal hatcheries began stocking brook trout in great numbers. The numbers peaked in 1930, when 15.4 million brook trout were stocked into Colorado streams and lakes. Most streams in Colorado have a self-sustaining population of wild brook trout that likely are descendants of the 19th Century pioneers.

At a broad scale, brook trout are found to be abundant across the streams of the Routt National Forest. For the preparation of the Forest Plan Revision (1998), a GIS analysis was completed for presence of trout species. Approximately 606 miles of stream were analyzed for the presence of brook, brown, cutthroat, or rainbow trout species. Out of the 606 miles of streams analyzed, approximately 439 miles of stream had brook trout present (USFS 1996). Through this analysis it was estimated that 72 percent of the streams on the Routt National Forest have the presence of brook trout, but this percentage is likely higher with so few streams having only Colorado River cutthroat, brown, or rainbow trout present.

Collectively, available population and habitat information suggests brook trout on the Routt National Forest have a population trend that is stable or likely increasing. Except for streams that are designated as Colorado River cutthroat trout 'conservation populations', the brook trout is widely distributed across the Forest and is well-distributed in mountain streams, ponds, and lakes. The Natural Diversity Information Source (2007) categorizes this cold water game fish in Colorado streams as extremely prolific with up to 3,500 brook trout per acre which also suggests stability and likely increasing populations.

Other Wildlife: Elk

The USFS Range and Wildlife Programs continue to work collaboratively with the CPW to monitor changes in elk and deer numbers as well as vegetation. In addition, all three agencies, with assistance from the Habitat Partnership Program, have collaborated on wildlife habitat improvement projects for elk, deer, and GRSG in northwest Colorado to improve habitat conditions and forage availability for elk and other wildlife species.

CPW adjust elk and deer herd objectives to address the land management agencies and the public's concern about competition for resources in northwest Colorado as Data Analysis Unit plans for deer and elk are developed. For example, during the development of the E-6 Data Analysis Unit plan for elk, which covers a large area in northwest Colorado, CPW recommended a 25 percent decrease in elk to address management concerns, which included maintenance of acceptable range and forage conditions, concerns regarding drought, potential impacts of

oil and gas development on winter ranges, and elk and mule deer competition on winter range (Finley 2005). Due to issues and concerns raised by CPW, USFS, BLM, and the public during the development of the E-6 Data Analysis Unit plan, the elk herd objective was set at a recommended range of 32,000 to 39,000 (Finley 2005). Currently, the elk herds are estimated at a range of 36,000 to 40,000 based on the post-hunt data from 2011 (Finley 2012).

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3.3. Special Status Species

The ESA requires that federal agencies ensure, in consultation with USFWS, that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered and threatened species, or result in the destruction or adverse modification of habitat of such species that is determined critical by USFWS. There are three effect (impact) determinations for consultation:

- no effect (concludes consultation)
- may affect, not likely to adversely affect (effects must be discountable, insignificant, or completely beneficial for this determination; USFWS concurrence required)
- may affect, likely to adversely affect (the appropriate determination when adverse effects may occur as a direct or indirect consequence and are not discountable, insignificant, or completely beneficial; triggers formal consultation and requires a Biological Assessment from the action agency and, subsequently, a Biological Opinion from USFWS

BLM

Special status species include animal or plant species that are formally designated by USFWS as federally endangered or threatened, proposed for listing, or candidates for listing. They also include those species designated by the CPW as state endangered or threatened Species, and those identified as BLM Sensitive species in the State of Colorado.

Responsibilities for management of federally listed, proposed, or candidate species are outlined in the ESA, as well as in the BLM Special Status Species Manual (Manual 6840; BLM 2008). The policy for management of federally listed species is to not authorize, fund, or implement any actions that are likely to jeopardize the continued existence of listed species, or to destroy or adversely modify designated critical habitat, and to develop programs to conserve listed species.

The goal of special status species management is to improve or provide habitat for the species that may exist on public lands in order to maintain viable populations of these species. Principal considerations include management of species habitat in order to ensure continued use by these species, identification of areas where other resource activities may conflict with special status species and their habitat requirements, and incorporation of programmatic consultations and conservation strategies.

Species discussed in this section have been listed by USFWS or by the State of Colorado, or have been placed on the Colorado BLM State Director's sensitive species list. The USFWS manages threatened and endangered species and designated critical habitat, in cooperation with other federal agencies, in order to support recovery. The BLM cooperates with USFWS in order to determine and manage habitats to support the species. Candidate species are managed in a manner designed to maintain viable populations, with the objective of preventing the need for them to be listed by the federal government. Under the ESA, federally listed threatened and endangered species require specific management. The ESA requires a consultation with USFWS (a Section 7 consultation) on any actions taken that are planned to occur where these species reside.

The BLM Special Status Species Manual defines Special Status Species as:

- species listed, or proposed for listing, under the ESA; and
- species requiring special management consideration in order to promote their conservation and to reduce the likelihood and need for future listing under the ESA, which are designated as BLM Sensitive by the BLM State Director(s).

All federal candidate species, proposed species, and delisted species in the 5 years following delisting, will be conserved as BLM Sensitive species. Species designated as BLM Sensitive species must be native species found on BLM-administered lands for which the BLM has the capability to significantly affect the conservation status of the species through management, and either:

- there is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range, or
- the species depends upon ecological refugia or specialized or unique habitats on BLM-administered lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk (BLM 2008).

It is BLM policy to provide BLM Sensitive species with the same level of protection that is given federal candidate species. The major objective of this protection is to preclude the need for federal listing.

USFS

The USFS has policy and direction on how wildlife, fish, and plant species and their habitats are managed. These species may be threatened, endangered, or sensitive plants and animals. Direction on how these species should be managed is described in the USFS Manual 2600, Chapter 2670. The 2670.12 US Department of Agriculture Directives, Departmental Regulation 9500-4, provides regulation and directs the USFS to:

1. Manage "habitats for all existing native and desired nonnative plants, fish, and wildlife species in order to maintain at least viable populations of such species."
2. Conduct activities and programs "to assist in the identification and recovery of threatened and endangered plant and animal species."
3. Avoid actions "which may cause a species to become threatened or endangered."

Federal land management agencies must consult on any action that may affect a federally listed species (threatened or endangered) and must conference on any action that may affect a species proposed for listing. Section 7(c)(1) of the ESA requires a Biological Assessment be performed if a listed species or critical habitat may be present in the action area (US Department of Agriculture 2011).

The USFS has developed policy regarding the designation of plant and animal species (USFS Manual 2670.32; Region 2 USFS Manual Supplement 2670-2011-1). In the Rocky Mountain Region, species are identified as USFS Sensitive, and are included on a comprehensive list, using eight evaluation criteria to determine the merits of sensitive status for a particular species (USFS Manual 2672.11, Region 2 USFS Manual Supplement No. 2600-2003-1, Exhibit 02). The Regional Forester's list was last updated in 2011 (Holifield 2011). All candidate species are automatically placed on the USFS Sensitive species list. As such, because GRSG is a candidate species, it also is a USFS Sensitive species.

3.3.1. Existing Conditions

Conditions of the Planning Area

There are 14 federally listed wildlife species and 9 listed plant species in the planning area. In addition, the planning area includes five candidates for federal listing, including the GRSG. These species may also be listed as sensitive by the BLM/USFS or as priority species by the State of Colorado. Within the planning area, the distribution of most of the special status wildlife species is known from land health assessment comments, Colorado Natural Heritage Program, CPW GIS data, Rocky Mountain Bird Observatory, field surveys, and other reports. Limited inventories and surveys have been conducted for special status wildlife species in the planning area. Specific management direction to influence habitat components, leading to species recovery, is integrated into BLM and USFS management plans.

Table 3.6, Special Status Animal Species in the Planning Area, and **Table 3.7**, Special Status Plant Species in the Planning Area, summarize those species located in the planning area and in

which field office(s) or National Forest their habitat exists. These are also displayed in **Figure 3-3**, Special Status Species. The tables include each species' listing status and its habitat requirements. GRSG is discussed in more detail following the tables.

Greater Sage-Grouse

GRSG is one of the most important, if not the most important, wildlife species that depends upon the sagebrush vegetative type. The downward trend of GRSG and its sagebrush-dominated habitat throughout its historical range have become a focus of wildlife and land managers in recent years. With the recent interest in the long-term well-being of GRSG and the sagebrush ecosystem, the CPW, BLM, and USFS have committed to ensuring that this species remains a high priority for management (BLM 2004b).

The GRSG is a federal candidate species for listing under the ESA, a Colorado BLM Sensitive species, USFS Sensitive species, and a Colorado species of concern.

GRSG are considered a sagebrush ecosystem obligate species. Obligate species are those species that are restricted to certain habitats or to limited conditions during one or more seasons of the year to fulfill their life requirements. GRSG are only found where species of sagebrush exist. Sagebrush species provide nesting, brooding, and fall and winter cover, as well as forage throughout the year (Colorado Greater Sage-Grouse Steering Committee 2008).

Each year, male GRSG congregate in late winter through spring on leks to display their breeding plumage, and to attract hens for mating. An active lek is a traditional display area attended by two or more male GRSG in two or more of the previous 5 years. Normally, the area is located in a very open site in, or adjacent to, sagebrush-dominated habitats. Generally, lek sites are traditional, with the same lek sites used year after year. Taller sagebrush on the outskirts of the leks is necessary as a food source, escape cover, nesting cover for females, and loafing cover during the day (Colorado Greater Sage-Grouse Steering Committee 2008). Typically, leks are positioned within proximity of nesting and brood-rearing habitat; therefore, they are often considered an excellent reference point for monitoring and habitat protection measures.

Table 3.6. Special Status Animal Species in the Planning Area

Common Name	Scientific Name	Status[1]	General Habitat	CRVFO	GJFO	KFO	LSFO	WRFO	Routt National Forest
MAMMALS									
American marten	Martes Americana	FSS	Mature coniferous and mixed deciduous forest				X		X
Big free-tailed bat	Nyctinomops macrotis	BLMS	Found in rocky canyons where it roosts in crevices		X			X	
Black-footed ferret	Mustela nigripes	FE, SE	Occupies prairie dog towns almost exclusively; prairie dog prey base in the planning area unlikely to be large enough to support breeding population				X	X	
Canada lynx[3]	Lynx canadensis	FT (P), SE	Habitat suitable to support viable populations of lynx is thought to consist of 15- to 25-square-mile areas of contiguous Spruce-fir and lodgepole pine forests on slopes of less than 30 percent	X	X	X	X	X	X
Fringed myotis	Myotis thysanodes	BLMS, FSS	Coniferous forest and woodland; ponderosa pine, pinyon-juniper, greasewood, saltbush and oak; roosts in rock crevices, caves, abandoned mines and buildings and trees; hibernates in caves and buildings	X	X			X	X
Gray wolf[4]	Canis lupus	FC, SE	Range through mixed open and forestland with abundant prey; can disperse long distances when not taken by humans						
Hoary bat	Lasiurus cinereus	FSS	Roosts primarily in foliage of coniferous trees, occasionally in caves, and forages over open areas				X	X	X
North American wolverine[4]	Gulo gulo	SE, FC, FS, SE-S	Dense forest at higher elevations; nearly extirpated from Colorado			X	X		X
Pygmy shrew	Sorex hoyi	FSS	Open wet areas in coniferous and deciduous forests						X

Common Name	Scientific Name	Status[1]	General Habitat	CRVFO	GJFO	KFO	LSFO	WRFO	Routt National Forest
Rocky Mountain bighorn sheep	Ovis canadensis	FSS	Found in alpine meadows, grassy mountain slopes and foothills near rugged, rocky cliffs and bluffs		X	X			X
Southwest river otter	Lutra canadensis sonorae	SE, FS, SE-S	Inhabits high quality riparian areas along permanent water with abundant food base	X	X	X	X	X	X
Spotted bat	Euderma maculatum	BLMS, FSS	Found in cliffs, dense forests, agricultural fields, marshes, riparian areas and shrub-steppe grasslands		X		X	X	X
Swift fox	Vulpes velox	BLMS, FSS	Dens in sandy soils of deserts and short-grass prairies				X		
Townsend's big eared bat	Corynorhinus townsendii pallescens	BLMS, FSS	Roosts and hibernates usually in caves and abandoned mines; however, may roost in old buildings, tunnels and bridges; typically feeds along riparian habitat, open areas, edge habitats	X	X	X		X	X
White-tailed prairie dog	Cynomys leucurus	BLMS, FSS	Found in valleys between 5,000 and 10,000 feet in desert grasslands and shrub grasslands	X	X	X	X	X	
BIRDS									
American peregrine falcon	Falco peregrinus anatum	BLMS, SC, FS, SC-S	Nests in high cliffs and hunts along riparian zones, especially the Colorado river and uplands above the Roan cliffs	X	X	X	X	X	X
American white pelican	Pelecanus erythrorhynchos	BLMS	Found in open areas of brackish or freshwater lakes near vegetation or rocks	X	X	X	X	X	X

Common Name	Scientific Name	Status[1]	General Habitat	CRVFO	GJFO	KFO	LSFO	WRFO	Routt National Forest
Bald eagle	Haliaeetus leucocephalus	FS, ST FSS Protected under Bald and Golden Eagle Protection Act	Nests in tall trees (typically mature cottonwood in this area) along the Colorado River and hunt along the river and adjacent uplands; seasonal migrant/historic resident	X	X	X	X	X	X
Barrow's goldeneye	Bucephala islandica	BLMS	Breeds in wooded lakes and ponds of western mountains						
Black swift	Cypseloides niger	BLMS, FSS	Nests on steep cliffs near waterfalls and forages in high elevation areas			X			X
Black tern	Chlidonias niger	BLMS FSS	Freshwater marshes, nesting on floating material or near-shore vegetation			X			
Boreal owl	Aegolius funereus	FSS	Cavity nester in dense coniferous forests			X			X
Brewer's sparrow	Spizella breweri	BLMS, FSS	Sagebrush/shrubland obligate, found on mesas and foothills in dense stands interspersed with grassy areas	X	X	X	X	X	X
Columbian sharp-tailed grouse	Tympanuchus phasianellus columbianus	SE, BLMS, FSS	Breeding in grassland, savanna, partially cleared boreal forest, shrubland, and sagebrush; leks are usually found on small knolls; nests in small depression in grass or under a shrub; may be a seasonal migrant	X		X	X	X	X
Ferruginous hawk	Buteo regalis	BLMS, SC, FSS	Breeding: open country (prairies, plains, badlands); nests in tree with commanding view, on ground, bank, butte or slope; historic and seasonal migrants	X	X	X	X	X	
Flammulated owl	Otus flammeolus	FSS	Cavity nester in mature mixed coniferous forests, primarily Douglas fir and ponderosa pine; migratory				X	X	X

Common Name	Scientific Name	Status[1]	General Habitat	CRVFO	GJFO	KFO	LSFO	WRFO	Routt National Forest
Golden eagle	Aquila chrysaetos	Protected under Bald and Golden Eagle Protection Act	Nest in cliffs, tall trees or human structures; forage over large areas	X	X	X	X	X	X
Greater Sage-Grouse	Centrocercus urophasianus	BLMS, FC(w), FS	Breeding in sagebrush, nests under sagebrush	X	X	X	X	X	X
Greater sandhill crane	Grus canadensis tabida	ST	Breeding in shallow wetlands, freshwater margins; nests on ground and requires surrounding water or undisturbed habitat; seasonal migrant	X	X	X	X	X	
Gunnison Sage-Grouse	Centrocercus minimus	FP, FSS	Breeding in sagebrush, nests under sagebrush		X				
Least tern	Sterna antillarum	FE, SE	Bare sand on shorelines of rivers, lakes, and reservoirs			X[2]			
Lewis's woodpecker	Melanerpes lewis	FSS	Open pine woodlands, and other areas with scattered trees and snags		X	X	X		X
Loggerhead shrike	Lanius ludovicianus	FSS	Open grassland, pasture, sagebrush, and desert		X		X	X	X
Long-billed curlew	Numenius americanus	BLMS, SC, FSS	Short-growth grasslands, mixed-grass prairies, meadows, scrub communities, cultivated fields, mud flats, salt marshes and edges of ponds, and lakes	X	X	X	X	X	
Mexican spotted owl	Strix occidentalis	FT, ST	Breeding: in dense old growth conifer (especially old growth fir) and deciduous (especially in steep walled canyons); nests in cliffs and abandoned platform nests of raven, eagle and hawks	X		X	X		
Mountain plover	Charadrius montanus	BLMS, PT, SC, FSS	Nests in flat dry land with sparse vegetation: short-grass prairie, farms, shrub-steppe, grazed areas			X	X		

Common Name	Scientific Name	Status[1]	General Habitat	CRVFO	GJFO	KFO	LSFO	WRFO	Routt National Forest
Northern goshawk	Accipiter gentilis	BLMS, FSS	Breeding: mixed, often mostly coniferous, forest, open woodland typically in mature aspen, mixed aspen/conifer and in lodgepole pine; nest in crotch or by trunk, occasionally in aspen	X	X	X	X	X	X
Northern harrier	Circus cyaneus	FSS	Wet grassland and marshes; less common in dry grassland, shrub-steppe and desert		X	X	X	X	X
Olive-sided flycatcher	Contopus cooperi	FSS	Coniferous forests and mixed woodlands, early colonizer after fire			X	X	X	X
Piping plover	Charadrius melodus circumcinctus	FT, ST	Open, sparsely vegetated sand and gravel near alkali wetlands, beaches and sandbars			X[2]			
Purple martin	Progne subis	FSS	Breed in open areas near water, nest in cavities				X	X	X
Sage sparrow	Amphispiza belli	FSS, BLMS	Found in sagebrush shrub-steppe; sagebrush obligate species	X	X	X	X	X	X
Southwestern willow flycatcher	Empidonax traillii extimus	FE, SE,	Breeding in willow (and tamarisk) thickets along rivers and streams; nests in upright or slanting fork; Colorado River, west of Rifle, Colorado						
Western burrowing owl	Athene cunicularia	ST, BLMS FSS	Breeding: grassland, prairie, savanna, open areas near human habitation; nests in burrows, often associated with prairie dog towns	X	X	X	X	X	
Western snowy plover	Charadrius alexandrinus nivosus	BLMS, SC	Breeding in beaches and dry mud or salt flats; sand margins of rivers, lakes, and ponds			X			
Western yellow-billed cuckoo	Coccyzus americanus occidentalis	FC, FSS	Cottonwood-willow galleries along streams and river corridors	X	X	X	X		

Common Name	Scientific Name	Status[1]	General Habitat	CRVFO	GJFO	KFO	LSFO	WRFO	Routt National Forest
White-faced ibis	Plegadis chihi	BLMS	Breeds in marsh, swamps, ponds, rivers-mostly freshwater, nests in aquatic vegetation, usually on ground but occasionally in shrubs or low trees; may be seasonal migrant	X	X	X	X	X	
White-tailed ptarmigan	Lagopus leucurus	FSS	Alpine and sub-alpine habitats			X			X
Whooping crane	Grus americana	FE, SE	Seasonal migrant with sandhill cranes			X[2]			
FISH									
Bluehead sucker	*Catostomus discobolus*	BLMS FSS	Colorado River Basin	X	X	X	X	X	
Bonytail chub	*Gila elegans*	FE, SE	Critical habitat: Colorado River, Yampa River, Dinosaur National Monument west, Ruby Canyon west (not in planning area)	X	X	X[2]	X	X[2]	
Colorado River cutthroat trout	*Oncorhynchus clarkii pleuriticus*	BLMS, FSS, SC	Tributaries to the Colorado River Basin	X	X	X	X	X	
Flannelmouth sucker	*Catostomus latipinnis*	BLMS FSS	Colorado River Basin	X	X	X	X	X	
Colorado pikeminnow	Ptychocheilus lucius	FE, SE	Upper Colorado River Basin	X	X	X[2]	X	X	
Greenback cutthroat trout	Oncorhynchus clarkii stomias	FT, ST	South Platte and Arkansas Rivers	X	X	X	X		
Humpback chub	*Gila cypha*	FE, SC	Critical habitat: Colorado River, Yampa River, Dinosaur National Monument west, Ruby Canyon west (not in planning area)	X	X	X[2]	X	X[2]	
Mountain sucker	*Catostomus platyrhynchus*	BLMS, SC, FSS, SC-S	Colorado River Basin	X			X	X	X
Pallid sturgeon	*Scaphirhynchus albus*	FE, SE	North Platte and Missouri Rivers			X[2]			
Razorback sucker	*Xyrauchen texanus*	FE, SE	Critical habitat: Colorado River, Rifle west, Yampa River, Gunnison River	X	X	X[2]	X	X[2]	

Common Name	Scientific Name	Status[1]	General Habitat	CRVFO	GJFO	KFO	LSFO	WRFO	Routt National Forest
Roundtail chub	*Gila robusta*	BLMS, SC, FSS, SC-S	Colorado River Basin	X	X	X	X	X	X
REPTILES									
Midget faded rattlesnake	*Crotalus viridis concolor*	BLMS, SC	Desert scrub, rocky outcrops, canyonlands	X	X		X	X	
AMPHIBIANS									
Boreal toad	Bufo boreas boreas	FC (w), ST, BLMS, FSS	Wetlands, elevation range from 8,000 to 12,000 feet	X		X	X		X
Great Basin spadefoot	Spea intermontana	BLMS, SC	Pinyon-juniper, sagebrush, semi-desert shrub, dry rocky slopes and canyons, elevation range less than 6,000 feet	X	X		X	X	
Milk snake	Lampropeltis triangulum taylori	BLMS, SC	Forested or open areas and rocky slopes	X	X			X	
Northern leopard frog	Rana pipiens	BLMS, SC, FSS, SC-S	Wetlands, ponds, riparian areas, elevation range up to 11,000 feet	X	X	X	X	X	X
Wood frog	Rana sylvatica	SC, FSS, SC-S	Forest and woodland habitats, and at edges of ponds and streams			X			X

[1] Status Codes:

FE Federally listed as endangered

FT Federally listed as threatened

FC Federally listed as a candidate species

FP Federally proposed for listing as endangered

SE State listed as endangered

ST State listed as threatened

SC State listed as species of special concern (no legal status)

BLMS Colorado BLM Sensitive

Common Name	Scientific Name	Status[1]	General Habitat	CRVFO	GJFO	KFO	LSFO	WRFO	Routt National Forest
FSS USFS Sensitive									
[2] These species do not occur in the KFO planning area, but water depletions may affect the species and/or critical habitat in downstream reaches.									
[3] These species are relatively uncommon species in the BLM planning area.									
[4] These species are unlikely to occur in the BLM planning area.									

Table 3.7. Special Status Species in the Planning Area

Common Name	Scientific Name	Status[1]	General Habitat	CRVFO	GJFO	KFO	LSFO	WRFO	Routt National Forest
Bladder's-mouth orchid	Malaxis brachypoda (= M. monophyllus spp. Brachypoda)	FSS	Riparian areas (7,200-8,000 feet)						X
Autumn willow	Salix serissima	FSS	Wetland areas including marshes, fens, and bogs (7,800-10,200 feet)						X
Boat-shaped bugseed	Corispermum navicula	BLMS	Endemic to cold climate dunes in northern Colorado			X			
Cathedral Bluff dwarf gentian	Gentianella tortuosa	BLMS	Barren shale knolls and slopes of the Green River Formation (8,500-10,800 feet)					X	
Cathedral Bluffs meadow-rue	Thalictrum heliophilum	BLMS	Dry shale barren communities in Garfield, Mesa, and Rio Blanco Counties in northwestern Colorado (6,200-8,800 feet)	X	X			X	
Clay hill buckwheat	Eriogonum viridulum	BLMS	Sand flats or clay slopes and hills, saltbush or sagebrush communities, pinyon-juniper woodlands				X		
Club spikemoss	Selaginella selaginoides	FSS	Marshy areas and wet spruce forests; east side of the Park Range						X
DeBeque milkvetch	Astragalus debequaeu	BLMS	Saline, selenium rich soils found on barren outcrops of dark clay interspersed with lenses of sandstone (5,100-6,400 feet)		X				
DeBeque phacelia	Phacelia submutica	FT	fine-textured, sandy, clay soils (4,970-6,500 feet)		X				
Colorado feverfew	Parthenium ligulatum (Bolophyta ligulata)	BLMS	Gypseous shale soils; bare clayey and gravelly areas				X		
Colorado hookless cactus	Sclerocactus glaucus	FT	Deserts, sagebrush/scrublands (3,900-6,000 feet)		X				

Common Name	Scientific Name	Status[1]	General Habitat	CRVFO	GJFO	KFO	LSFO	WRFO	Routt National Forest
Colorado tansy aster	Machaeranthera coloradoensis	FSS	Mountain parks, slopes and rock outcrops and dry tundra (8,500-12,500 feet)						X
Debris milkvetch	Astragalus desperatus	BLMS	Pinyon-juniper and mixed desert shrub, often on rocky soils ranging from sandy clays to sandy loams: also alluvial terraces with cobbles (5,400-7,200 feet)				X	X	
Dropleaf buckwheat	Eriogonum exilifolium	FSS	Sagebrush flats; North and Middle Parks (7,500-9,000 feet)			X			X
Duchesne milkvetch	Astragalus duchesnensis	BLMS	Pinyon-juniper woodland and desert shrub, around sandstone or shale outcrops (4,600-6,400 feet)				X	X	
Dudley Bluffs bladderpod	Physaria congesta	FT	Barren, white shale outcrops of the Green River and Uinta Formations (6,000-6,700 feet)					X	
Dudley Bluffs Twinpod	Physaria obcordata	FT	Barren, white outcrops and steep slopes of the Parachute Creek Member of the Green River Formation (5,900-7,500 feet)					X	
Dwarf raspberry	Rubus arcticus var. acaulis (= Cylactis arctica ssp. Acaulis)	FSS	Wetlands in willow carrs and mossy stream sides (8,600-9,700 feet)						X
Elliptic spikerush	Eleocharis elliptica	FSS	Wetlands; widely distributed in North America but with few confirmed Colorado records						X
Ephedra buckwheat	Eriogonum ephedroides	BLMS	Shale and clay flats of slopes in saltbush, sage and pinyon-juniper habitats (4,900-6,900 feet)				X	X	
Flaming Gorge evening primrose	Oenothera acutissima	BLMS	Seasonally wet areas in meadows, depressions or along arroyos, mixed conifer forest to sagebrush, on sandy gravelly, or rocky soils (5,300-8,500 feet)				X	X	

Common Name	Scientific Name	Status[1]	General Habitat	CRVFO	GJFO	KFO	LSFO	WRFO	Routt National Forest
Fragile rockbrake	Cryptogramma stelleri	BLMS	Rarely seen fern that exists in cool, moist, sheltered calcareous cliff crevices and rock ledges, typically in coniferous forest or other boreal habitats			X			
Gibbens' beardtongue	Penstemon gibbensii	BLMS	Shale and sandy clay in sagebrush, saltbush and pinyon-juniper woodland				X		
Graham's beardtongue	Penstemon grahamii	FC (w), FSS	Talus slopes and knolls of the Green River Formation in sparsely vegetated desert scrub and pinyon-juniper (5,800-6,000 feet)					X	X
Hairy Townsend daisy	Townsendia strigosa	BLMS	Open sites, sands, shales, clays with desert scrub, juniper, pinyon				X		
Harrington's penstemon (Harrington's beardtongue)	Penstemon harringtonii	BLMS, FSS	Found in open sagebrush shrublands (*Artemisia tridentata* ssp. *pauciflora* or *A. tridentata* ssp. *Wyomingensis*) on rocky loams or rocky clay loams derived from coarse calcareous parent materials (basalt) (6,200-10,000 feet)	X		X			X
Hoary willow	Salix candida	FSS	Fens and pond and stream edges in foothill/montane wetlands (8,800-10,600 feet)						X
Largeflower triteleia	Triteleia grandiflora	FSS	Full sunlight to partial shade in meadows, grasslands, sagebrush, pinyon-juniper woodlands, aspen woodlands, pine forests, and scattered woodlands (7,760 feet)						X
Lesser bladderpod	Utricularia minor	FSS	Shallow water of subalpine ponds (5,500-9,000 feet)						X
Lesser panicled sedge	Carex diandra	FSS	Wet meadows and subalpine willow cars (7,400-9,000 feet)			X			X
Ligulate feverfew	Bolophyta ligulata (Parthenium ligulatum)	BLMS	Barren shale knolls (5,400-6,500 feet)					X	

Common Name	Scientific Name	Status[1]	General Habitat	CRVFO	GJFO	KFO	LSFO	WRFO	Routt National Forest
Narrow-leaved moonwort	Botrychium lineare	FSS	Disturbed sites, grassy slopes among medium height grasses, along edges of streamside forests, alpine areas and aspen forests (7,900-9,500 feet)			X			X
Narrow-stem gilia	Gilia stenothyrsa	BLMS	Grassland, sagebrush, mountain mahogany, or pinyon-juniper; silty to gravelly loam soils of the Green River formation (6,200-8,600 feet)					X	
Naturita milkvetch	Astragalus naturitensis	BLMS	Sandstone ledges and canyon rims pinyon-juniper woodland (5,400-6,200 feet)		X				
North Park phacelia	Phacelia Formosula	FE	Barren exposures where Coalmont Formation forms outcrops or ledges of sandy soil or ledges; most abundant on steep, sparsely vegetated, erodible slopes (such as on the sides of deep ravines)			X			
Osterhout milkvetch	Astragalus osterhoutii	FE, BLMS	Indigenous to Grand County, this species prefers alkaline, selenium-rich clay soils derived mostly from Niobrara and Pierre shale; found between 7,500 and 7,700 feet on barren and relatively flat areas			X			
Pale blue-eyed grass	Sisyrinchium pallidum	BLMS	Prefers fens, wet meadows, and stream edges			X			
Parachute penstemon (Parachute beardtongue)	Penstemon debilis	FT	Steep talus slopes of the Parachute Creek Member of the Green River Shale Formation in Garfield County (8,000-9,000 feet)	X					
Park Milkvetch	Astragalus leptaleus	FSS	Moist swales and meadows; South Park to the Wet Mountain Valley (7,500-10,000 feet)						X

Common Name	Scientific Name	Status[1]	General Habitat	CRVFO	GJFO	KFO	LSFO	WRFO	Routt National Forest
Paradox moonwort	Botrychium paradoxum	FSS	Grassy meadows, gravelly road sides, low herbaceous cover under small conifer saplings; probably at 5,000–9,000 feet; 2 small sites in Colorado.						X
Penland alpine fen mustard	Eutrema penlandii	FT	Alpine tundra habitat above 12,000 feet			X			
Penland beardtongue	Penstemon penlandii	FE, BLMS	Indigenous to Grand County, this species is found in run-off channels shaded by deeply cut banks			X			
Piceance bladderpod	Lesquerella parviflora	BLMS	Shale outcrops of the Green River Formation, on ledges and slopes of canyons in open areas (6,200-8,600 feet)		X			X	
Roan Cliffs blazingstar	Mentzelia rhizomata	BLMS	Steep talus slopes of the Green River Shale Formation in Garfield County (5,800-9,000 feet)	X					
Rock tansy	Sphaeromeria capitata	BLMS	Dry, rocky hills (5,000-7,800 feet)				X		
Rollins cryptantha	Cryptantha rollinsii (Oreocarya rollinsii)	BLMS	White shale slopes of the Green River Formation, in pinyon-juniper or cold desert shrub communities (5,300-5,800 feet)					X	
Selkirk violet	Viola selkirkii	FSS	Forests from montane to subalpine (6,000-9,100 feet)						X
Singlestem buckwheat	Eriogonum acaule	BLMS	Gravelly or clayey flats and slopes, saltbush or sagebrush (6,500-8,000 feet)				X		
Slender cotton grass	Eriophorum gracile		Montane and subalpine wetlands, wet meadows and pond edges (8,100-12,000 feet)			X			X
Tufted cryptantha	Cryptantha cae-spitosa(Oreo-carya caespitosa)	BLMS	Sparsely vegetation shale knolls, with pinyon-juniper or sagebrush; usually with other cushion plants (5,500-8,100 feet)				X	X	
Uinta Basin springparsley	Cymopterus duchesnensis	BLMS	Desert shrub, sagebrush, and juniper; sandy clay and clay soils (4,700-6,800 feet)				X		

Common Name	Scientific Name	Status[1]	General Habitat	CRVFO	GJFO	KFO	LSFO	WRFO	Routt National Forest
Ute ladies'-tresses orchid	Spiranthes diluvialis	FT	Moist meadows, alluvial banks, oxbows and floodplains of perennial streams (720-7,000 feet)			X	X	X	
Weber's monkey flower	Mimulus gemmiparus	FSS	Granitic seeps, slopes, and alluvium in open sites within spruce-fir and aspen forests (8,500-10,500 feet)			X			X
Weber's scarlet-gilia	Ipomopsis aggregata ssp. weberi	FSS	Forb or shrub dominated montane meadows (6,560-10,500 feet); a narrow endemic known from the Park Range			X			X
Western prairie fringed orchid	Platanthera praeclara	FT	Associated with sedge meadows in the Great Plains, primarily within tall grass prairie in fire- and grazing-adapted grassland communities			X			
White River beardtongue	Penstemon scariosus var. albifluvis	FC, FSS	Sparsely vegetated shale slopes of the Green River Formation Desert in shrub and pinyon-juniper communities (5,000-7,200 feet)					X	
Woodside buckwheat	Eriogonum tumulosum	BLMS	Gravelly to clayey soils, saltbush sagebrush, and pinyon-juniper woodlands (5,000-7,500 feet)				X		
Yellow lady's slipper	Cypripedium parviflorum		Moist forests and aspen groves (7,400-8,500 feet)						X

[1]Status Codes:

FE Federally listed as endangered

FT Federally listed as threatened

FC Federally listed as a candidate species

FP Federally proposed for listing as endangered

SE State listed as endangered

ST State listed as threatened

Common Name	Scientific Name	Status[1]	General Habitat	CRVFO	GJFO	KFO	LSFO	WRFO	Routt National Forest
SC State listed as species of special concern (no legal status) BLMS Colorado BLM Sensitive FSS USFS Sensitive [2] These species do not occur in the KFO planning area, but water depletions may affect the species and/or critical habitat in downstream reaches. [3] These species are relatively uncommon species in the BLM planning area. [4] These species are unlikely to occur in the BLM planning area.									

Nesting habitat is primarily characterized by sagebrush communities that have 15 percent to 30 percent canopy cover, and a grass and forb understory. Residual cover of grasses is also important for nesting cover. Most nesting occurs within 4 miles of leks (Colorado Greater Sage-Grouse Steering Committee 2008). Nesting and early brood-rearing habitats are similar, and include appropriate sagebrush canopy cover of 10 to 25 percent with greater than 15 percent herbaceous ground cover. Young birds eat insects for their first 3 weeks and mostly forbs until they are 3 months old. As the sagebrush habitat stands begin to dry out in mid-summer, GRSG move to more mesic areas, including higher elevations, wet meadows, and riparian areas where succulent forbs are present. From mid-September into November, GRSG prefer areas with relatively dense canopy cover and late green forbs. Winter habitat comprises sagebrush greater than 12 to 16 inches tall and greater than 25 percent canopy cover in drainages with tall sagebrush and on ridges and south and west-facing slopes. Winter habitat is used by segregated flocks of males and females (Beck 1977).See **Figure 3-4**, Greater Sage Grouse Habitat Types, for habitat distribution in the planning area.

Habitat loss and fragmentation from agricultural encroachment, urbanization, lack of fire (which rejuvenates native habitat), and overgrazing are the primary threats to the GRSG. Considerable attention has been given to this species since the 1980s, as evidenced by the National Sage-Grouse Habitat Conservation Strategy (BLM 2004). This conservation strategy provides national GRSG habitat conservation guidance for the BLM. The plan identifies potential conservation actions that might be implemented in order to maintain and enhance GRSG populations and habitat (CPW 2004).

Several factors related to GRSG habitat and the way it is used by this species have been considered causes of the decline in GRSG distribution and abundance. These factors include habitat loss, alteration, and degradation (Braun 1995). Historically, sagebrush-dominated vegetation was one of the most widespread habitats in the country and still covers much of the Great Basin and Wyoming Basin, reaching into the Snake River Plain, Columbia Basin, the Colorado Plateau, Montana, southwestern Colorado, northern Arizona, and New Mexico. Across this area, big sagebrush predominates and has five known subspecies (West 1988; Kartesz 1994).

The sagebrush mosaic was historically subject to impacts from natural components of the environment, such as small and patchy fires, and periodic population explosions of jackrabbits, grasshoppers, and crickets. Big sagebrush does not resprout 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 itself within 5 years of a burn, but a return to a full pre-burn community (density and cover of sagebrush) cover can take 15 to 30 years (Bunting 1984; Miller and Rose 1999).

Since settlement of the West began, the amount, distribution, and quality of sagebrush habitats and populations of the GRSG that depend on them have declined as a result of activities such as large-scale conversions to cultivated croplands or pastures, altered fire frequencies resulting in conifer invasion at higher elevations, and annual grass invasion at lower elevations, livestock grazing, herbicide use, mineral and energy development, and recreational activities related to urban growth and increased human populations. As a result, the 156 million acres of sagebrush that existed historically were reduced to 119 million acres by 2004 (Connelly et al. 2004). Currently, sagebrush communities and GRSG are at risk from multiple sources across multiple scales (BLM 2004b). About 56 percent of the potential pre-settlement distribution of habitat is currently occupied by GRSG (Connelly et al. 2004).

GRSG use different components of their sagebrush habitat for breeding, nesting, brood rearing, and wintering. Key habitat components include adequate canopy cover of tall grasses and medium height shrubs for nesting, abundant forbs and insects for brood rearing, and availability of herbaceous riparian species for late growing-season foraging (BLM 2004c). Understory, height, density, cover, and patchiness of the sagebrush-dominated ecosystem are important to GRSG.

The negative impacts of habitat fragmentation on GRSG include reductions in courtship site persistence, courtship site attendance, winter habitat use, recruitment, yearling annual survival, and female nest site choice (USFWS 2010a). Invasive plants are also a serious range-wide threat to GRSG habitat. Once established, invasive plants reduce and eliminate vegetation essential for GRSG food and cover. Invasive species can out-compete sagebrush, and increase wildfire frequencies, further contributing to direct loss of habitat. Sagebrush restoration techniques are limited and have generally been ineffective (USFWS 2010a).

GRSG have declined within the past 20 years in large portions of its overall range. In March 2010, USFWS concluded that the GRSG warranted protection under the ESA; however, USFWS determined that proposing the species for protection is precluded by the need to take action on other species facing more immediate and severe extinction threats. As a result, the GRSG will be added to the list of species that are candidates for ESA protection. Habitat loss and fragmentation resulting from wildfire, energy development, urbanization, agricultural conversion, conversion of sagebrush to other vegetation types (such as pinyon-juniper woodlands) and infrastructure development are the primary threats to the species (USFWS 2010a).

For a complete description of acreages in the 21 Colorado MZs, see **Table 3.8**, Acres of Land Ownership and ADH within Colorado Management Zones, and **Table 3.9**, Acres of Federal Mineral Estate by PPH and PGH.

Table 3.8. Acres of Land Ownership and ADH within Colorado Management Zones

Colorado Management Zone	BLM Field Office or National Forest	Surface Acres (all ownerships)	Surface Acres (BLM-administered lands)	Split-Estate Acres (ADH)
1	LSFO	15,200	8,400	12,700
2	LSFO	172,900	120,000	137,800
3	LSFO	547,400	461,800	487,800
4	LSFO	244,400	111,100	155,500
5	LSFO	258,300	123,100	162,400
6	LSFO	307,900	50,600	99,400
7	LSFO	83,300	18,000	47,800
7	Routt National Forest	11,700	0	9,300
8	LSFO	252,300	4,700	40,400
9	LSFO	372,400	150,000	236,100
9	WRFO	50,800	21,800	32,000
10	LSFO	3,700	100	1,500
10	WRFO	282,000	190,300	239,200
11	KFO	413,200	138,600	214,400
12	KFO	18,300	6,800	11,800
11	Routt National Forest	800	0	800
13	KFO	272,400	72,900	123,100
13	Routt National Forest	1,000	0	1,000
14	CRVFO	97,300	41,000	69,000
14	Routt National Forest	38,600	0	900

Colorado Management Zone	BLM Field Office or National Forest	Surface Acres (all ownerships)	Surface Acres (BLM-administered lands)	Split-Estate Acres (ADH)
14	LSFO	51,000	2,300	9,900
15	WRFO	47,600	3,000	12,100
16	WRFO	11,300	11,300	11,300
17	CRVFO (Roan Plateau)	37,600	23,900	29,800
17	GJFO	78,600	14,500	23,300
17	WRFO	237,500	75,900	160,300
18	WRFO	19,200	13,000	18,000
19	CRVFO	5,400	2,100	2,100
19	WRFO	219,800	62,400	1,119,000
19	LSFO	40	0	0
20	LSFO	40,600	2,200	5,900
21	KFO	10,700	2,200	4,800
Total		**4,203,240**	**1,732,000**	**3,479,400**
Source: BLM 2013				

Table 3.9. Acres of Federal Mineral Estate by PPH and PGH

BLM or USFS Location	BLM-Administered Surface		National Forest System Lands		Other Surface	
	PPH	PGH	PPH	PGH	PPH	PGH
CRVFO	22,800	16,200	0	0	17,400	10,300
Roan Plateau	0	28,300	0	0	0	1,200
GJFO	5,500	8,900	0	0	4,100	4,500
KFO	185,200	18,300	0	0	115,900	25,500
LSFO	554,000	463,500	0	0	239,700	134,100
WRFO	121,900	175,300	0	0	75,800	81,600
Routt National Forest	0	0	1,600	10,300	0	0
Source: BLM 2013						

Conditions on BLM-Administered Lands

Colorado River Valley Field Office

GRSG historically existed in the larger sagebrush habitats west of Glenwood Springs, between New Castle and Rifle, and south of Interstate 70 near Eagle. Current populations within the CRVFO planning area are north of Eagle, Gypsum, and Wolcott on scattered BLM and private lands. This habitat is where the majority of the mapped PPH falls within the CRVFO boundary. Based on 2004 lek counts, this population of GRSG numbers from 304 to 489 (CPW 2004).

The CRVFO participated in the Northern Eagle/Southern Routt GRSG Workgroup. The Workgroup completed the population-specific Northern Eagle/Southern Routt GRSG Conservation Plan in September 2004 (CPW 2004). The Northern Eagle/Southern Routt GRSG population is one of the smaller populations in Colorado, and the portion of the population within the CRVFO is vulnerable to local extirpation. A significant portion of remaining GRSG habitat in the Northern Eagle portion of the population is managed by the CRVFO. Maintaining the current GRSG habitat on BLM-administered lands is critical to conserving the population (Rossi 2011) and maintaining range-wide connectivity and genetic diversity. The CRVFO performs habitat treatments to conserve and improve GRSG habitat and monitors the population in cooperation with CPW.

As is the case with the North Eagle/Southern Routt population on the east side of the CRVFO, the Roan Plateau is at the southernmost part of the range for this species. It is incorporated in the Parachute-Piceance-Roan population. Although the area is mapped as preliminary general habitat (PGH), it does not contain large contiguous sagebrush stands. GRSG habitat use studies are ongoing on the Roan Plateau. Currently, the BLM's only data comes from global positioning system monitoring by the CPW where some use was noted in the Anvil Points area. Overall habitat use by GRSG is most likely transitory in nature.

Grand Junction Field Office

The southern end of the Parachute-Piceance-Roan population of the GRSG is found on the northeastern side of the GJFO planning area with approximately 5,600 acres of PPH and approximately 8,900 acres of PGH. The Colorado GRSG Conservation Plan (Colorado Greater Sage-Grouse Steering Committee 2008) shows a larger portion of the GJFO planning area as potential pre-settlement habitat based on historic sagebrush distribution, encompassing everything above the Book Cliffs and portions of the Grand Mesa slopes (though the plan identifies this as an area where the species of GRSG is uncertain). There are 16 active and inactive GRSG leks within the GJFO planning area: 3 on BLM-administered lands and 13 on private lands. Of these 16 leks, 7 are considered active; 1 of the active leks is on BLM-administered lands on 4A ridge. In the winter of 2008, Sage-Grouse droppings were found within the GJFO just north of the town of Mesa in an area between occupied Gunnison Sage-Grouse habitat and GRSG habitat. A follow-up study was conducted in the winter of 2009 by the Rocky Mountain Bird Observatory where numerous droppings and cecal casts were discovered, suggesting the area is an important wintering area. Genetic information could not be collected from the droppings and cecal casts, therefore, the species of Sage-Grouse (Gunnison or Greater) is still unknown (Beason 2009) but is believed to be GRSG. As a result, this area has been mapped as PGH.

The local working group completed the Parachute-Piceance-Roan GRSG Conservation Plan in 2008 (Parachute-Piceance-Roan Greater Sage-Grouse Work Group 2008). The Parachute-Piceance-Roan population of GRSG covers portions of the WRFO, CRVFO, and GJFO.

Current populations within the GJFO planning area are located in upper reaches of Roan Creek and its tributaries (Kimball, Carr, Brush, and Clear creeks) north of the Town of DeBeque, primarily on private land and scattered public lands. Some birds are thought to winter in sagebrush areas west of DeBeque, and winter use has been documented in the Plateau Valley south of DeBeque in an area of mixed BLM-administered and private land known as Sunnyside. Since 2008, lek counts in the Parachute-Piceance-Roan population range from a low of 77 males in 2010 to a high of 226 males in 2008 (CPW 2012). GRSG habitat within the GJFO is primarily on relatively flat sagebrush-covered ridges with pockets of aspen in north-facing draw slopes, giving way to mountain shrub communities as one moves further south and down in elevation on the ridges. The landscape is naturally fragmented by deep canyons. Former habitats in the broad Roan Creek Valley south of the steep canyons have been lost to fragmentation from sagebrush plant community conversion to agricultural and residential uses. These activities do not threaten habitat on the remaining ridge top habitat, but natural gas exploration and production activity, lack of fire (which rejuvenates native habitat), and poor grazing management are the primary threats.

The GJFO participated in the Parachute-Piceance-Roan Greater Sage-Grouse Workgroup that developed the local plan. Only a small part of the Parachute-Piceance-Roan population is within the GJFO, and much of it lies on private lands. Nonetheless, the GRSG do use BLM lands for

breeding, nesting, and wintering. Maintaining the current GRSG habitat on BLM lands is critical to conserving the population and maintaining range-wide connectivity and genetic diversity.

The current status of the population within the GJFO is better than from 2009 to 2011. Within the GJFO, there were 6 active leks in 2012, with a total of 13 males. In 2008, 14 males were counted on 5 leks. From 2009 to 2011, five to nine males used three or four leks. Only 1 of the leks was active all 5 years; that is also the only lek located on a public land parcel (Chimney Rock, on the edge of 40 acres surrounded by private lands). Two other leks considered inactive are on GJFO public lands; one of those leks had a single male in 2011. Evidence of wintering GRSG was found in the Sunnyside area of the Plateau Valley in 2009, 5 to 10 miles south-southeast of DeBeque. The Parachute-Piceance-Roan population within the GJFO is the nearest population of GRSG to the Plateau Valley.

Based on lek counts within the GJFO boundary, the GJFO portion of the Parachute-Piceance-Roan population is nine percent of the Southside Parachute-Piceance-Roan population in 2012, and seven percent of the overall Parachute-Piceance-Roan population.

Kremmling Field Office

WAFWA Management Zone II has the largest regional extent and highest breeding density of GRSG in the western US, with several important populations in the Wyoming Basin, including Jackson and Routt Counties, Colorado. Livestock grazing is ubiquitous across these sagebrush ranges, which also have seasonal importance for native ungulates and wild horses (Manier et al. 2013). Changes in land cover and land use are contributing to population declines in this region (Manier et al. 2013).

GRSG inhabit much of the planning area. Throughout the year, GRSG will move between select habitats within the overall sagebrush habitat area. In Jackson County, there are approximately 39 active leks, 5 inactive leks, and 19 historic leks (CPW 2010). Of the active leks, 20 are on BLM-administered lands. In Grand County, there are 19 active leks, 1 inactive lek, and 41 historic leks (2010 data). Of those, 21 leks are on BLM-administered lands. In Larimer County, there is 1 historic lek (last active in the 1960s). In Summit County, there is 1 active lek and 1 historic lek (CPW 2010). In Eagle County, there are no leks within the planning area. Sagebrush habitat in Jackson County is largely intact, and there is little threat of fragmentation. Currently, oil and gas development and related infrastructure is low; however, in 2006, there was an increased interest in coalbed natural gas exploration. In Grand County, there is a high risk of habitat fragmentation and loss due to urban development and related infrastructure, especially at the east end of the county.

Three local GRSG working groups cover the planning area: Eagle/South Routt, North Park, and Middle Park. Each group developed a local conservation plan that sets forth a strategy for the long-term management of GRSG in their area. The BLM administers 27 percent (26,200 acres) of occupied habitat in the Eagle/South Routt population; 34 percent (140,000 acres) of occupied habitat in the North Park population; and 29 percent (74,100 acres) of the occupied habitat in the Middle Park population. The BLM is a partner in all three local working groups, as well as in the Colorado GRSG Plan, and has agreed to implement the plans as fully as possible.

Little Snake Field Office

GRSG use areas are all located in shrublands. Sagebrush is the primary habitat used. Areas of sagebrush along streams, where forbs and insects are abundant, are used for brood rearing.

Some production areas have also been identified in areas that have been mapped as saltbush and mountain shrub.

Within the planning area, identified brood-rearing areas are in smaller drainages associated with the Vermillion Creek, Little Snake River, and Yampa River watersheds, where moist conditions in late spring and early summer produce the succulent forbs and insects on which broods feed.

Production areas, traditionally mapped as a 2-mile buffer around leks and believed to contain 80 percent of the nests associated with GRSG displaying at the lek, have recently been expanded. No more than 75 percent of GRSG nests are found within a 4-mile radius of a lek, making the previous production area size insufficient to protect most nests (Apa 2007; Petch 2009).

Data specific to Moffat and Routt Counties and to the planning area are provided by Rogers (1964), who described GRSG populations in Moffat County as having the largest population and the highest density of GRSG of any county in Colorado. The highest density of GRSG was localized in the Beaver Basin area of Cold Spring Mountain, the extreme northwest part of the county. Other areas in Moffat County with a high population density were the western portion of Blue Mountain north of Artesia near the Utah line, the Two Bar Ranch on the Snake River, Lay Creek, Bluegravel Gulch, upper Timberlake drainage, Big Gulch drainage, upper Bighole Gulch, the head of Spring Creek, and the area around the town of Great Divide. The principal GRSG population in the southwest part of the county was on top of Blue Mountain within 10 miles of the Utah line.

In Routt County, there are four distinct GRSG groups: two areas with fair population density near the towns of Toponas and Hayden and about equal numbers and range; one area in the upper Slater Creek and Snake River areas in the extreme northern part of Routt County with a light population in the summer months and a wintering area near the Wyoming line; and one area north of Steamboat Springs and west of Clark on Deep Creek with small range and numbers. The highest concentration of GRSG in the county was in the Twentymile area southeast of the town of Hayden on the upper Sage and Fish Creek drainages. The Breeze Basin-Yampa River area west of Hayden near the Moffat County line was known to contain a high density of GRSG area in 1947, but no GRSG were observed in this area in 1959 and 1960.

Today, within the planning area, essentially all of the land west of State Highway 13 (except the area on the south side of Cold Spring Mountain, and the lands closest to the Yampa and Green River drainages) is within the range of the GRSG. The central portion of this area-north, west, and southeast of Maybell-as well as a broad area along the northern boundary of the planning area from Middle Mountain near the northwest corner of Colorado to Baker Peak east of State Highway 13 provides winter range. A number of comments in the Land Health Assessments focus on GRSG populations and habitat. The following comments characterize the attention given to this species:

- **Axial.** GRSG habitat types in the Axial Basin Landscape include strutting grounds, brood-rearing habitat, and winter range. Thirty leks have been documented within this landscape. Of these, 11 (37 percent) are active; 6 (20 percent) are inactive (no activity the last 5 years); 11 (37 percent) are historic (no activity the last 6 years or longer), and 2 (7 percent) are unknown.

- **Douglas Draw.** The watershed does have potential to support GRSG near Sheephead Basin. There has not been any documented use by GRSG in this area, but treatments of encroaching juniper may make the area more attractable to GRSG.

- **Cold Spring Mountain.** The large expanses of sagebrush steppe intermixed with wet meadows provide important GRSG nesting and brood rearing habitats. GRSG numbers are up since the early 1990s, with lek counts remaining stable over the last 3 years; however, GRSG are only at 50 to 60 percent of their historic population numbers for the area.

- **Douglas Mountain.** Sagebrush grasslands and sagebrush mixed shrub habitat types have the potential to support GRSG within this landscape. There are no known GRSG leks within the landscape; however, efforts to locate breeding GRSG in the landscape have been minimal.

- **Dry Creek.** The large expanses of sagebrush steppe intermixed with wet meadows provides important GRSG nesting and brood rearing habitats along Vermillion Creek, although there are no known GRSG leks within this watershed. Heavy historic grazing, especially in mesic areas at the higher elevations, has reduced the quality of brood rearing habitat essential for GRSG in the area.

- **Fourmile Creek.** The entire landscape is considered a GRSG production area, although the quality of GRSG brood-rearing habitat has been reduced by heavy historic grazing, especially in mesic areas at the higher elevations. The large expanses of sagebrush steppe intermixed with wet meadows provide important GRSG nesting and brood rearing habitats along Timberlake Creek. Fourteen GRSG leks have been identified and brood rearing habitats have been documented.

- **Green River.** The Green River Landscape provides habitat for GRSG and the various life cycle stages for which they are used. There are no known GRSG leks or nesting habitat within the landscape; however, hens with broods are often observed in the Ryegrass area. GRSG are also observed near Chicken Springs and Five Springs. A small amount of winter habitat (200 acres) is located near Five Springs. Sagebrush in this area was in good condition, providing suitable winter habitat for GRSG. Overall, the Green River Watershed provides productive habitat for GRSG.

- **Lay Creek.** The majority of this watershed provides habitat for GRSG. GRSG use the watershed throughout the year for breeding, nesting, brood rearing and wintering habitat. This watershed is an important production area for GRSG in Colorado. There are seven active GRSG leks within this watershed, with two additional active leks within 1 mile of the watershed boundary. Breeding, nesting, brood-rearing, and wintering habitat are all found within the boundaries of this watershed. Some portions of the watershed are capable of providing all four habitat requirements in the same area.

- **Powder Wash.** This is an important area for GRSG breeding, nesting and brood rearing, containing 10 known leks and about 2,400 acres of GRSG winter range.

- **Sandhills.** Available habitats provide winter range, nesting, and brood rearing for GRSG.

- **Sand Wash.** This is an import production area for GRSG nesting and winter range. The numerous historic leks on Seven Mile Ridge are no longer active.

- **Williams Fork.** Sagebrush grasslands and sagebrush mixed shrub habitat types have the potential to support GRSG within this landscape. There are no identified GRSG leks or critical habitat, such as nesting or winter, located in the Williams Fork watershed.

White River Field Office

The Northwest Colorado GRSG population area (Colorado MZ 10) is composed of several distinct segments that differ widely in character for GRSG. The Blue Mountain portion of this population (higher-elevation sagebrush communities north of US 40) supports the largest and most productive population and has the largest continuous block of suitable and occupied GRSG habitat in the WRFO. Broods gradually disperse and drift to higher elevations (e.g., Moosehead Mountain), such that essentially all sagebrush habitat on Blue Mountain is considered brood range. Blue Mountain's capacity for strong production and recruitment is largely attributable to an abundance of wet meadow habitats and well-developed herbaceous understories.

The remaining segments of the Northwest Colorado population area in the WRFO consist of: (1) isolated and sporadically occupied parcels in the Douglas Creek drainage south of the White River; (2) extremely small and insular groups of birds along and probably once connected by habitats along the White River valley; (3) a sparsely populated southern extension of the larger Sagebrush Draw population located in the adjoining LSFO; and (4) most notably, an expansive low-elevation salt-desert complex extending west from Pinyon Ridge along the US 40 corridor and south to the White River. This area supports limited year-round occupation by GRSG, but these xeric habitats, whose ground cover is often dominated by invasive annual weeds, are considered marginal in their support of nesting and brood-rearing functions. These areas have been known to support concentrated high density winter use. The breeding population in the western half of this area (west of Massadona) had begun to collapse prior to the mid-1970s, and this trend continued through the 1980s. The only remaining active lek is located on the far eastern end of the area. Suitable sagebrush stands along Highway 40 are relatively limited. These predominantly salt desert habitats are dissected by deeply incised channels that assume the role of brood habitat, although the broods along the White River probably originate from the lower Red Wash and Boise Creek areas. The origin of large numbers of wintering birds in lower Wolf Creek is unclear but likely involves much of the Highway 40 population.

The Crooked Wash complex is administratively split between the WRFO and the LSFO to the north and is composed of a high percentage of private lands. Although upland sagebrush conditions are superficially adequate for nesting in the WRFO, upper portions of the basin are likely preferred. Late season brood use has been noted, although brood habitat conditions are considered suboptimal in portions of the basin within the WRFO. Although a number of channels in the area support persistent flow, riparian expression is extremely limited. Concentrated winter use in the Crooked Wash area is assumed to represent the major fraction of this complex. The small summer population in Black's Gulch seems to be a fragment of the Crooked Wash complex. This area has also supported concentrated winter use in the past.

The Piceance Basin/Roan Plateau area, encompassing the majority of Colorado MZ 17, is comprised of roughly 152,600 acres of GRSG PPH and 84,400 acres of PGH. Virtually all seasonal use functions take place on relatively narrow mid-elevation ridges, with a drift toward higher elevations along the Piceance Rim and Roan Plateau through the brood and general summer use periods. Winter use appears to occur at all elevations, depending on accumulated snow depth and snow texture. Broad ridges at lower elevations may support the bulk of wintering birds during extreme conditions.

The Parachute-Piceance-Roan Plateau (PPR) sage-grouse population is considered to be at high risk due primarily to energy and mineral development (USFWS COT report 2013). Presently, there are two distinct sage-grouse population areas in the PPR: the Barnes Ridge subcomplex to the east and the Figure 4 subcomplex on its western margin (both of which are encompassed by identified PACs or Priority Areas for Conservation). The Figure 4 subpopulation hosts the largest

number of birds and active leks in the PPR. Identified priority habitats that support the western Figure 4 subcomplex are composed of a large continuous central core of fee land (30,000+ acres) currently complemented by two relatively large consolidated tracts of unleased federal minerals forming extensions of priority habitat to the north (10,950 acres) and southwest (14,700 acres).

The Magnolia area (Colorado MZ 16) has within the past decade become heavily industrialized. This area is comprised entirely of BLM-administered lands and contains roughly 7,600 of GRSG PPH and 3,700 acres of PGH.

The Meeker GRSG population (Colorado MZ 15) area encompasses about 47,600 acres in the area outside the Piceance Basin (13,000 acres GRSG PPH, 34,600 acres PGH). Federal mineral estate underlies about 15,500 acres (31 percent) of all mapped range, but federal estate associated with habitats currently supporting GRSG use (north of the White River and across the north flank of LO7 15 Hill) are limited to about 500 acres in 7 parcels (less than 4 percent). The largest parcel, about 300 acres, consists primarily of private agricultural lands, but supports consistent use by this remnant flock of birds. The BLM surface that presently supports habitat potentially suited for this population of GRSG is limited to about 300 acres.

Approximately 115 leks have been identified in the WRFO, of which about 55 are currently active. The status of about 20 leks is unknown, because of limited or irregular use. The count of males at leks in the WRFO planning area in 2012 was 290 birds (CPW 2012) (see Table 3.12, "GRSG Population Data within Colorado Management Zones" (p. 259), in the **Trends** section).

Other Special Status Species

Other special status species with potential to exist on BLM-administered land are included in **Table 3.6**, Special Status Animal Species in the Planning Area. Draft RMPs for each field office, which are incorporated here by reference, further describe special status species, including BLM Sensitive and USFWS federally listed species, within each field office.

Conditions on National Forest System Lands

Routt National Forest

Greater Sage-Grouse

The Routt National Forest provides habitat for the GRSG, but no active leks have been documented on the Forest in recent years. One historic lek was documented in Colorado MZ 7 in the vicinity of California Park and Slater Park, but GRSG lek activity has not been documented for several decades. Though no telemetry data has been collected on the Routt National Forest by CPW, it is inferred by CPW and USFS biologists that the Routt National Forest does provide GRSG nesting, brood-rearing, and some wintering habitat. GRSG experts at CPW mapped GRSG habitat across much of northwest Colorado. Approximately 17,400 acres was mapped on the Routt National Forest. Of the 17,400 acres, approximately 12,500 acres are on National Forest System lands, and 4,900 acres are within the Routt National Forest's administrative boundaries, but land ownership is either private or state inholdings (see Table 3.10, "PGH and PPH by Land Ownership on the Routt National Forest" (p. 251)).

Table 3.10. PGH and PPH by Land Ownership on the Routt National Forest

Surface Land Ownership	Acres
PGH	
National Forest System	11,100
Private Inholding	2,300
State Inholding	1,000
PPH	
National Forest System	1,600
Private Inholding	1,400
State Inholding	10
Total	**17,400**
Source: USFS 2012	

The CPW-mapped GRSG habitat on the Routt National Forest consists of PPH and PGH and is made up of grass, shrub, riparian, and forb cover types. In some instances, the buffering of 4 miles from leks did include tree cover types. The Routt National Forest's vegetation data (from the USFS' Field Sampled Vegetation Spatial database) is different from CPW's vegetation data and so the inclusion of tree cover types is an artifact of how vegetation polygons are delineated on the Routt National Forest. Though CPW has documented GRSG nesting in close proximity to aspen stands, the inclusion of aspen cover types (or other tree cover type) may occur when the dominant cover type is a treed cover type, but remaining portion is shrub or other GRSG habitat that is important for meeting life history needs. As a result, the presence of a tree cover types may be due to a mapping error that is inaccurately typed or it is a large polygon that is buffered in as PGH or PPH by the 4-mile buffer from a lek. The Routt National Forest biologists briefly reviewed PPH and PGH habitat maps before they were finalized for the Draft EIS. This review was completed through use of satellite imagery of vegetation, but not through the use of the Field Sampled Vegetation Spatial database.

Other Special Status Species

Other special status species with potential to exist on National Forest System lands are included in **Table 3.6**, Special Status Animal Species in the Planning Area. Threatened, endangered and sensitive species and MIS are addressed in **Appendix L**, USFS Wildlife Specialist Report.

3.3.2. Trends

Trends on BLM-Administered Lands

Greater Sage-Grouse

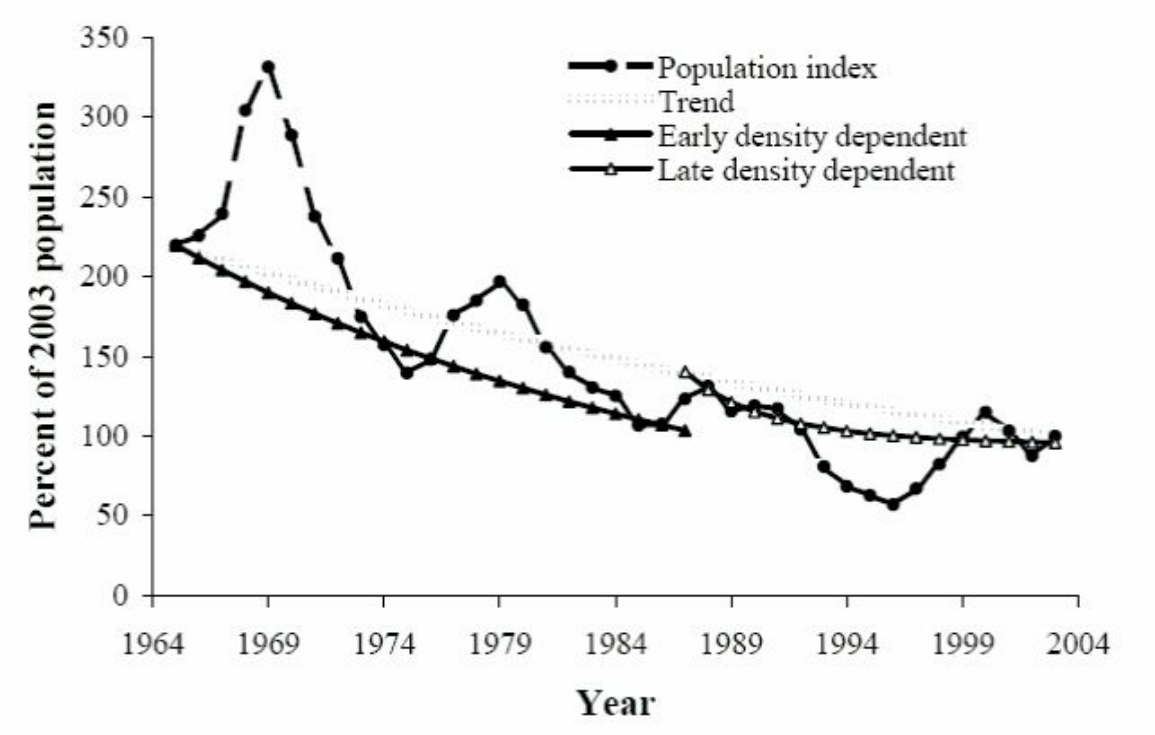
Historically, GRSG inhabited much of the sagebrush-dominated ecosystems of North America. Populations of this species have declined in both abundance and extent throughout most of their historical range. Even after taking into account the strong cyclic behavior of GRSG population dynamics, populations have declined markedly relative to both pre-settlement anecdotal numbers (BLM 2004a), and the records kept in the last 30 years where the peak in the cycle of bird numbers has declined (BLM 2004c).

Rogers (1964) interviewed numerous homesteaders present in northwest Colorado in the early years of the 20th century and reported that GRSG numbered in the "thousands." Wagon loads of harvested birds were taken near Hayden, and thousands of birds were shot for the annual

Sage Hen Days held in Craig in the early 1900s. In the early 20th century, the highest densities of GRSG were found in Moffat, Routt, Rio Blanco, Garfield, and Grand counties. Populations appear to have declined substantially across Colorado in the 1920s and 1930s, resulting in the first closure of the hunting season in 1937. Hunting was again allowed in 1953 after GRSG populations had recovered during the 1950s. Populations of the birds continued to increase into the 1960s but were never so great as in the early part of the century (Rogers 1964).

Connelly et al. (2004) published a conservation assessment of GRSG and sagebrush habitats that is based on data from questionnaires completed by 11 states (California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington, Wyoming) and two Canadian provinces (Alberta and Saskatchewan). Generally, between 1965 and 2003, there was a 729-percent increase in the number of leks inventoried-a marked increase in monitoring effort, although not all survey methods provided compatible data. In addition, not all leks were active, with the largest number of inactive leks clustered in Colorado, Utah, and Washington. During this time period, 80 percent of the States (all but California and Colorado) showed population declines. Populations in the late 1960s and early 1970s were about two to three times greater than in 2003. The range-wide trends in population index are shown in diagram 3–1 below.

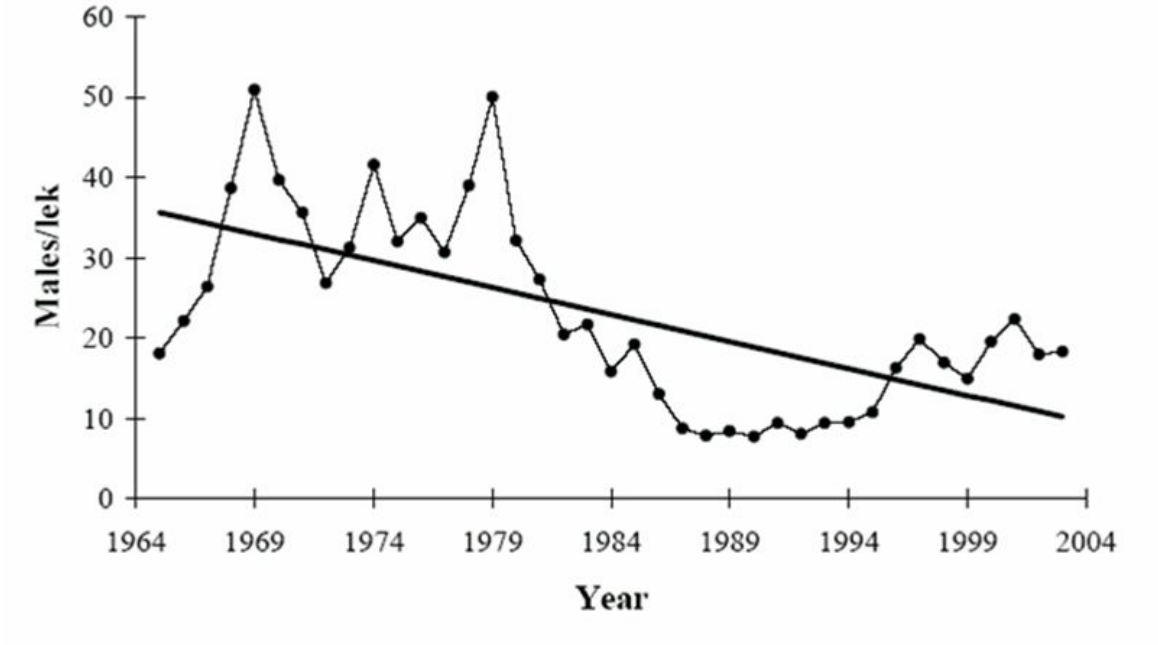
Diagram 3–1 Range-wide Change in the Population Index for GRSG in North America, 1965–2003 (Connelly et al. 2004)



Connelly et al. (2004) used data for Colorado from 1965 to 2003 that reflected information from 275 leks, although for 5-year periods within this timeframe averages of 44 to 171 leks were inventoried. The overall results indicated that lek size has decreased, but populations have increased in Colorado. (This discrepancy could result, in part, from the fact that data from Moffat County were collected using inconsistent methods and could not be used in the Connelly et al. analysis of changes in lek size.) Other findings for Colorado GRSG populations included the following:

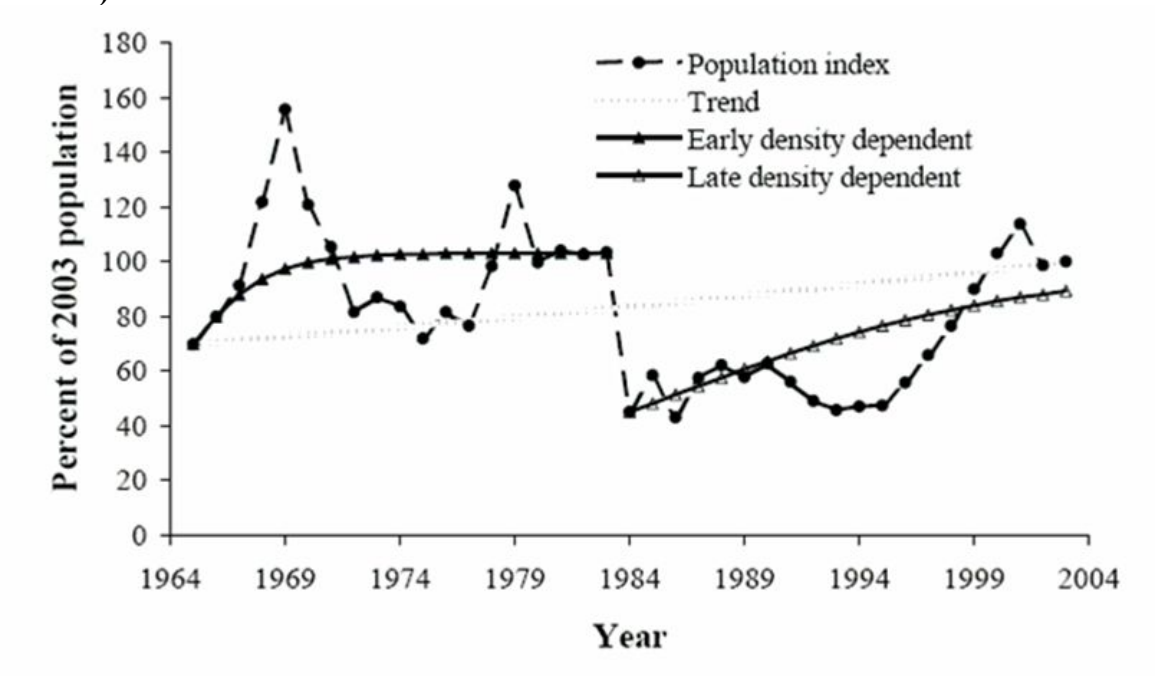
- The proportion of active leks ranged from 41 to 96 percent.
- Population trends based on counts of male GRSG at leks decreased over the assessment period, regardless of the parameter used, with a significant decline in males per lek; see diagram 3–2 below.

Diagram 3–2 Change in Lek Size for GRSG in Colorado, 1965–2003 (Connelly et al. 2004)



- A decline in lek size was also reflected in the distribution of leks among size classes, with medium and large leks each comprising over 30 percent of the leks sampled from 1965 through 1979, but for the remainder of the period, the proportion of medium and especially small leks increased.
- Annual rates of population change standardized on 2003 populations were relatively stable to increasing (see diagram 3.3, Change in the Population Index for GRSG in Colorado, 1965-2003 (Connelly et al. 2004)). GRSG populations increased at an overall rate of 1 percent per year from 1965 to 2003, at an average rate of 2.2 percent from 1965 to 1985, and fluctuated around a level similar to the 2003 population at an average rate of 4.3 percent from 1986 to 2003, and continued to fluctuate around the 2003 population level.
- Populations in the late 1960s and early 1970s were approximately 0.7 to 1.6 times the current populations (see diagram 3.3, Change in the Population Index for GRSG in Colorado, 1965-2003 (Connelly et al. 2004)) with relatively large population fluctuations.
- Although GRSG populations have definitely declined nationwide, the GRSG in Colorado have been increasing for about the last 17 years, and breeding populations have not declined for the last 39 years (see **Figure 3-5**, Greater Sage Grouse Breeding Bird Density, for current densities in the planning area). However, Braun (1995) reported a long-term decline in GRSG distribution and abundance. Similarly, Connelly and Braun (1997) indicated that GRSG breeding populations declined by 31 percent and production declined by 10 percent when they compared the long-term average of males/lek to the average obtained from the 1985 to 1994 data.

Diagram 3–3 Change in the Population Index for GRSG in Colorado, 1965–2003 (Connelly et al. 2004)



Colorado River Valley Field Office

The GRSG population in the Northern Eagle/Southern Routt area is small (<500 birds) and current lek count data indicate that both the high count of males and the number of active leks have decreased since lek counts began in the late 1950s. Long-term lek counts for this population show a general decline (Diagram 3–4, Historic Annual Male High Counts for the Northern Eagle/Southern Routt GRSG Population); however, Colorado Division of Wildlife lek count effort prior to 1998 was inconsistent. Area and District personnel of the CPW were requested, starting in the 1950's, to document GRSG presence and general trend within specific areas of western Colorado. Thus, locations of active leks and counts of males on leks were recorded. Generally, only accessible leks were counted and intensive searches for new or relocated leks were not made because of personnel and equipment priorities. Searches and counts were sporadic, as firm procedures were not in place. Counts of male GRSG on leks were initiated in 1978 under existing protocols (three counts per spring). These counts were conducted 1983 through 1993 (though gaps exist for some years) and were intensified in 1998 (CPW 2004). The lek count results since 1998 have been more consistent with relatively little fluctuation in the population (Diagram 3–5, Recent High Count and 3-year Running Average Data for Northern Eagle/Southern Routt GRSG Population).

Diagram 3–4 Historic Annual Male High Counts for the Northern Eagle/Southern Routt GRSG Population

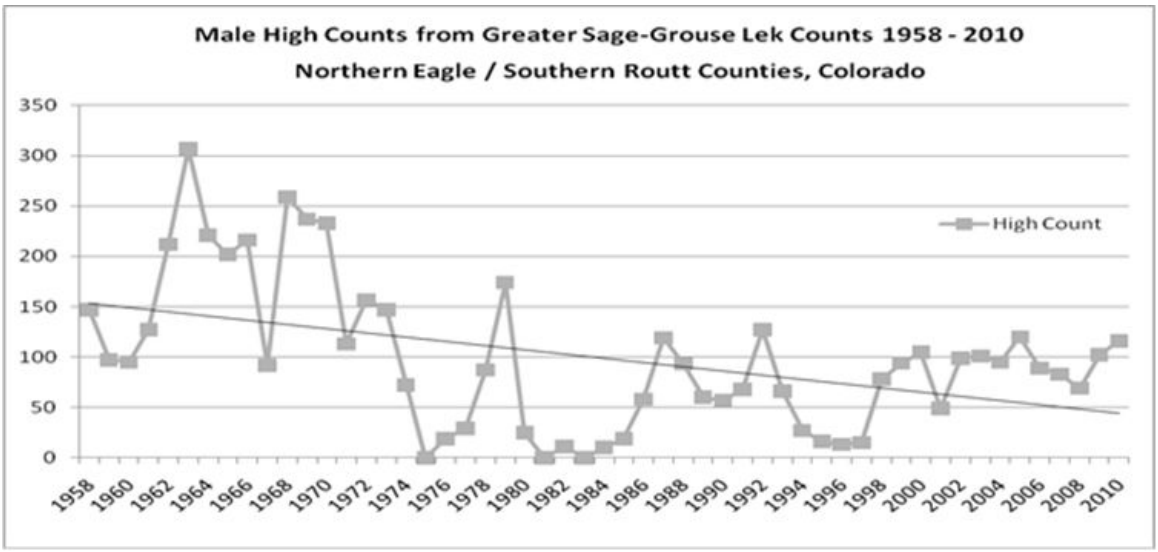
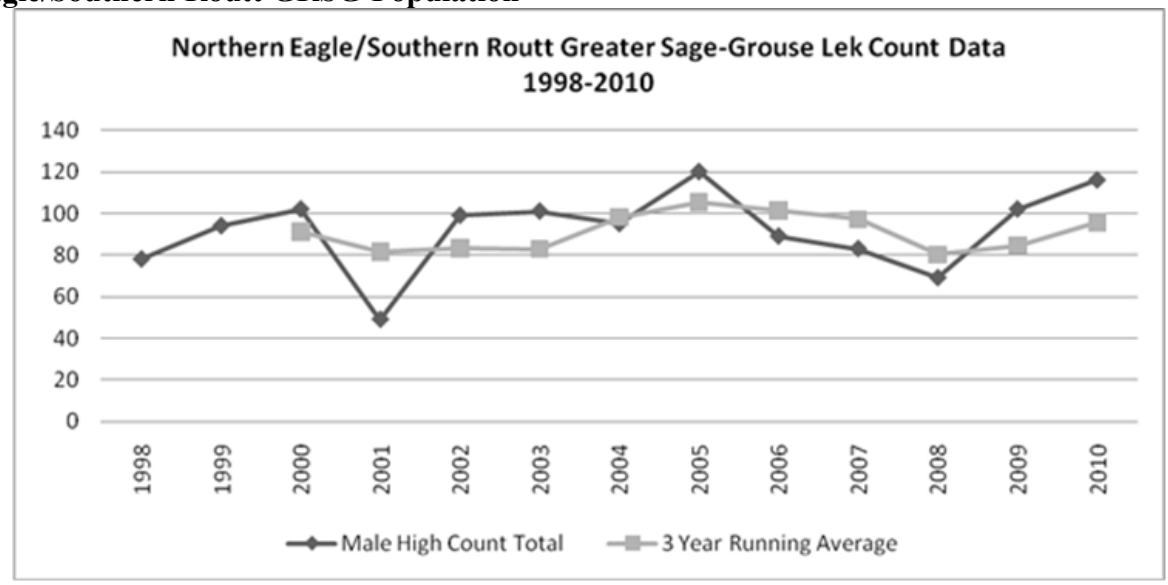


Diagram 3–5 Recent High Count and 3–year Running Average Data for Northern Eagle/Southern Routt GRSG Population



Grand Junction and White River Field Offices

The Parachute-Piceance-Roan GRSG population has been in general decline since at least 1977 when CPW (Krager 1977) documented 25 active leks. Hagen (1999) found only 9 leks active 20 years later. These historic trends are believed to have been primarily attributable to the advancing successional status of the mountain shrub and sagebrush communities used as habitat by the Parachute-Piceance-Roan birds. Current lek count data suggests an increasing population trend, but recent efforts to locate and document high bird counts have intensified over the past few years and may confound comparisons with earlier data. The present emphasis on developing natural gas reserves on these ranges has the potential to impinge heavily on GRSG habitats and behaviors and contribute substantially to declining trends.

Habitat potentially suited for occupation by GRSG in the Piceance Basin exists in physically fragmented patterns. These patterns are due not only to topographic and edaphic variability, but as

a function of successional status and deciduous shrub expression in those vegetation communities. Hagen (1999) found GRSG distribution in Piceance Basin to be highly clustered, implying that the availability of suitable habitat was, therefore, also clustered.

Due to the peculiar configuration of habitat associated with the Parachute-Piceance-Roan population, these GRSG are believed to be particularly vulnerable to development and habitat-related effects. The characteristic pattern of GRSG habitats in the Parachute-Piceance-Roan are such that each parcel of ridgeline habitat (generally 400 to 1,000 feet in width) is separated from adjacent ridgeline habitats by 1,000- to 3,000-foot intervals of habitat unsuited for occupation or ground movement. Habitat potentially suited for use by Parachute-Piceance-Roan GRSG comprises only 16 percent of the mapped overall range. Although this pattern moderates at lower elevations where ridgeline habitats broaden, bird distribution tends to be confined to higher elevations (greater than 7,400 feet in the east, greater than 7,700 feet in the west) and modeled habitat at lower elevations supports few birds.

Adding to this vulnerability, the Parachute-Piceance-Roan population is distributed in clusters across the Piceance Basin and Roan Plateau. The birds' primary distribution across the Cathedral Bluffs and Roan Plateau is divided into two relatively distinct subcomplexes: the Figure Four area to the west and the Barnes Ridge area to the east. Although CPW monitoring of telemetered birds has established that there is regular, but infrequent, interchange among these groups, the large interval of land separating these subgroups (about 9 miles) is relatively devoid of suitable habitat.

The small remnant flock of birds on Magnolia (east of Piceance Creek) has been confined to about 1,000 acres of suitable habitat for at least 3 decades and appears to be effectively isolated from other populations of birds. Although lek numbers have remained relatively constant over this time, several abrupt shifts in lek locations over the past decade suggests that this limited habitat base does not provide a stable continuum of available resources and that the birds are reacting to pronounced short-term fluctuations in habitat quality. **Table 3.11**, High Count of Male GRSG from 2008–2012 in the GJFO and WRFO, provides lek count data for those leks within the GJFO and WRFO.

The Northwest Colorado population appears to have undergone marked decline since 2008. Large tracts of arid, low-elevation sagebrush and salt-desert habitat in the southwest corner of Moffat County (west of Massadona) became vacant prior to the 1990s. These marginal habitats supported small, widely separated groups of breeding birds. Increased prevalence of cheatgrass and other invasive annual weeds across these shrub-scrub habitats may have contributed substantially to their demise. A single remaining lek at the eastern, higher-elevation margin of this habitat belt has maintained a small but stable number of attending males. The Blue Mountain segment of this population inhabits a relatively large contiguous block of high-elevation mountain big sagebrush. This group of birds has declined dramatically, and the trend is largely inexplicable since the area has not been subjected to new or pervasive forms or patterns of human activity and land use over the past 30 years or more. No trends can be evaluated for the birds associated with habitats associated with Sagebrush Draw and Indian Valley. These birds occupy the southern margin of the Sagebrush Draw population in the LSFO, and their abundance and distribution appears to expand and contract commensurate with core population status. Those remaining lands mapped south of the town of Rangely in western Rio Blanco County do not appear to support persistent seasonal use. Leks have never been identified, and the numbers of birds encountered over the past 30 years are few. It is possible that these birds occasionally disperse from neighboring Utah.

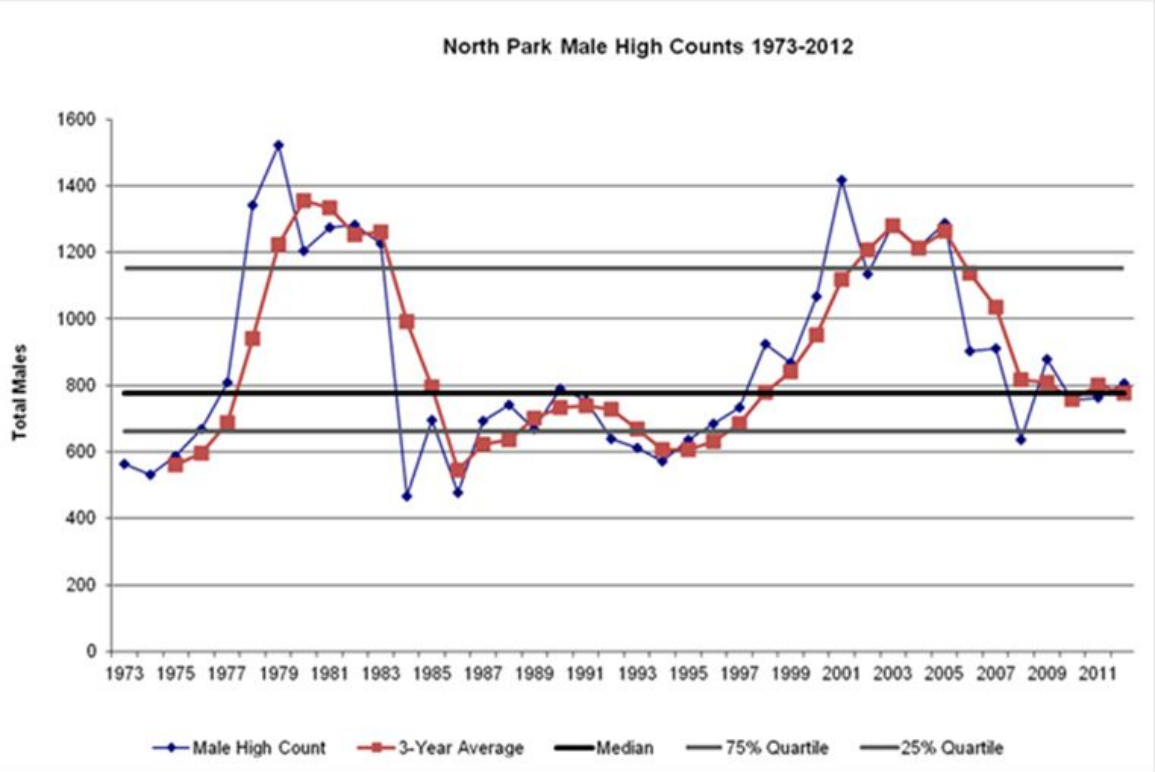
Table 3.11. High Count of Male GRSG from 2008–2012 in the GJFO and WRFO

Area	2008 Male High Count	2009 Male High Count	2010 Male High Count	2011 Male High Count	2012 Male High Count
Parachute-Piceance-Roan North	31 (6 leks)	35 (4 leks)	11 (2 leks)	15 (4 leks)	22 (7 leks)
Parachute-Piceance-Roan South	72 (24 leks)	60 (17 leks)	66 (22 leks)	91 (28 leks)	152 (39 leks)
Meeker	4 (1 lek)	9 (1 lek)	5 (1 lek)	5 (1 lek)	6 (1 lek)
Northwest Colorado population	234 (8 leks)	117 (8 leks)	96 (8 leks)	86 (8 leks)	110 (8 leks)
Source: CPW 2012					

Kremmling Field Office

GRSG populations have fluctuated greatly since 1984 in both Middle Park and North Park. The CPW counted GRSG males on strutting grounds consistently and reliably since the 1970s in North Park and the 1990s in Middle Park. According to these counts, 1984 GRSG populations were at their lowest levels recorded between 1984 and 1997 in North Park. GRSG males counted in 1984 totaled 466. From 2000 to 2005, counts in North Park were above 1,000 male GRSG. Currently, the 3-year running average for North Park (2010 to 2012) is 755 males. Lek count effort has been fairly consistent in North Park since 1973, and the entire data set was used to generate the North Park Population MZ in the Colorado GRSG Conservation Plan (2008). Diagram 3–6, Annual Male High Count for the North Park GRSG Population, illustrates that the annual male high count for the North Park GRSG population has fluctuated through time, but the population has remained fairly stable for the past 40 years. The 2010 to 2012 3-year average is close to the long-term median (1973 to 2012) for the population and well within the North Park Population MZ (639 to 1,214) recommended in the Colorado GRSG Conservation Plan (2008).

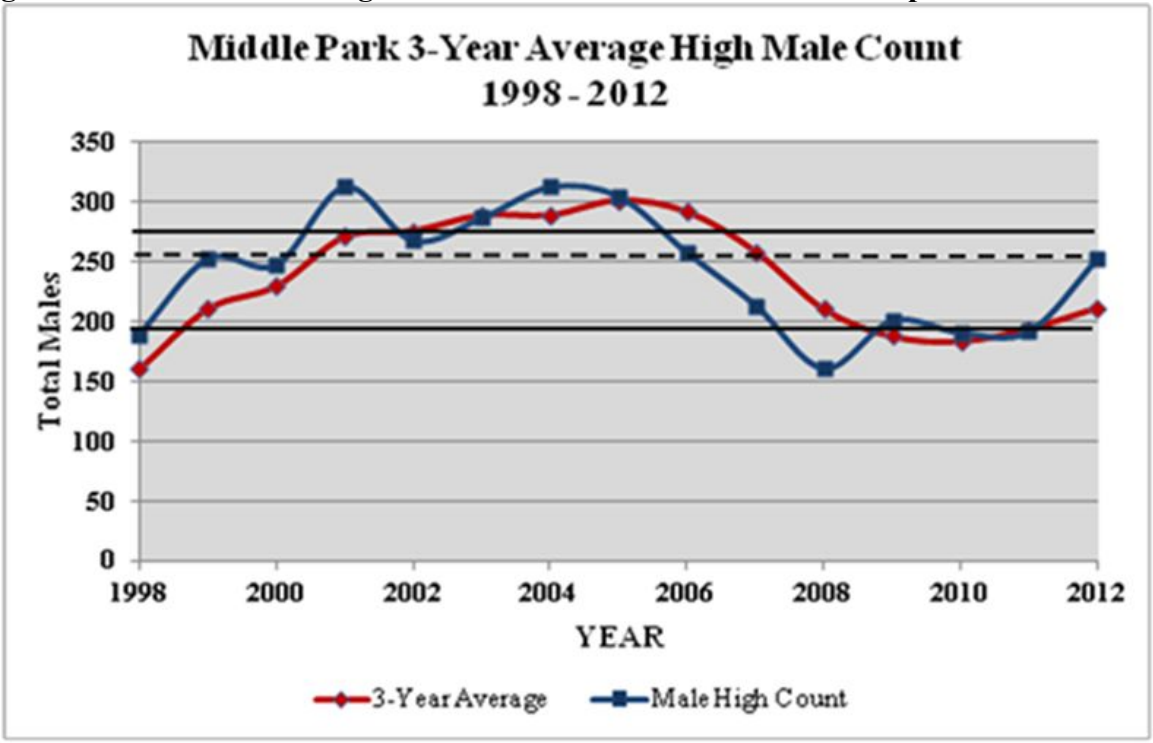
Diagram 3–6 Annual Male High Count for the North Park GRSG Population



In Middle Park, the lowest recoded population from 1984 to 1997 was 51 males in 1985; however, this could be attributed to inconsistencies in lek counts. Lek counts have fluctuated from 238 to 313 between 2000 and 2005, with a 3-year average from 2010 to 2012 recorded at 197. Diagram 3–7, Annual Male High Count for the Middle Park GRSG Population, showing the 3-year average lek counts, high male counts, the 25 percent and 75 percent quartile and the median for these years. The Middle Park plan has the optimum level of spring males counted at 250 and states that effort will be made from keeping the minimum number of males from falling below 125. The populations naturally fluctuate, so it is difficult to determine at any given time if a population is increasing, decreasing, or staying stable. The Middle Park population has fluctuated around and within the population MZ recommendations (185 to 286) provided in the Colorado GRSG

Conservation Plan (2008) and could be considered stable. It is worth noting that the 5 years prior to 2012 were the lowest the population had been in the last decade, hovering at or below the low end of the recommendations.

Diagram 3–7 Annual Male High Count for the Middle Park GRSG Population



Little Snake Field Office

In 2012, CPW updated GRSG habitat across the species range in Colorado. There are 138 active leks in the Northwest population (83 on BLM-administered land; 2012 data) and 7 in the Eagle/South Routt population (1 on BLM-administered land; 2011) within the LSFO. Recent data on GRSG populations within the Colorado MZs are provided in . Table 3.12, "GRSG Population Data within Colorado Management Zones" (p. 259)

Table 3.12. GRSG Population Data within Colorado Management Zones

Zone	Count 2008	Count 2009	Count 2010	Count 2011	Count 2012
1	62 (2 leks)	96 (8 leks)	63 (10 leks)	55 (7 leks)	66 (10 leks)
2	205 (6 leks)	175 (7 leks)	108 (7 leks)	218 (10 leks)	268 (10 leks)
3a	495 (13 leks)	433 (18 leks)	278 (17 leks)	373 (19 leks)	406 (18 leks)
3b	459 (21 leks)	616 (25 leks)	557 (24 leks)	462 (24 leks)	410 (29 leks)
3c	44 (4 leks)	111 (6 leks)	61 (8 leks)	158 (10 leks)	255 (11 leks)
4a	43 (1 lek)	138 (5 leks)	105 (7 leks)	94 (7 leks)	101 (7 leks)
4b	85 (9 leks)	108 (11 leks)	123 (11 leks)	156 (12 leks)	111 (12 leks)
5	205 (20 leks)	159 (24 leks)	206 (32 leks)	294 (35 leks)	277 (35 leks)
6	234 (7 leks)	117 (8 leks)	96 (9 leks)	92 (9 leks)	112 (9 leks)
7	15 (2 leks)	7 (2 leks)	12 (2 leks)	11 (2 leks)	8 (1 leks)
Total	**1,847**	**1,960**	**1,609**	**1,913**	**2,014**
Source: CPW 2012					

Other Special Status Species

By definition, the populations of all special status wildlife species have historically suffered downward trends. Management efforts by the BLM, USFS, USFWS, CPW, and others have reversed the downward trend for a number of these populations, but none of the populations are near their historic levels. Most populations remain at levels that are biologically insecure, regardless of their legal status. In addition to continued threats from habitat loss and fragmentation, variability in habitat condition is an ongoing factor in the distribution and density of special status plant, fish and wildlife species. For example, population viability for special status plant, fish, and amphibian species varies with hydrologic conditions. The recent drought has reduced the amount or quality of habitat in some areas, further stressing populations of these species.

Draft RMPs for each field office further describe special status species and describe in detail BLM Sensitive and federally listed species within each planning area in Chapter 3. These sections describe the current trends for special status species in each field office and are incorporated here by reference.

Trends on National Forest System Lands

Routt National Forest

Greater Sage-Grouse

The GRSG is associated with sagebrush habitats, though there are several types of sagebrush communities, which include the following floristic regions: Great Plains, Wyoming Basin, Southern Great Basin, Snake River Plains, Northern Great Basin, Columbia Basin, and Colorado Plateau (Stivers et al. 2006). The Routt National Forest is part of the Wyoming Basin Floristic Region (Stivers et al. 2006), and most of the sagebrush is typed as mountain big sagebrush (*Artemisia tridentata* var. *vaseyana*). Although sagebrush appears to still occupy much of the historical distribution of GRSG, sagebrush does not always provide adequate habitat due to degradation and fragmentation or a loss of important understory components within sagebrush habitats (USFWS 2010a).

Prior to 1800, GRSG existed in 13 western states across 463,509 square miles (USFWS 2010a). Currently GRSG are found in 11 western states: Washington, Oregon, California, Nevada, Idaho, Montana, Wyoming, Colorado, Utah, and North and South Dakota, and occupy approximately 56 percent of their historical range (USFWS 2010a). Recently, the CPW completed habitat mapping across northwest Colorado that is being used by the BLM and USFS to amend the BLM's RMPs and the Routt National Forest's Forest Plan (USFS 1998). The result of the mapping has identified PPH and PGH across much of northwest Colorado in sagebrush habitats. Of the 12,600 acres of GRSG habitat mapped by CPW on the Routt National Forest, 11,100 acres is PGH and 1,600 acres is PPH.

No active GRSG leks have been documented on the Routt National Forest in recent years; however one historic lek has been previously documented. Though no active leks are found on the Routt National Forest, many leks are located in close proximity (less than 4 miles) to the Forest resulting in the classification of PPH. No population trend information exists for the Routt National Forest, thus this section will defer to population trend information provided at the national and state level within the following documents: USFWS's 12-month finding for petition to list the GRSG (USFWS 2010b); Colorado GRSG Conservation Strategy and Plan; GRSG Comprehensive Conservation Strategy (Stivers et al. 2006); and the GRSG NTT direction (2011).

Other Special Status Species

Other special status species are identified in **Table 3.6**, Special Status Animal Species in the Planning Area. **Appendix L**, USFS Wildlife Specialist Report, addresses the existing condition for Routt National Forest special status species.

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3.4. Lands and Realty

The Lands and Realty Program secures and protects the American public's rights, title, value, and interests in its public lands, and authorizes a variety of uses on those public lands in order to meet the needs of present and future generations. Lands and realty actions ensure that public lands are managed to benefit the public.

Lands and realty actions can be divided between land tenure adjustments and land use authorizations. Land tenure adjustments focus primarily on land acquisition and disposal (including easement acquisition), while land use authorizations consist of ROWs, utility corridors, communication sites, and other leases or permits. Wind and solar renewable resource production is also permitted by ROW authorizations through the Lands and Realty Program.

LUP decisions related to limitations or restrictions on land use authorizations, such as COAs or stipulations, or land tenure changes (acquisition or disposal of BLM-administered or National Forest System lands) within the planning area could affect the Lands and Realty Program.

3.4.1. Existing Conditions

Conditions of the Planning Area

The planning area includes land in Eagle, Garfield, Grand, Jackson, Larimer, Mesa, Pitkin, Rio Blanco, Moffat, and Routt Counties in central and northwestern Colorado. Lands are administered or owned by multiple federal, state, and local agencies and private landowners. The configuration of land ownerships and their proximity to each other is an important factor when considering land tenure adjustments and evaluating ROW applications. The planning area contains lands owned by the BLM, USFS, other federal agencies, various state agencies, counties, and private land owners. In **Chapter 1**, Introduction, **Table 1.2**, Planning Area Land Ownership and GRSG Habitat (in Acres), shows the acreage and overall percent ownership for each land owner in the planning area.

Table 3.13, Acres of GRSG Habitat within City Limits in the Planning Area, through **Table 3.17**, Acres of Vertical Obstructions within GRSG Habitat in the Planning Area, display data compiled in a baseline environmental report produced by the US Geological Survey and BLM (Manier et al. 2013). In each table, acreages and mileages are presented by surface management agency and their presence within PGH and PPH in the planning area. **Figure 3-6**, Existing Designated Utility Corridors, displays those corridors listed in **Table 3.16**, Utility Corridors within GRSG Habitat in the Planning Area.

Table 3.13. Acres of GRSG Habitat within City Limits in the Planning Area

Surface Management Agency	Total Acres within City Limits	Acres within PGH	Acres within PPH
BLM	300	300	0
USFS	1,100	1,100	0
Tribal and Other Federal	0	0	0
Private	1,300	1,100	200
State	0	0	0
Other	0	0	0
Source: Manier et al. 2013			

Table 3.14. Miles of Transmission Lines within GRSG Habitat in the Planning Area

Surface Management Agency	Total Miles [1]	Miles within PGH	Miles within PPH
BLM	17,900	7,500	10,400
USFS	600	500	100
Tribal and Other Federal	0	0	0
Private	29,500	13,700	15,800
State	3,000	1,200	1,800
Other	1,100	100	1,000
Source: Manier et al. 2013 [1] Includes transmission lines greater than 115 kilovolts			

Table 3.15. Number of Communication Towers within GRSG Habitat in the Planning Area

Surface Management Agency	Total Number of Communication Towers [1]	Number within PGH	Number within PPH
BLM	100	50	40
USFS	0	0	0
Tribal and Other Federal	0	0	0
Private	100	80	50
State	10	2	10
Other	0	0	0

Source: Manier et al. 2013

[1] Displays the number of Federal Communication Commission communication towers

Table 3.16. Utility Corridors within GRSG Habitat in the Planning Area

Surface Management Agency	Miles of Utility Corridors			Acres of Utility Corridors		
	Total [1]	PGH	PPH	Total [2]	PGH	PPH
BLM	80	30	60	61,500	21,000	40,500
USFS	0	0	0	0	0	0
Tribal and Other Federal	0	0	0	0	0	0
Private	0	0	0	27,600	13,200	24,400
State	0	0	0	6,400	2,200	4,200
Other	0	0	0	2,200	0	2,200

Source: Manier et al. 2013

[1] Includes Section 368 energy corridors

[2] Acreages calculated by buffering corridor centerlines with varying widths based on the corridor width itself

Table 3.17. Acres of Vertical Obstructions within GRSG Habitat in the Planning Area

Surface Management Agency	Total Acres [1]	Acres within PGH	Acres within PPH
BLM	0	0	0
USFS	0	0	0
Tribal and Other Federal	0	0	0
Private	3,100	3,100	0
State	0	0	0
Other	0	0	0

Source: Manier et al. 2013

[1] Derived from dataset containing Federal Communication Commission communication towers and Federal Aviation Administration vertical obstructions. Assumes footprint of 56.4 square meters per obstruction

Conditions on BLM-Administered Lands

Land Tenure

Land ownership (or land tenure) adjustment refers to those actions that result in the disposal or withdrawal of public land, or the acquisition by the BLM of nonfederal lands or interests in land. The FLPMA requires that public land be retained in public ownership unless, as a result of land use planning, disposal of certain parcels is warranted. Tracts of land that are identified in BLM

RMPs as potentially available for disposal are more likely to be conveyed out of federal ownership through an exchange rather than a sale. This preference toward exchange over sale is established in BLM policy. Acquisition of and interests in lands are important components of the BLM's land tenure adjustment strategy. Lands and interests in lands are acquired for the following purposes:

- to improve management of natural resources through consolidation of federal, state, and private lands
- to secure key property necessary to protect endangered species, promote biological diversity, increase recreational opportunities, and preserve archeological and historical resources
- to implement specific acquisitions authorized or directed by acts of Congress

Disposal

Disposal areas include tracts of land that are economically difficult to manage and parcels that could serve important public objectives such as expansion of communities and economic development. These lands are usually disposed of through exchanges or land sales with public or private partners that allow the surrounding lands to be managed more effectively.

There are approximately 1,800 acres of BLM-administered land identified for disposal in the planning area. Case-by-case determinations for disposal would be made on the remaining acres of BLM-managed federal land.

Land exchanges are initiated in direct response to public demand or by the BLM to improve management of the public lands. Lands need to be formally determined as suitable for exchange. In addition, lands considered for acquisition would be those lands that meet specific land management goals identified in the RMP. Nonfederal lands are considered for acquisition through exchange of suitable public land, on a case-by-case basis, where the exchange is in the public interest and where acquisition of the nonfederal lands will contain higher resource or public values than the public lands being exchanged. There are no pending land exchanges within the planning area.

Public lands determined suitable for sale are offered on the initiative of the BLM. The lands are not sold at less than fair market value. Lands suitable for sale must be identified in an RMP. Any lands to be disposed of by sale that are not identified in the current RMP require a plan amendment before a sale can occur. There are no pending land sales within the planning area.

Acquisition

Acquisition of lands can be pursued to facilitate various resource management objectives. Acquisitions, including easements, can be completed through exchange, Land and Water Conservation Fund or other purchases, condemnation, or donations. There are no pending land acquisitions within the planning area.

Withdrawal

Withdrawn lands are lands that are reserved and set aside from application of some, or all, of the public land laws in order to protect specific resource values such as waterpower, reservoir sites, federal reserve water rights, and SRMAs. Segregative effects of withdrawals can vary depending upon the particular resource being protected, and the withdrawal may be modified or eliminated through revocation. Withdrawals are used to preserve sensitive environmental values, protect

major federal investments in facilities, support national security, and provide for public health and safety. Federal policy now restricts all withdrawals to the minimum time and acreage required to serve the public interest, maximize the use of withdrawn lands consistent with their primary purpose, and eliminate all withdrawals that are no longer needed.

In the current RMPs, over 900,000 acres are withdrawn from mineral entry in the entire planning area. Within GRSG habitat, 124,800 acres are currently withdrawn from mineral entry. There are no pending withdrawals within the planning area.

Land Use Authorizations

The most common form of authorization to permit uses of BLM-administered lands by commercial, private, or governmental entities is the ROW. A ROW grant is an authorization to use a specific piece of public land for projects such as roads, pipelines, transmission lines, or communication sites. The ROW grant authorizes rights and privileges for a specific use of the land for a specific period of time.

It is the BLM's objective to grant ROWs to any qualified individual, business, or government entity, and to direct and control the use of ROWs on public lands in a manner that:

- protects the natural resources associated with public lands and adjacent lands, whether private or administered by a government entity
- prevents unnecessary or undue degradation to public lands
- promotes the use of ROWs in common, considering engineering and technological compatibility, national security, and area RMPs
- coordinates, to the fullest extent possible, all BLM actions with local, State, Native American Tribal, and other federal agencies; interested individuals; and appropriate quasi-public entities (43 CFR 2801.2)

Some uses of BLM-administered lands are authorized through land use long-term land uses, and permits are used to authorize short-term uses. Private individuals and groups, as well as various businesses and government entities can hold these authorizations (**Table 3.18**, Acres of BLM Land Use Authorizations within the Decision Area).

Table 3.18. Acres of BLM Land Use Authorizations within the Decision Area

	Acres PPH	Acres PGH	Total Acres
Existing ROWs	257,600	219,800	477,500
Avoidance Areas	25,600	43,300	68,900
Exclusion Areas	17,100	15,700	32,800
Corridors	22,600	48,100	70,600
Source: BLM 2013			

Rights-of-Way

To the extent possible, linear ROWs, such as roads and pipelines, are routed where impacts would be least disturbing to environmental resources, taking into account point of origin, point of destination, and purpose and need of the project. The ROWs for long-term land uses are issued with surface reclamation stipulations and other mitigation measures. Restrictions and mitigation measures are applied and may be modified on a case-by-case basis, depending

upon impacts on resources. The placement of major linear facilities depends upon meeting the following location criteria:

- concentrate linear facilities within, or contiguous to, existing corridors, where possible
- avoid locations that would take intensively managed forest land out of production
- avoid locations that would harass livestock or wildlife
- avoid steep topography, poor soils, or other fragile areas (such as Threatened and Endangered habitats)
- avoid cultural sites that are listed on, or are eligible for listing on, the National Register of Historic Places (NRHP).

See **Table 3.18**, Acres of BLM Land Use Authorizations within the Decision Area, for an overview of the number and acreages of ROWs within the planning area and the habitat types they cross.

Avoidance and Exclusion Areas

Areas closed to mineral leasing, having an NSO restriction, or otherwise identified as unsuitable for surface disturbance or occupancy are generally identified as avoidance or exclusion areas for ROWs. Restrictions and mitigation measures could be modified on a case-by-case basis for avoidance areas, depending on impacts on resources, while exclusion areas are strictly prohibited from ROW development. See **Table 3.18**, Acres of BLM Land Use Authorizations within the Decision Area, for an overview of the ROW avoidance or exclusion areas within the planning area and the habitat types within these areas.

Corridors

Utility corridors, developed to concentrate the effects of utility lines in manageable locations on BLM-administered lands, often provide suitable locations for utility transmission lines. The corridors may contain power lines, transcontinental fiber-optic communication cables, and trans-state gas pipelines. Identifying corridors does not necessarily mandate that transportation and transmission facilities would be located within the corridor, especially if they are not compatible with other resource uses, values, and objectives in and near the corridors, or if the corridors are already at maximum capacity with existing structures. See **Table 3.18**, Acres of BLM Land Use Authorizations within the Decision Area, for an overview of the number and acreages of utility corridors within the planning area and the habitat types they cross.

Communication Sites

Communication sites contain equipment for various public and private tenants, including phone companies; local utilities; and local, state, and other federal agencies. Communication site applications are granted through a ROW communications lease.

Renewable Energy

Solar, wind, biomass (which are administered through the Forestry program), and geothermal (which is managed as a fluid leasable mineral) are considered renewable energy resources. Renewable energy resources all have different requirements related to economic development;

however, some issues are common to all renewable energy resources, including distance to existing power transmission facilities and compatibility with existing federal land use.

Wind and solar resource facilities are permitted with ROWs through the Lands and Realty Program. All solar energy projects 20 megawatts and greater are excluded in all RMPs within the Northwest District, as described in the Solar Energy Development Programmatic EIS Record of Decision, dated October 2012. Geothermal resources, as mentioned above, are considered fluid leasable minerals.

There are no existing renewable energy land use authorizations within the planning area within GRSG habitat.

Conditions on National Forest System Lands

Routt National Forest

Several aspects of public land management must be considered in the Forest Planning process, including land tenure adjustments (i.e., disposals, acquisitions, and withdrawals), ROWs, and permits and leases.

Land Ownership Adjustment

National Forest System lands are exchanged to achieve a desired national forest land ownership pattern that supports forest land and resource goals and objectives, addresses fragmentation, reduces future management costs, and responds to urban and community needs. Lands are purchased through the Land and Water Conservation Fund to protect critical resource areas and provide increased public recreation opportunities. Land donations are accepted to consolidate National Forest System lands and protect critical resource areas. The legal public use of National Forest System lands are improved by acquiring ROWs for roads and trails. Opportunities for land ownership adjustments are equally distributed across the Yampa, Hahns Peak/Bears Ears, and Parks Ranger Districts.

The landowner must be willing to engage in a land ownership adjustment, and the USFS ensures that market value is obtained for lands or interests in lands to protect the public and private property owner's interest. The USFS has identified parcels that meet the criteria for land adjustment. Other parcels not presently identified are evaluated under the merits of each proposal. Nonfederal lands are considered for acquisition through exchange of suitable public land, on a case-by-case basis. The objectives of the land ownership adjustment program are to achieve the optimum land ownership pattern for the protection and management of resource uses, settle land title claims, and provide resource administrators with title information about the use of and resources on the land they administer. In all land exchanges, keeping the surface and mineral estate intact on both the disposed and acquired lands would benefit the future owners and their uses of the land.

Purchase. Land purchase can be pursued to facilitate various resource management objectives. Lands considered for purchase would be those lands that meet specific land management goals identified in the Forest Plan. Most funding for purchases comes from the Land and Water Conservation Fund. This is a competitive national fund and is not a reliable source of funding for land purchases on National Forest System lands. In the future, most land ownership adjustments will be done with land exchanges. In December 2012, the USFS accepted a land donation in the

California Park area resulted in transferring approximately 100 acres of private lands classified as PGH to USFS ownership and management.

Rights-of-Way. ROW acquisitions on National Forest System lands is necessary for all improvements, such as roads, trails, telephone lines, powerlines, pipelines, ditches, and fences over private or other lands not administered by the USFS. To the extent possible, linear ROWs, such as roads and pipelines, are routed where impacts would be least disturbing to environmental resources, taking into account the point of origin, point of destination, and purpose and need of the project. Although established corridors exist, this does not preclude the location of transportation and transmission facilities in other areas if environmental analysis indicates that the facilities are compatible with other resource values and objectives. Further identification of corridors may not necessarily mandate that transportation and transmission facilities be located within these areas if they are not compatible with other resource uses, values, and objectives in and near the corridors or if the corridors are saturated. ROWs are issued with surface reclamation stipulations and other mitigating measures. Restrictions and mitigating measures may be modified on a case-by-case basis, depending on impacts on resources. Areas closed to mineral leasing, having a NSO restriction, or otherwise identified as unsuitable for surface disturbance or occupancy are generally avoidance or exclusion areas for ROWs.

Wind energy developments on National Forest System lands have not been proposed as of this time. Although the potential in the forest area for wind energy development is high in many locations, the terrain and lack of accessibility to the grid makes it generally unsuitable for development.

Special Uses

Special use permits authorize and administer use of public lands by individuals, companies, organized groups, other federal agencies and State or local levels of government in a manner that protects natural resource values and public health and safety. For example, special use permits authorize uses that contribute to the Nation's infrastructure for generating and transmitting energy resources, such as: electric transmission facilities, oil and gas pipelines, hydropower facilities, and wind and solar facilities. They authorize uses for communications, commerce, public health and safety, and homeland security, such as fiber-optic and wireless telecommunications, water development systems, and federal, state, and local highways. Authorizations are needed by landowners to exercise statutory rights and outstanding and reserved interests in National Forest System lands. **Table 3.19**, Number of Special Use Permits on the Routt National Forest, lists the number of each type of special use permit on the National Forest.

Table 3.19. Number of Special Use Permits on the Routt National Forest

Use	Number of Permits
Power lines	8
Road permits	72
Ditches	156
Communication permits	28
Dams and reservoirs	51
Recreation residences	20
Cultural Use	0
Oil and gas pipelines	1
Monument	2
Ski area	1

Use	Number of Permits
Telephone	4
Snow Play	3
Wells of spring developments	6
Stream gauging stations	2
Research/education	3
Outfitters and guides	42
Recreation events	5
Organization camps	1
Fences	1
Other Improvements/permits	12
Warehouse	1
Fish ladder	1
Water Treatment	1
Totals	**421**
Source: Special Use Data System 2013	

The 1986 amendment to FLPMA, known as the Ditch Bill, provides for permanent easement for agricultural water systems in use before 1976. Water users had 10 years from passage of the bill to apply for existing structures located on National Forest System lands. Currently, 48 easements have been issued under this law with an estimated 10 additional applications being processed.

Recreation Residence Permits. There are three summer home groups with a total of 20 cabins located on the National Forest. In many areas, this use has existed since 1925. Permits for the recreation residences are issued for 20 years. The purpose was to encourage use of the National Forests by allowing individuals to build cabins and occupy them for a portion of the year. Several thousand permits were issued nationwide. The current national policy is not to issue any additional permits but continue to acknowledge the recreational values associated with the existing Recreation Residences and to reissue existing permits when the current permit tenure expires. It is the intent of the Routt National Forest to conduct the proper environmental analysis and reissue existing permits when the current permit tenure expires.

3.4.2. Trends

Trends on BLM-Administered Lands

Land Tenure Adjustments

Field offices in Colorado have been consolidating their lands to benefit the public. To achieve this, candidates for land tenure adjustment through disposal, sale, exchange, or acquisition include parcels that are difficult to manage or that do not have public access, parcels that are relatively small and are adjacent to other federally or state-managed lands, parcels that would increase conservation of natural resources, and parcels that increase access to and use of BLM-administered land.

The planning area currently does not have any pending land tenure adjustments and no indications of increased activity in the future. However, the BLM field offices in the planning area remain open to any suggestions by staff, members of the public, and other entities, and will process land exchanges, acquisitions, easements, and potential sales within the decision area on a case-by-case basis, as staff and priority workload allow.

Land Use Authorizations

Land use authorizations (primarily ROWs) are currently very active in the planning area across all BLM field offices. Each year, the field offices collectively process more than 300 land use authorizations per year.

ROW applications across BLM-administered lands have increased and will likely continue to increase; demand for communication site leases, for both existing and new sites on BLM-administered lands within the planning area is also increasing. Issues driving the trend to more land use authorizations include growth and urbanization issues, the interface between private landowners, and the demands on BLM-administered land to locate the facilities (e.g., access roads, communication sites, mineral development, pipelines, water tanks, and utility corridors) needed to support the fast-growing infrastructure. As communities and mineral developments continue to expand in the planning area, it is likely that requests for the use of BLM-administered land for facilities would increase.

In recent years, small-scale renewable energy facilities on private lands have been increasing in number within the planning area, and are expected to continue into the future. Private wind turbines and solar facilities are being located within the planning area, providing renewable energy to localized structures and services. Within the planning area, however, the potential for wind and solar energy is low to medium. The demand for biomass is expected to increase within the planning area.

Trends on National Forest System Lands

Routt National Forest

Proposals for land adjustments will be considered on a case-by-case basis. Land adjustments tend to be more opportunistic and do not have an apparent trend. In December 2012, the USFS completed a 124-acre land donation acquisition of approximately 124 acres of PGH in the California Park area. No other land adjustments in GRSG habitat are currently being evaluated.

Special land use applications are increasing as more people make use of National Forest System lands. Recreational Residence permits are anticipated as a flat trend because current national policy is not to issue any additional permits, and to reissue existing permits when the current permit tenure expires. Considering that renewable energy developments have not been proposed, and the terrain and lack of grid accessibility are limiting factors, the trend is anticipated to be flat without any increase in demand for renewable energy authorizations at this time.

3.4.3. References

BLM (United States Department of the Interior, Bureau of Land Management). 2013. Geographic Information Systems Data. Unpublished data. BLM, various field offices.

Manier, D. J., D. J. A. Wood, Z. H. Bowen, R. Donovan, M. J. Holloran, L. M. Juliusson, K. S. Mayne, S. J. Oyler-McCance, F. R. Quamen, D. J. Saher, and A. J. Titolo. 2013. Summary of Science, Activities, Programs and Policies that Influence the Rangewide Conservation of Greater Sage-Grouse (*Centrocerus urophasianus*). US Geological Survey Open-File Report 2013-1098. Ft. Collins, CO.

USFS (United States Department of Agriculture, Forest Service). 2013. Geographic Information Systems data. Unpublished data. United States Department of Agriculture, Forest Service, Routt National Forest, Steamboat Springs, CO.

3.5. Vegetation (Forest, Rangelands, Riparian and Wetlands, and Noxious Weeds)

Vegetation serves multiple purposes on the landscape and provides many ecosystem benefits. Vegetation stabilizes soils, prevents erosion, uses carbon dioxide, releases oxygen, increases species diversity, and provides habitat and food for animals and products for human use. Many BLM and USFS land management policies are directed toward maintenance of healthy vegetation communities.

The riparian community includes wetlands and is associated with and depends on the presence of water during some part of the growing season. This community provides the link between aquatic and upland (dry) habitats across all elevations. Typical riparian areas are lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers, streams, and shores of lakes and reservoirs with stable water levels. Excluded are such sites as ephemeral streams or washes that do not exhibit vegetation dependent on free water in the soil (BLM 2004a). Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions under normal circumstances. Wetlands include marshes, shallows, swamps, lakeshores, bogs, muskegs, wet meadows, estuaries, springs, seeps, and riparian areas (BLM 2004a).

Oil and gas development, timber harvest and associated activities, fuels management, livestock grazing, recreation, travel management, and special designations can affect vegetation. In particular, activities dealing with water rights and subsequent water diversions may affect riparian areas.

Many BLM and USFS land management policies are directed toward the maintenance and improvement, of healthy vegetation communities. Generally, vegetation can be characterized by ecological provinces, and more specifically characterized by plant communities. The plant communities discussed below are those that provide the most important land cover across identified GRSG habitat within the planning area.

3.5.1. Existing Conditions

Conditions of the Planning Area

The planning area lies within three US EPA Level III Ecoregions: Southern Rockies, Wyoming Basin, and Colorado Plateaus (US EPA 2011). Ecoregions represent areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. They serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components (Chapman et al. 2006).

The planning area is characterized by high elevations and rugged mountains where vegetation is dominated by conifers of the Southern Rockies Ecoregion (Chapman et al. 2006). Vegetation types within this ecoregion are organized by elevation zones, with grass and shrublands found in the lower elevations up to the highest elevations with coniferous forest and tundra. The

Wyoming Basin ecoregion is a broad intermontane basin interrupted by hills and low mountains and dominated by grasslands and shrublands. The Colorado Plateaus ecoregion is an uplifted, eroded, and deeply dissected tableland with mesas, cliffs, and canyons. It has large low-lying areas with saltbush-greasewood, and more pinyon-juniper and Gambel oak (*Quercus gambelii*) woodlands compared to the Wyoming Basin (US EPA 2010).

A number of different vegetation communities exist within GRSG habitat in the planning area, including sagebrush steppe, agriculture/irrigated meadow, mountain shrub, desert shrub/scrub, grasslands subalpine meadow, pinyon-juniper, other forests and woodlands, riparian and wetlands, and other. **Table 3.20**, Vegetation Communities in GRSG Habitat in the Planning Area, shows the acreage of each of these vegetation communities across GRSG habitat in the planning area. Each vegetation community is also described below.

Table 3.20. Vegetation Communities in GRSG Habitat in the Planning Area

Vegetation Community	PPH		ADH	
	Acres	Percent	Acres	Percent
Sagebrush steppe	1,651,300	69.8	2,545,400	61.4
Agriculture/Irrigated meadow	233,000	9.9	426,900	10.2
Mountain shrub	150,500	6.4	347,500	8.4
Desert shrub/scrub	82,300	3.5	227,500	5.5
Grasslands	85,900	3.6	116,900	2.8
Subalpine meadow	17,100	0.7	27,700	0.7
Pinyon-juniper	54,000	2.3	265,600	6.4
Other forest and woodland	58,700	2.5	131,000	3.2
Riparian and Wetlands	19,900	0.8	33,400	0.8
Other	12,400	0.5	26,600	0.6
Total	**2,365,100**		**4,148,500**	
Source: BLM 2013				

Sagebrush Steppe

Sagebrush steppe vegetation occupies 61.4 percent of ADH and 69.8 percent of PPH within the planning area. Sagebrush conditions within the planning area are generally split between upper and lower elevations, with 7,000 feet representing the approximate dividing line. The higher-elevation sagebrush communities are usually composed of mountain big sagebrush (*A. tridentata* ssp. *pauciflora*) or subalpine sagebrush (*A. tridentata* ssp. *vaseyana*), sometimes in pure stands but often with serviceberry (*Amelanchier* spp.), mountain snowberry (*Symphoricarpos rotundifolius*), green rabbitbrush (*Chrysothamnus viscidiflorus*), or antelope bitterbrush (*Purshia tridentata*). The higher-elevation sagebrush tends to be very productive, shows little evidence of decadence (mature shrubs where approximately 25 percent or more of plant is dead), and shows good recruitment of young sage. Common grass and grass-like species found in the sagebrush community include bluebunch wheatgrass (*Pseudoroegneria spicata*), thickspike wheatgrass (*Elymus lanceolatus*), Sandberg bluegrass (*Poa secunda*), muttongrass (*Poa fendleriana*), Indian ricegrass (*Achnatherum hymenoides*), needle and thread (*Hesperostipa comata*), threadleaf sedge (*Carex filifolia*), green needlegrass (*Nassella viridula*), Columbia needlegrass (*Achnatherum nelsonii*), bottlebrush squirreltail (*Elymus elymoides*), and Idaho fescue (*Festuca idahoensis*). Common forbs include phlox (*Phlox* spp.), Hooker's sandwort (*Arenaria hookeri*), buckwheat (*Eriogonum* spp.), penstemon (*Penstemon* spp.), wild onion (*Allium* spp.), Indian paintbrush (*Castilleja* spp.), globemallow (*Sphaeralcea* spp.), Oregon grape (*Mahonia* spp.), and prickly pear cactus (*Opuntia* spp.) (BLM 2007b).

Lower-elevation sagebrush communities [Wyoming big sagebrush (*A. tridentata* ssp. w*yomingensis*) and xeric mountain big sagebrush] consist of older stands of sagebrush that show more signs of decadence (mature shrubs where approximately 25 percent or more of plant is dead) and little recruitment. These communities often have less herbaceous cover and diversity, especially forbs, and are highly susceptible to cheatgrass (*Bromus tectorum*) invasion. The forb component may vary considerably with recent precipitation amounts and timing. Nearly 100 years of fire suppression have allowed pinyon pine (*Pinus edulis*) and juniper trees (*Juniperus utahensis*) to encroach into sagebrush habitat. **Table 3.21**, Acres of Sagebrush and Pinyon-Juniper Interface within GRSG Habitat in the Planning Area, displays data compiled in a baseline environmental report produced by the US Geological Survey and the BLM (Manier et al. 2013). In this table, acres are presented by surface management agency and their presence within PGH and PPH in the planning area.

Table 3.21. Acres of Sagebrush and Pinyon-Juniper Interface within GRSG Habitat in the Planning Area

Surface Management Agency	Total Acres of Interface [1]	Acres within PGH	Acres within PPH
BLM	163,300	97,300	66,000
USFS	1,000	500	500
Tribal and Other Federal	3,600	2,500	1,100
Private	83,900	43,100	40,800
State	21,100	7,100	14,000
Other	2,400	700	1,700

Source: Manier et al. 2013

[1] Includes the number of acres where sagebrush land cover occurs within 120 meters of pinyon-juniper land cover

Lower-elevation sagebrush also comprises the bulk of big game winter range and, as such, the sagebrush is often moderately to heavily hedged. Repeated heavy hedging eventually leads to more decadence (mature shrubs where approximately 25 percent or more of plant is dead) throughout sagebrush stands and even mortality of individual sagebrush shrubs.

Agriculture/Irrigated Meadows

Agricultural lands within GRSG habitat in the planning area largely consist of irrigated meadows. Irrigated meadows are mostly found on private lands not administered by the BLM or USFS. These agricultural lands occupy 10.2 percent of ADH and 9.9 percent of PPH in the planning area. Irrigated meadows primarily consist of lower-elevation flat areas, including river bottoms, terraces, and benches that are mainly used for hay production in the summer and winter feeding areas for livestock. The major grasses used for hay production on the irrigated meadows include timothy (*Phleum* spp.), smooth brome (*Bromus inermis*), orchardgrass (*Dactylis glomerata*), American sloughgrass (*Beckmannia syzigachne*), meadow foxtail (*Alopecurus pratensis*), and redtop (*Agrostis gigantea*). Grass-like plants, such as sedges and rushes, are also found in these meadows, often on the bog-like sites.

Mountain Shrub

Mountain shrub vegetation occupies 8.4 percent of ADH and 6.4 percent of PPH in the planning area. Mountain shrubland includes large stands of Gambel oak and other more diverse associations with Gambel oak, mountain mahogany (*Cercocarpus* spp.), mountain

snowberry (*Symphoricarpos* spp.), and serviceberry (*Amelanchier* spp.), with scattered sagebrush, rabbitbrush, bitterbrush, kinnikinnick (*Arctostaphylos* spp.), currant (*Ribes* spp.), shrubby cinquefoil (*Dasiphora fruticosa*), and skunkbush sumac (*Rhus trilobata*). The most common areas where mountain shrub vegetation communities are found are on northern exposures in snow pockets and along drainages where moisture is not a limiting factor. These areas are frequently located about mid-slope and may be associated with steep topography. Although thinly scattered, mountain shrub vegetation communities provide vital forage and habitat for wildlife and livestock. Grasses found in the community include needle and thread, basin wildrye (*Leymus cinereus*), Indian ricegrass, green needlegrass, Columbia needlegrass, thickspike wheatgrass, Idaho fescue, Thurber's fescue (*Festuca thurberi*), mountain muhly (*Muhlenbergia montana*), prairie junegrass (*Koeleria macrantha*), slender wheatgrass (*Elymus trachycaulus*), Sandberg bluegrass, Kentucky bluegrass (*Poa pratensis*), letterman's needlegrass (*Achnatherum lettermanii*), bottlebrush squirreltail, western wheatgrass (*Pascopyrum smithii*), beardless bluebunch wheatgrass, brome (*Bromus* spp.), and muttongrass. Common forbs include arrowleaf balsamroot (*Balsamorhiza sagittata*), buckwheat, Indian paintbrush, lupine (*Lupinus* spp.), penstemon, sego lily (*Calochortus nuttallii*), wild onion, larkspur (*Delphinium* spp.), violet (*Viola* spp.), bluebells (*Mertensia* spp.), and prickly pear cactus (BLM 2007b).

Desert Shrub/Scrub

Desert shrub/scrub vegetation occupies 5.5 percent of ADH and 3.5 percent of PPH in the planning area, and only on BLM-administered lands. This system is comprised of arid to semi-arid shrublands on lowland and upland sites usually at elevations between 5,000 and 7,000 feet. Sites can be found on all aspects. Slopes are typically gentle to moderately steep but are sometimes unstable and prone to surface movement. Many areas within this system are degraded due to erosion and may resemble "badlands." Soil surface is often very barren in occurrences of this system. The interspaces between the characteristic plant clusters are commonly covered by a microphytic crust. Dominant shrubs found in this community are drought tolerant and include Gardner's saltbush (*Atriplex gardneri*), fourwing saltbush (*Atriplex canescens*), birdfoot sagebrush (*Artemisia pedatifida*), bud sagebrush (*Picrothamnus desertorum*), spiny hopsage (*Grayia spinosa*), greasewood (*Sarcobatus vermiculatus*), broom snakeweed (*Gutierrezia sarothrae*), Basin big sagebrush, rabbitbrush, and winterfat (*Krascheninnikovia lanata*) (BLM 2007b). Grasses associated with these sites are Indian ricegrass, bottlebrush squirreltail, Sandberg bluegrass, bluebunch wheatgrass, needle and thread, and western wheatgrass (BLM 2007b). Forbs include wild onion, biscuitroot (*Lomatium* spp.), woody aster (*Xylorhiza* spp.), globemallow, and prickly pear cactus (BLM 2007b).

Grasslands

Grasslands vegetation occupies 2.8 percent of ADH and 3.6 percent of PPH in the planning area. Native grasslands within the planning area generally consist of two distinct types: dry and moist/wet. The dry grasslands are found in small isolated areas, often on exposed ridges or hilltops, where winds reduce available moisture and prevent shrub growth. Soils at these sites are generally very shallow and include a high percentage of rocks or cobbles. Most of these areas are actively grazed by livestock and wildlife and are dominated by grasses like Colorado wildrye (*Leymus ambiguus*), saline wildrye (*Leymus salinus*), Indian ricegrass, bottlebrush squirreltail, western wheatgrass, beardless bluebunch wheatgrass, Sandberg bluegrass, brome, arrowleaf balsamroot, buckwheat, and penstemon (BLM 1994). Many lower-elevation grasslands are degraded and are dominated by cheatgrass.

Moist/wet grasslands exist primarily as high-mountain meadows. Plant communities here are typically productive and diverse. These grasslands can be found in areas with ample moisture and gentle topography, such as mountain valleys, swales, parks, and around pot holes. Numerous grass, grass-like, and forb species produce a lush variety of vegetation that provides significant amounts of summer feed for wildlife and livestock. Common grasses include Idaho fescue, Thurber's fescue, mountain muhly, needle and thread, prairie junegrass, slender wheatgrass, Sandberg bluegrass, Kentucky bluegrass, and letterman's needlegrass (BLM 1994). Lowland grassland species that are also found at these elevations include Indian ricegrass, bottlebrush squirreltail, western wheatgrass, beardless bluebunch wheatgrass, brome, arrowleaf balsamroot, buckwheat, muttongrass, and penstemon.

Forest and Woodlands

The forest and woodland cover type found at the lowest elevation in the planning area is pinyon-juniper woodlands, and the highest is spruce-fir forest. Other forest types are found at various elevations in between, and include quaking aspen (*Populus tremuloides*), Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), and lodgepole pine (*Pinus contorta*) communities. Herbaceous cover within woodlands is generally very low, although some areas with openings could have a substantial understory (including shrubs).

Pinyon-juniper woodlands vegetation occupies 6.4 percent of ADH and 2.3 percent of PPH in the planning area. Pinyon-juniper woodlands are mostly found between 5,200 and 8,000 feet on somewhat xeric ridgetops (BLM 1994). These woodlands vary from an open to closed canopy with a highly variable understory of shrubs and herbaceous plants. Old growth pinyon-juniper and areas with a greater dominance of juniper generally have less understory vegetation (BLM 2007b). Dominant plants in this community include pinyon pine, Utah juniper, Gambel oak, sagebrush, mountain mahogany, and many of the herbaceous species listed under the sagebrush steppe community.

Other forests and woodland vegetation occupies 3.2 percent of ADH and 2.5 percent of PPH in the planning area. Ponderosa pine forests are generally found between 6,000 and 8,000 feet (BLM 2007b). They are generally found on higher mesas and mountain slopes, and could contain substantial amounts of Douglas-fir, aspen, or pinyon-juniper woodlands. Healthy ponderosa pine forests have somewhat open canopies and contain a substantial understory of shrubs and grasses. This type of structure provides more year-round forage for wildlife than most other coniferous forest types. Herbaceous plants found in this community typically include many of those listed for mountain shrubland.

Lodgepole pine forests exist between 8,000 and 10,000 feet (Kingery 1998). This community represents an early successional stage and is the result of past stand-replacing fires. In these stands, the community is usually dominated by dense monocultures of trees of similar age, but understory species such as kinnikinnick and others from the mountain shrubland community could be found in more open areas.

Spruce-fir forests are usually found between 7,000 and 11,000 feet. These areas typically have shallow soils and contain dense stands of Engelmann spruce (*Picea englemanni*), Douglas-fir, and subalpine fir (*Abies lasiocarpa*) with a closed canopy. Openings in the forest support many herbaceous and woody plants that are found in the mountain shrublands and grassland communities.

Aspen forest communities are usually found between 7,000 and 10,000 feet. This community is early successional and consists of open to dense stands of aspen in sometimes isolated pockets in higher elevations (BLM 1994). Understory vegetation is highly variable and depends mostly on available moisture and canopy closure. Many aspen forests are very productive and contain a lush understory, whereas others could have somewhat sparse understories. Plant species commonly found in the aspen trees in this community include those listed under the mountain shrubland community.

Subalpine Meadow

Rocky Mountain subalpine mesic meadows are restricted to sites where finely textured soils, snow deposition, and/or wind-swept dry conditions limit tree establishment. These meadows are typically found above 9,800 feet in elevation in the southern part of its range, and above approximately 5,000 feet in the northern part. Typically, this vegetation type is forb-rich, with forbs contributing more to overall herbaceous cover than grasses (BLM 2011). This vegetation type covers 0.7 percent of ADH and 0.7 percent of PPH within the planning area.

Riparian and Wetland Vegetation

Riparian and wetland vegetation occupies 0.8 percent of ADH and 0.8 percent of all PPH in the planning area. Riparian areas in the planning area are generally small and account for a small proportion of the total acreage, but are highly productive and provide forage and cover for nearly all wildlife species at some point in their life cycle. A variety of vegetation types containing riparian zones and wetlands exist with the planning area, such as evergreen riparian forests and woodlands, mixed coniferous and deciduous forests and woodlands, deciduous dominated forests and woodlands, tall willow shrublands, short willow shrublands, non-willow shrublands, and herbaceous vegetation (Carsey et al. 2003). Riparian areas and wetlands are important because they improve water quality in watersheds by buffering open waterways from surface runoff that could contain sediment, toxicants, or other undesirable constituents.

The steeper-gradient riparian systems typically support aspen, willows (*Salix* sp.), red-osier dogwood (*Cornus sericea*), thinleaf alder (*Alnus incana* ssp. *tenuifolia*) and currant. Lower-gradient streams and lakes support predominantly herbaceous communities of sedges (*Carex* spp.), rushes (*Juncus* spp.), tufted hairgrass (*Deschampsia cespitosa*), and redtop with some narrowleaf cottonwood trees (*Populus angustifolia*). These riparian areas provide important brood-rearing habitat for GRSG because they support large populations of insects.

Other

Other vegetation covers in GRSG habitat within the planning area occupy 0.6 percent of ADH and 0.5 percent of PPH within the planning area. This category includes developed and disturbed landscapes, non-specific barren lands, open water, and recently burned, logged, mined or quarried lands.

Noxious Weeds

A noxious weed is a plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or nonnative, new, or not common to the US. Invasive vegetation species, as defined in Executive Order 13112, are "nonnative plants whose introduction does, or is likely to, cause economic or environmental harm or harm to human health."

Weed invasion continues to be a primary concern in western lands. Noxious weeds pose an ever-increasing threat to native plant communities, wildlife habitat, agricultural lands, and human recreation. As populations of noxious weeds and other invasive, nonnative plants increase in size and frequency, they often displace native plants, especially on recently disturbed sites, reducing the diversity of surrounding native plant communities, altering species composition and community structure, increasing potential for soil erosion, reducing water quality and quantity, losing long-term riparian area function, reducing habitat quality for wildlife and forage for livestock, increasing control costs, and affecting the aesthetic quality of the landscape.

The Noxious Weed Control and Eradication Act of 2004 requires the Secretary of Agriculture to provide assistance to eligible weed management entities in order to control or eradicate noxious weeds on public and private land. In 2004, Colorado amended the Noxious Weed Control and Eradication Act to list 72 species in 3 categories: A, B, and C. List A includes 18 species in Colorado that are designated by the Commissioner for eradication. List B includes 40 species for which a State Noxious Weed Management Plan is being, or will be, developed and implemented in order to stop the continued spread. List C includes 14 species that build from the goals of List B species, and for which additional education, research, and biological control will be provided to jurisdictions that chose to require management.

Of the weeds on the State of Colorado Noxious Weed List, those which are commonly found in GRSG habitat include houndstongue (*Cynoglossum officinale*), Canada thistle (*Cirsium arvense*), whitetop (*Cardaria draba*), and cheatgrass. Several other weed species have been found in small, isolated patches. Another invasive nonnative, Kentucky bluegrass is of concern. While this grass is not on the Colorado weed list, it is capable of outcompeting native, cool-season grasses under heavy grazing pressures, and is therefore an indicator of declining habitat quality in rangelands and riparian areas.

Cheatgrass is of particular concern in lower elevation and degraded areas within the planning area. Degradation into cheatgrass-dominated areas is most commonly associated with historic overgrazing, drought, and/or fire. Once established, the presence of cheatgrass increases the intensity and size of wildland fires, which leads to further vegetative degradation (BLM 2008). **Table 3.22**, Acres of Cheatgrass Potential within GRSG Habitat in the Planning Area, displays data compiled in a baseline environmental report produced by the US Geological Survey and the BLM (Manier et al. 2013). In this table, acres with cheatgrass potential are presented by surface management agency and their presence within PGH and PPH in the planning area.

Table 3.22. Acres of Cheatgrass Potential within GRSG Habitat in the Planning Area

Surface Management Agency	Total Acres [1]	Acres within PGH	Acres within PPH
BLM	1,488,200	624,100	864,100
USFS	9,100	4,700	4,400
Tribal and Other Federal	42,500	17,400	25,100
Private	1,783,800	612,900	1,170,900
State	244,200	62,700	181,500
Other	35,900	5,900	30,000

Source: Manier et al. 2013

[1] Acreage comprised of areas with a high potential for cheatgrass occurrence

Conditions on BLM-Administered Lands

Upland Vegetation

Acres of each vegetation community on BLM-administered lands within ADH and PPH are presented in **Table 3.23**, Vegetation Communities on BLM-Administered Lands in GRSG Habitat.

Table 3.23. Vegetation Communities on BLM-Administered Lands in GRSG Habitat

Vegetation Community	PPH		ADH	
	Acres	Percent	Acres	Percent
Sagebrush steppe	722,300	78.4	1,143,300	66.0
Agriculture/Irrigated meadow	10,200	1.1	18,600	1.1
Mountain shrub	35,700	3.9	105,600	6.1
Desert shrub/scrub	61,800	6.7	176,800	10.2
Grasslands	29,500	3.2	43,500	2.5
Subalpine meadow	5,000	0.5	8,300	0.5
Pinyon-juniper	35,900	3.9	179,800	10.4
Other forest and woodland	13,100	1.4	40,500	2.3
Riparian and Wetlands	1,800	<1	3,300	<1
Other	6,300	<1	11,800	<1
Total	**921,600**		**1,731,500**	
Source: BLM 2013				

In 1997, the BLM adopted the Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado (see **Appendix K**, BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado) (BLM 1997a). These standards and guidelines were developed to guide the BLM and public land users to maintain or achieve rangeland health. During the permit renewal process, allotments are assessed for compliance with the standards and guidelines by a BLM interdisciplinary team that visits the site and determines the health of the allotment. For livestock grazing allotments, a goal is for the vegetation to meet or be moving toward compliance with the following standard:

- Standard 3 - Plant and Animal Communities: Healthy productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the species and habitat's potential. Plants and animals at both the community and population level are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations and ecological processes.

Only limited spatial data for land health assessments is available for BLM-administered lands throughout the planning area. Of the 581,000 acres of PPH on BLM-administered lands in the planning area for which spatial land health data are available, 308,700 acres (53 percent) were found to meet land health standards. Of the 1,121,900 acres of ADH on BLM-administered lands in the planning area for which spatial land health data are available, 503,900 acres (45 percent) were found to meet land health standards. Note that these figures do not include any lands in the BLM's KFO or WRFO. In areas that were not achieving or making progress toward achieving Standard 3, historic grazing practices and weed invasion (e.g., cheatgrass [*Bromus tectorum*]) were the most common indicated causal factors for these determinations (see **Appendix K**, BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado).

Riparian/Wetland Vegetation

Proper Functioning Condition is an inventory methodology the BLM uses to assess the physical functioning of riparian areas and wetlands. The Proper Functioning Condition assessment provides a consistent approach for assessing the physical functioning of riparian areas and

wetlands through consideration of such factors as hydrology, vegetation, and soil/landform attributes. The assessment synthesizes information that is foundational to determining the overall health of riparian areas and wetlands. Proper functioning condition is a state of resiliency that will allow riparian areas and wetlands systems to hold together during a 25- to 30-year flow event, sustaining that system's ability to produce values related to both physical and biological attributes.

Proper Functioning Condition assessments have been performed on most riparian areas on BLM-administered lands within the planning area. Streams rated "Functioning at Risk" are functional, but at risk. Within the planning area, most of the "Functioning at Risk" streams are streams where the use levels place the area at risk for degradation, especially if such use levels continue. Desired plant communities that can help stabilize the stream are starting to be replaced by communities that tolerate moderate-to-heavy use. Areas rated "Non-Functioning" no longer provide the basic riparian area/wetlands values due to current on-site conditions. There is a need for better inventory of wetlands within the planning area.

Noxious Weeds

The BLM has a proactive weed management program that includes conducting education, inventorying weeds, developing partnerships, coordinating weed control efforts, and monitoring effectiveness of treatments. Some basic inventory data are available on invasive species present within on BLM-administered lands as a result of Land Health Assessments and general plant inventories; however, the location and actual number of infested acres by species and specific location is unavailable for all BLM-administered lands within the entire planning area. The BLM conducts annual weed treatments, with the exact acreage depending on funding, priorities, and available resources. Weed treatments conducted by oil and gas operators have increased markedly in the past decade, partly due to the dramatic increase in surface disturbances associated with oil and gas development (and a resulting increase in weeds becoming established).

Conditions on National Forest System Lands

Upland Vegetation

Acres of each vegetation community on National Forest System lands within PPH and PGH are presented in **Table 3.24**, Vegetation Communities on National Forest System Lands in GRSG Habitat.

Some localized areas are recovering from prior management (spraying to promote grasses and intensive grazing). However, the vast majority of rangelands on the National Forest (including shrublands, riparian areas, and aspen forest) are in satisfactory condition with a stable or upward trend. Sagebrush stands within GRSG habitat vary in species composition and other characteristics among sites. On shallower soil sites, shorter species such as black sagebrush and three-tip sagebrush dominate. On the more moist sites, bitterbrush is co-dominant with big sagebrush. Canopy cover of sampled sites within GRSG habitat areas generally vary from 8 to 25 percent. Bare ground measurements on these sites range from 1 to 18 percent. The herbaceous layer on most sites is dominated by native bunchgrasses and native perennial forbs.

Table 3.24. Vegetation Communities on National Forest System Lands in GRSG Habitat

Vegetation Community	PPH		ADH	
	Acres	Percent	Acres	Percent
Sagebrush steppe	4,400	84.1	15,100	75.5
Agriculture/Irrigated meadow	30	<1	900	4.5

Vegetation Community	PPH		ADH	
	Acres	Percent	Acres	Percent
Mountain shrub	200	3.0	600	3.0
Desert shrub/scrub	0	0	40	<1
Grasslands	0	0	200	1.0
Subalpine meadow	50	<1	200	1.0
Pinyon-juniper	20	<1	200	1.0
Other forest and woodland	200	4.5	2,100	10.5
Riparian and Wetlands	300	4.9	600	3.0
Other	80	1.5	80	<1
Total	**5,200**		**20,000**	

Riparian/Wetland Vegetation

Riparian areas, because of their high ecological value, are managed under an extensive set of standards, guidelines, and best management practices. They are managed with the objective of meeting or moving toward Proper Functioning Condition as a part of meeting allowable forage utilization guidelines. Most of the acres of rangeland found to be in unsatisfactory condition are found in riparian zones. In that category, First Creek and Elkhead Creek in California Park are the two riparian areas on the National Forest most in need of continued improvement.

Noxious Weeds and Other Invasive Plants

There are 15 species of state-listed noxious weeds documented on the Routt National Forest. Ongoing inventories indicate the presence of just over 35,000 acres infested by all noxious weed species. The most common noxious weeds found on the National Forest are leafy spurge, yellow toadflax, houndstongue, tarweed, three species of knapweeds, hoary cress (whitetop), musk thistle, Canada thistle, and cheatgrass (downy brome). In addition to the state-listed noxious weeds, numerous other invasive nonnative species are found in the area. One of the more notable effects of the drought was the increased spread of several species, especially yellow toadflax and houndstongue, and cheatgrass stands in locations where it had not been seen before or where only scattered plants had previously been observed.

Most cheatgrass infestations are on steep south-facing slopes in drier shrublands up to 9,500 feet in elevation. They occupy relatively small areas in comparison to total shrubland acres on the National Forest, but cheatgrass readily colonizes burned areas and other disturbed sites. Patches of cheatgrass commonly infest sagebrush communities in GRSG habitat areas.

Noxious weeds are treated annually using a variety of methods, and a number of prevention measures are in place; however, weed control funding levels and available labor are not adequate to treat or inventory all weed populations. Annual treatment has averaged nearly 900 acres over the last 5 years. New weed populations become established every year. Overall, weed control efforts do not keep pace with growth of existing populations of many species or establishment of new populations.

Treatment of cheatgrass has only occurred on a limited basis in a few locations. Most of the infestations are very difficult to safely and effectively treat by ground application of herbicide because they are on steep, rocky slopes. The best herbicide for controlling cheatgrass must be applied at a very low, even rate either early in the spring or in the fall when negative effects on non-target species are avoided because they are dormant. This is only feasible via aerial application. The Routt National Forest cannot aerially apply pesticides without first completing an EIS; that effort is underway.

3.5.2. Trends

Trends on BLM-Administered Lands

Upland Vegetation

The density and cover of shrubby vegetation have consistently increased in rangelands throughout the Rocky Mountain West since the onset of wildfire control and livestock grazing in the late 19th century. This is most commonly observed in big sagebrush vegetation types (Beetle and Johnson 1982) and is apparent in much of the planning area. Trends in the percentage of desirable species present in the planning area rangeland communities are mixed, with many areas in stasis, some areas with increases in desirable species, and other areas with decreases in desirable species and increases in undesirable species.

Lower-elevation sagebrush communities in GRSG habitat within the planning area appear to be in a downward trend due to pinyon-juniper encroachment, a gradual increase in cheatgrass, and in some areas, heavy browsing pressure that has resulted in decadence (mature shrubs where 25 percent or more of plant is dead) or mortality of shrubs.

Forest and woodlands in Colorado have been affected by drought, insects, and disease. Pinyon ips beetle, mountain pine beetle, spruce bark beetle, and balsam fir beetle have all been increasing in population. Many lodgepole, Douglas-fir, and spruce-fir forest communities are mature even-aged stands with increasing density. Increased stand density magnifies competition among species and decreases tree vigor. Low-vigor stands are more susceptible to insect and disease infestation. Aspen within the planning area are in varying stages of growth, although in overall decline with many stands exhibiting signs of rot (Colorado State Forest Service 2005). Drought is also a factor in the extensive mortality of mature aspen in the Piceance Basin, although these stands continue to regenerate. Lack of regeneration in the aspen, possibly associated with livestock and big game management, is also a contributing factor to the decline observed in the planning area.

Pinyon and juniper woodlands have expanded and have increased fuel loading in much of the western US, including in GRSG habitat within the planning area (Hood and Miller 2007).

Vegetation management objectives include improving upland health and habitat for GRSG and other sagebrush-dependent species and reducing hazardous fuels, particularly in the wildland-urban interface. In order to achieve these objectives, the BLM has been implementing numerous vegetation management actions, and range improvements have been made through the grazing permit renewal process. Many recent vegetation treatments have targeted sagebrush stands within GRSG habitat. The vegetation treatments have included selective removal of pinyon pine and Utah juniper trees in sagebrush habitat, brushbeating of small patches of sagebrush, and the use of prescribed fire to create a mosaic of age-classes and improve herbaceous understory.

Because plant communities respond to many environmental influences, such as wildlife and livestock foraging, drought, disease, wildfire, and prescribed burns, it is difficult to forecast their health. Where the BLM has primary authority to manage livestock grazing and where grazing is the primary activity that is potentially diminishing vegetation health, the BLM will continue to act to restore the health of plant communities through managing for desired plant communities and adjusting the number and seasonal distribution of livestock. Where other agencies or private landowners share or have primary authority over factors causing the decline of vegetation health, the forecast is less clear because the situation is more complex. At best, resolution of landscape health issues is likely to progress slowly over the planning period.

Riparian/Wetland Vegetation

Continued population growth within the surrounding areas has increased the use of BLM-administered lands, which threatens riparian areas and wetlands. New trails, paths, and road crossings, or travelling within riparian areas and wetlands, can disrupt hydrology, introduce weeds, and compact or rut soils. Continued population growth and land sales may result in more agricultural water rights being converted to municipal and industrial uses, or used in ways that do not offer indirect benefits to riparian areas and to wetlands. Currently, there are water rights that are leased to agricultural users until they are needed by municipal and industrial users. Changes in use may greatly affect the hydrology of streams, riparian areas, and wetlands on BLM-administered lands, as there are several acres of public wetlands that are supported or created by the current private irrigation practices.

The riparian and wetland condition in many portions of the planning area has been improved through adjustment and implementation of grazing systems. Monitoring data, such as utilization, photo-points, and general observations, along with land health assessments, indicate that riparian and wetland conditions in many areas are improving, and progress is being made in meeting land health standards; however, some issues remain in some riparian-wetland areas. Wildlife and livestock concentrations and high forage utilization rates have led to the development of small hummocks that eventually alter surface flow patterns. Increased soil compaction of moist soils increases surface runoff and damages the riparian system. Lotic riparian areas with headcuts can lead to excessive drainage out of the system, decreasing the capability of the system. Fluctuating water levels resulting from climatic conditions and water diversions contribute to these areas not meeting Standard 2 of the Colorado Standards for Public Land Health (see **Appendix K**, BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado). In arid environments, lack of perennial surface water, presence of sandy channels, and excessively salty soils limit the capability of some watersheds to support diverse and extensive riparian systems.

Noxious Weeds

Within the planning area, especially in the last 10 years, there has been an increase in noxious and invasive weeds, including salt cedar (tamarisk), halogeton, Russian thistle, Canada thistle, and cheatgrass. These problems are most evident in oil and gas production fields and other locations where native vegetation has been disturbed. Trends in rangeland health are managed by adjusting livestock, recreation, wild horse, and wildlife usage, as well as by controlled burns, brush beatings, and weed control. These actions manipulate plant composition with the goal of maintaining desirable plant species and communities that, on average, represent mid- to upper seral stages of development. Weed treatments and other efforts, such as cooperative agreements with local agencies, have helped reduce and prevent the spread of weeds in localized areas.

Trends on National Forest System Lands

Routt National Forest

Sagebrush dominated areas of GRSG habitat on the National Forest has undergone a significant transition over the last 60 years, from the targeted spraying of sagebrush to reduce its presence and promote grass production to a focus on restoration of sagebrush habitats in these historically impacted areas. Many acres of big sagebrush were sprayed from the late 1950s through the early 1980s to remove or thin sagebrush stands, intended to increase forage production for livestock. Virtually all of California Park was consistently sprayed from the early 1950s to the early 1990s

to control the presence of Wyethia (mule's ears), some populations of which increased after sagebrush-control efforts of that same time. Tarweed infested and greatly increased in many areas of the California Park after the treatments for reduction of mule's ears. Tarweed has had a significant effect on amounts of native grass species there since it is an allelopathic plant that releases inhibitory chemicals that negatively affect the growth and development of neighboring plants. This resulted in areas dominated by bare ground with little value to wildlife or domestic grazing animals. The USFS has been involved in active restoration of these degraded areas of PGH in the California Park area beginning around 2000 and continuing to present. The active restoration has mostly focused on re-seeding, planting and resting degraded areas. With an end result of an improving condition of PGH in the California Park area. The rest of the GRSG habitat on the Routt National Forest has had a fairly stable vegetation condition and is in a mid to late seral condition in the sage-brush type.

3.5.3. References

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3.6. Wildland Fire Ecology and Management

Fire is an inherent component of ecosystems and historically has had an important role in promoting plant succession and the development of plant community characteristics. Control of fires and other land use practices during the last century has changed plant communities by altering the frequency, size, and severity of wildfires.

BLM and USFS management practices include the control of wildfires in some areas, the use of fire through prescribed burning or the management of wildfires in order to meet land management goals, and the treatment of vegetation so that fires are more controllable in areas where values at risk are higher. Wildland fire management on BLM-administered and National Forest System lands is guided by a Fire Management Plan that considers the three elements mentioned above, as well as firefighter and public safety and cost effectiveness.

The two types of wildland fire are unplanned ignitions and planned ignitions (prescribed fire). Wildfire describes unplanned ignitions or prescribed fires that are declared wildfires (2009 Guidance for Implementation of Federal Wildland Fire Management Policy). Wildland fires occur from natural causes, such as lightning, or are caused by humans either accidentally or with the intent to cause damage. Prescribed fire is used in a controlled manner under a specific prescription and planned effort for beneficial purposes such as reducing hazardous fuel accumulation. Wildland fires are sometimes managed to achieve resource objectives.

Fire may be used to maintain or increase age class diversity within vegetation communities (e.g., big sagebrush/grassland); rejuvenate fire-dependent vegetation communities (e.g., aspen); maintain or increase vegetation productivity, nutrient content, and palatability; and maintain or improve wildlife habitat, rangeland, and watershed condition. Fire is also considered a management tool for timber slash disposal, seedbed preparation, hazardous fuel reduction, disease or insect control, grazing management, thinning, or species manipulation in support of forest

management objectives. The full range of fire management activities can be used to help achieve ecosystem stability, including its interrelated ecological, economic, and social components.

3.6.1. Existing Conditions

Conditions of the Planning Area

Fire plays a critical role in shaping vegetative characteristics throughout the planning area. Fire suppression practices of the twentieth century have pushed some ecosystems outside their historic range of variability due to increased fuel accumulations, higher densities of trees and shrubs, and increased ladder fuels. As a result, these areas are prone to higher-intensity wildfires than historically experienced.

Fire regimes describe fire frequency (average number of years between fires) and fire severity (effect of the fire on the dominant overstory vegetation-low, mixed, or stand replacement). These regimes represent fire intervals prior to Euro-American settlement and are calculated and classified by analyzing natural vegetation, known fire cycles, and fire history data. Fire regime condition class (FRCC) indicates the degree of departure from the historic fire regime (Hann and Bunnell 2001) (**Table 3.25**, Fire Regime Condition Classes).

Fires within the planning area are both naturally occurring and are used as a management tool. Naturally occurring fires are widely distributed in terms of frequency and severity. While regional and annual variations may occur, the fire season for GRSG habitat within the planning area normally extends from late April to early November. The most critical fire conditions are often present from mid-June until late summer, when monsoonal moisture pushes into the area, and again from late August through October, before season-ending winter weather arrives. The highest potential for human-caused wildfire is during the September to October hunting season.

Table 3.25. Fire Regime Condition Class

FRCC	Attributes
Condition Class 1	Fire regimes are within or near an historical range. The risk of losing key ecosystem components is low. Fire frequencies have departed from historical frequencies by no more than one return interval. Vegetation attributes (species composition and structure) are intact and functioning within an historical range.
Condition Class 2	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components has increased to moderate. Fire frequencies have departed (either increased or decreased) from historical frequencies by more than one return interval. This results in moderate changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. Vegetation attributes have been moderately altered from their historical range.

FRCC	Attributes
Condition Class 3	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. Vegetation attributes have been significantly altered from their historical range.
Source: Interagency FRCC Guidebook Version 3.0, September 2010	

Table 3.26, Acres of Wildland Fire within GRSG Habitat in the Planning Area, and **Table 3.27**, Acres with High Probability for Wildland Fire within GRSG Habitat in the Planning Area, display data compiled in a baseline environmental report produced by the US Geological Survey and the BLM (Manier et al. 2013). This information provides a relatively coarse estimate of acres of wildland fire in GRSG habitat within the planning area. In each table, acres are presented by surface management agency and their presence within PGH and PPH in the planning area.

Table 3.26. Acres of Wildland Fire within GRSG Habitat in the Planning Area

Management Agency	Total Acres [1]	Acres within PGH	Acres within PPH
BLM	11,000	5,800	5,200
USFS	0	0	0
Tribal and Other Federal	2,000	1,900	100
Private	5,200	1,100	4,100
State	1,000	300	700
Other	0	0	0
Source: Manier et al. 2013 [1] Acres calculated from wildland fires occurring between 2000 and 2012			

Table 3.27. Acres with High Probability for Wildland Fire within GRSG Habitat in the Planning Area

Surface Management Agency	Total Acres with High Probability for Wildland Fire [1]	Acres within PGH	Acres within PPH
BLM	352,600	177,300	175,300
USFS	200	200	0
Tribal and Other Federal	2,600	1,700	900
Private	410,900	169,300	241,600
State	31,600	12,600	19,000
Other	9,700	1,300	8,400
Source: Manier et al. 2013 [1] Derived from USFS FSim Burn data			

Conditions on BLM-Administered Lands

Fire Regime Condition Class

While the fire regime of a particular area is not likely to change except in the very long term, the condition class can be changed through fire management and other vegetation management actions. Extreme departure from the historic fire regime results in changes to one or more of the

following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g., insect and disease mortality, grazing, and drought).

More recently, in some parts of the planning area (e.g., GJFO) the combination of wildfire suppression and changing land use patterns has altered the natural cycle and role of fire. Suppression actions have resulted in large, unnatural fuel loads that are continuous across the landscape. Wildland fires burn with greater intensities and spread more rapidly, consuming more acres than in the past under these altered landscape conditions.

Table 3.28, Acres by Fire Regime Condition Class within GRSG Habitat on BLM-Administered Lands, summarizes the current condition class of all BLM-administered lands within GRSG habitat in the planning area.

Table 3.28. Acres by Fire Regime Condition Class within GRSG Habitat on BLM-Administered Lands

FRCC	CRVFO	GJFO	KFO	LSFO	WRFO	Total
1	39,900	16,100	163,200	25,100	0	244,300
2	75,900	38,900	646,300	2,179,200	1,201,200	4,141,500
3	8,900	4,100	82,900	87,200	475,300	658,400
Source: BLM 2013						

Fire Occurrence

Lightning fires have traditionally been an integral factor in the formation and arrangement of vegetation types in GRSG habitat. The primary fuel type within GRSG habitat in most of the planning area is sagebrush and grass, with some areas supporting a low density of pinyon-juniper and pockets of mountain shrub (see **Section 3.5**, Vegetation, for further descriptions).

Table 3.29, Fire Occurrence within GRSG habitat on BLM-Administered Lands (1992–2011), displays the size and number of fires by size class in GRSG habitat and within a 1-mile buffer of this habitat for that timeframe on BLM-administered lands. **Table 3.30**, Fire Occurrence within PPH on BLM-Administered Lands (1992–2011), displays the size and number of fires by size class in the GRSG PPH and within a 1-mile buffer of this habitat for that timeframe on BLM-administered lands. These tables show that the majority of large fires occur in PPH. This is largely a result of greater fuel continuity in the PPH that allows fires to spread unchecked by natural barriers.

Table 3.29. Fire Occurrence within GRSG Habitat on BLM-Administered Lands (1992–2011)

Size Class	Number of Fires	Acres Burned	Average Fire Size
A: 0 to 0.25 acres	1,809	200	0.1
B: 0.26 to 9.9 acres	507	1,000	1.7
C: 10 to 99 acres	151	5,200	40
D: 100 to 299 acres	52	8,800	130
E: 300 to 999 acres	40	23,700	430
F: 1,000 to 4,999 acres	23	53,400	910
G: 5,000+ acres	7	82,300	4,000
Total	**2,589**	**174,600**	**5,510**
Source: Wildland Fire Management Information 1992 to 2012			

Table 3.30. Fire Occurrence within PPH on BLM-Administered Lands (1992–2011)

Size Class	Number of Fires	Acres Burned	Average Fire Size
A: 0 to 0.25 acres	706	80	0.1
B: 0.26 to 9.9 acres	254	500	1.5
C: 10 to 99 acres	90	3,100	30
D: 100 to 299 acres	32	5,600	130
E: 300 to 999 acres	30	17,400	310
F: 1,000 to 4,999 acres	14	32,500	780
G: 5,000+ acres	7	82,300	4,000
Total	**1,133**	**141,480**	**5,250**
Source: Wildland Fire Management Information 1992 to 2012			

Conditions on National Forest System Lands

Routt National Forest

The planning area encompasses three Routt National Forest Ranger Districts, including Hahns Peak/Bears Ears, Yampa, and Parks. Vegetation communities that are susceptible to fire include sagebrush, shrubland, and grassland communities at the lower elevations; mixed mountain shrub, aspen, and conifer stands at mid-elevations; and subalpine fir and Engelmann spruce and the highest elevations. In mixed conifer stands, fuel sources include dead and down, as well as standing timber with heavy fuel loading, due to past management actions, drought, insect and disease. Although aspen are not as susceptible to fire as are conifers, they will burn and carry fire during the late fall and during drought conditions.

Fuels management activity in the planning area is shown in **Table 3.31**, Acres of Harvest Activity and Fuels Reduction in GRSG Habitat on the Routt National Forest.

Table 3.31. Acres of Harvest Activity and Fuels Reduction in GRSG Habitat on the Routt National Forest

Activity Description	Year	GRSG Habitat Type	Acres
Pile Burning	1998	General	400
Stand Clearcut	1992	General	<0.5
Shelterwood Preparatory Cut	1991	General	4
Shelterwood Preparatory Cut	1992	General	5
Source: USFS 2012 Forest Activities Database (FACTS)			

Most fires on the Routt National Forest occur in July and August, after the wetter months of May and June. Some fires will occur in the early spring (pre green-up) and in the fall after curing. Green-up begins in spring (April), curing in mid-summer (July to August), and freezing temperatures may be expected in early fall (late September). Continuous snow cover is generally 5 months in duration.

The primary fire cause is lightning, and many of these fires remain small because most lighting storms are accompanied by rain. Large fires can occur during dry thunderstorm events with wind. Most of these fires are single burning period events in the sagebrush/grass fuel type, but can be longer if they occur in or burn into timber.

Fire occurrence statistics for wildland fire are included in **Table 3.32**, Fire Starts in GRSG Habitat on the Routt National Forest (1970–2012).

Table 3.32. Fire Starts in GRSG Habitat on the Routt National Forest (1970–2012)

Ranger District	Location	Fire Year	Fire Size (Acres)	Start Date	GRSG Habitat Type
Hahns Peak/ Bears Ears	California Park	1970	181	701002	PGH
Hahns Peak/ Bears Ears	California Park	1976	0.1	761031	PGH
Parks	Pinkham Area (south of Snowy Range)	1980	0.1	800828	PPH
Hahns Peak/ Bears Ears	California Park	1980	0.1	800821	PGH
Hahns Peak/ Bears Ears	California Park	1994	1	940612	PGH

Source: Routt National Forest 2013

Fire starts from the FireHistoryPoint Spatial Layer that intersects GRSG habitat on the Routt National Forest. No polygons from the FireHistoryPolygon layer intersect GRSG habitat.

3.6.2. Trends

Trends on BLM-Administered Lands

Over the past century, the combination of wildfire suppression and changing land use patterns has altered the natural cycle and role of fire. Suppression actions have resulted in large, unnatural fuel loads that are continuous across the landscape. Due to the decrease in fire-return interval, there has been an increase in fuel loading across the landscape. Wildland fires burn with greater intensities and spread more rapidly, consuming more acres than in the past.

The main structural change in what were historically sagebrush shrub lands is the encroachment of pinyon and juniper, other conifers, and other woody shrubs into sagebrush. Over time the encroachment will increase the fuels loading, causing an upward shift in fire behavior. This leads to an increase resistance to control, thereby decreasing firefighting effectiveness.

Sagebrush within this habitat is also transitioning to older age class that is more decadent (mature shrubs where 25 percent or more of plant is dead) with high fuels loading that can support large, severe wildfires. These increased fuels loadings are leading to higher severity fires that require more post-fire rehabilitation.

Human activities and management practices have also resulted in the spread of nonnative species. Incursion of nonnative annual grasses, primarily cheatgrass, can increase wildfire risk. This is primarily an issue in the sagebrush, grass, and pinyon-juniper fuel types. Changing climate conditions may also impact the spread of these species.

Some portions of the planning area are adjacent to timber stands in poor health with mortality from bark beetle and other insects and diseases. There is high fire potential in these stands. However, only a small portion of the BLM-administered lands within GRSG habitat in the planning area is in or near these areas.

The majority of fires within the planning area over the past 20 years have been caused by lightning. Percentage of fires caused by humans has averaged 16 percent (**Table 3.33**, Causes of Fire in Planning Area GRSG Habitat).

Table 3.33. Causes of Fire in Planning Area GRSG Habitat

	CRVFO	GJFO	KFO	LSFO	WRFO	Planning Area Average
Human Caused	16%	8%	43%	6%	9%	16%
Source: BLM Wildland Fire Management Information Data, NPS Wildland Fire Management Information Data, KCFAST Data 1992 through 2012						

It should be noted that acreage burned may not correlate with percentage of fire. For example, in the LSFO, only 6 percent of fires were human caused, but those resulted in more than 25 percent of total acres burned in the last 20 years. As human activity increases, there is more potential for human-caused fires. The location of GRSG habitat in remote areas can lead to long response times for ground-based fire response.

Trends on National Forest System Lands

Routt National Forest

In the last 43 years, there has been very little fire activity in PPH or PGH on the Routt National Forest with the only noticeable fire burning 200 acres in 1970. In the 42 years following, there have been occasional starts that are most often limited to less than 1 acre. The wildfire trend on the Routt National Forest is stable with no significant fires occurring for several decades.

The mountain pine beetle epidemic has resulted in a significant fire hazard on the Routt National Forest that could result in impacting adjacent GRSG habitat if a wind-driven wildfire were to start in these areas of pine mortality and spread to adjacent areas.

3.6.3. References

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3.7. Minerals (Leasable)

Leasable minerals, as defined by the Mineral Leasing Act (February 1920) and 43 CFR 3000-3599 (1990), include the leasable fluid and leasable solid minerals. Leasable fluid minerals present in Northwestern Colorado include oil, natural gas (including methane, coalbed natural gas, and carbon dioxide), and geothermal resources. Leasable solid minerals in Northwestern Colorado include coal, oil shale, sodium, and uranium (which can be either a leasable or locatable mineral).

Fluid Leasable Minerals

The process of leasing and developing federal fluid mineral resources is described at 43 CFR Part 3100. Oil and gas leases are periodically made available for sale through a competitive bidding process within each BLM state office. Provisions of the lease documents in relation to surface and subsurface resources and resource uses are dictated by the RMPs in use at the time for each field office within which leases are offered. In general, these RMPs specify types of restrictions on fluid mineral leasing within each field office boundary. These include:

- Management of lands closed to leasing for fluid minerals
- Management of lands available for leasing for fluid minerals subject to differing levels of protective stipulations attached to the leases

    1. NSO-Prohibits any occupancy or other use of the surface that results in ground-disturbing activities.. Use of occupancy of the land surface for fluid mineral exploration or development would be prohibited to protect identified resource values.
    2. TL - Prohibits occupancy or other use of the surface during a specified season or other period; For oil and gas, applies to construction, drilling, and completion activities, including road travel in support of such purposes, but does not apply to production and maintenance
    3. CSU - Allows the BLM and USFS to apply special requirements, such as those related to location, design, and reclamation/monitoring of proposed facilities.
    4. Standard Stipulations - Sets general parameters for development of a lease.

Most but not all stipulations attached to leases at the time of sale have a provision, specified in the individual RMPs, for granting exceptions, modifications, or waivers. An exception is a one-time exemption from a stipulation, such as allowing drilling through a big game winter range TL. A modification is a permanent change in the specifics of a stipulation, such as changing the dates of the big game winter range TL or changing the areas mapped as winter range based on research conducted by CPW. A waiver is a permanent dissolution of a stipulation, such as eliminating protections for a particular species when it is removed from the federal list of threatened or endangered species.

In addition to the management and stipulations described above, federal regulations give the BLM and USFS the authority to ensure that oil and gas activities are conducted in a manner that minimizes impacts on other resources and use and protects human health and safety. These protections are accomplished through the BLM and USFS's inspection and enforcement program, as well as through the attachment of COAs to each project. This is in conjunction with the NEPA process and during review of individual applications for permit to drill and of Sundry Notices

submitted in conjunction with proposed changes in well pad design and operation. These COAs typically include BMPs and other required mitigation measures, including attachment of TLs up to 60 days in duration.

Oil and Gas

Colorado is the seventh largest gas producer, has the third largest gas reserves, and has the largest reserves of coalbed natural gas in the nation. Oil production from Colorado accounts for about one percent of the annual US total. Northwest Colorado has three major oil and gas producing basins in the planning area: Piceance, Sand Wash and North Park basins. Carbon dioxide is produced in Northwest Colorado in the North Park basin.

Coalbed Natural Gas

Coalbed natural gas is methane gas that can be extracted from coal seams. Water permeates the coalbed and the pressure causes the methane to be absorbed into the grain surfaces of the coal. To produce this resource, the water must first be removed, which causes a pressure reduction that allows methane to be desorbed from the coal and flow into the well bore. Since most coalbed natural gas is associated with coals at shallow depth, exploration, well drilling, completion, and production costs are considerably lower than for conventional deep gas production.

Geothermal Resources

Geothermal resources are a source of energy that uses the natural heat of the Earth's interior, carried to the surface by steam or hot water. Geothermal resources have been used in Colorado since the early 1900s. Although geothermal potential exists in the planning area, there has been no interest in commercial development. Therefore, geothermal resources are not discussed further in this section.

Solid Leasable Minerals

Coal

The process of leasing and developing federal coal resources is described in the federal regulations at 43 CFR, Part 3400. Coal leases are made available for sale through a competitive bidding process in each BLM state office. Provisions of the lease documents in relation to surface and subsurface resources and resource uses are dictated by the then-current RMPs for each field office within which leases are offered. In general, these RMPs specify types of restrictions on coal leasing within each field office boundary as follows:

- Identification of lands with potentially developable coal resources
- Determination of lands found suitable for coal leasing using the 20 criteria listed in Section 522 of the Surface Mining Control and Reclamation Act
- For lands found suitable for coal leasing, an evaluation of whether those lands are acceptable or unacceptable for further consideration for coal leasing, including an analysis of multiple use conflicts

Coal leases are subject to readjustment of their stipulations. The first readjustment would occur 20 years after the initial date of issuance and then every 10 years thereafter. For lands found suitable for leasing, analysis of acceptability for leasing would consider the protective measures identified in the then-current RMP. Depending on the particular field office, these protections may

include design, reclamation, and mitigation of proposed measures analogous to oil and gas lease stipulations, including the following or their equivalent:

- NSO - Prohibits any occupancy or other use of the surface that results in ground-disturbing activities with other than a temporary impact
- TL - Prohibits occupancy or other use of the surface during a specified season or other period
- CSU - Specifies that the BLM may require special design or reclamation standards to avoid or minimize significant adverse impacts on certain resources and resource use

Most but not all protections are attached to leases at the time of sale, and the protections may identify exception criteria for granting temporary or permanent relief from a specific measure. In addition, federal regulations give the BLM the authority to ensure that coal is developed in a manner that minimizes impacts on other resources and use and is protective of human health and safety. These protections are accomplished through the attachment of COAs to each project in conjunction with the NEPA process and during review of individual permit application.

In 2011, Colorado was ranked 9th in US coal production. There are currently three surface mines and eight underground mines located in Colorado. These mines collectively produce about 27 million tons of coal annually. Colorado coal is mostly bituminous and sub-bituminous, and characterized as a high heat content, low sulfur, low to medium ash, and low mercury coal. There are two surface mines and three underground mines in the Northwest Colorado District Planning area, Trapper, Colowyo, Deserado, and Foidel Creek (Twentymile), and Sage Creek.

BLM-administered lands are acceptable for coal leasing only after the lands have been evaluated through the BLM's multiple-use planning process (CFR 3420.1-4). In areas where development of coal resources may conflict with the protection and management of other resources or land uses, the BLM may identify mitigating measures which may appear on leases as either stipulations or operational restrictions.

Oil Shale

Oil shale is an organic-rich sedimentary rock consisting of calcareous shale with a large amount of organic material consisting of shale with a large amount of mixed organic compounds known as kerogen. Oil shale is prevalent in the western states of Colorado, Utah and Wyoming. The resource potential of these shales is estimated to be the equivalent of 1.5 to 1.8 trillion barrels of oil in place (Bartis et al. 2005 [from WRFO RMPA]). Resource potential within the Piceance Basin totals approximately 1.0 trillion barrels of oil in place (Smith 1980 [from WRFO RMPA]). Oil shale resources in the planning area are fully analyzed in the Oil Shale and Tar Sands Programmatic EIS (BLM 2013b).

Sodium

The Piceance Basin contains the world's largest and most economically significant nahcolite resource (naturally occurring sodium bicarbonate).

3.7.1. Existing Conditions

Conditions of the Planning Area

Fluid Leasable Minerals

Oil and Gas

Major Oil- and Gas-Producing Basins and Formations. There are three major oil and gas producing basins within the planning area, the Piceance, Sand Wash and the North Park Basins.

Piceance Basin – The Piceance Basin is a part of the greater Uinta-Piceance Basin, which extends into northwestern Colorado from northeastern Utah and southwestern Wyoming and currently has production in conventional gas, tight sands, shale gas and oil. The Piceance Basin is an elongated structural depression trending northwest - southeast located in western Colorado. The basin is more than 100 miles long and has an average width of over 60 miles, encompassing an area of approximately 7,110 square miles. The Piceance structural basin encompasses varying portions of Moffat, Rio Blanco, Garfield, Mesa, Pitkin, Delta, Gunnison, and Montrose counties. The Piceance basin contains six of the top one hundred natural gas reserves in the US one of the top one hundred oil reserves (Colorado Geological Survey – online).

Sand Wash Basin – The Sand Wash Basin is part of the Greater Green River Basin which extends into northwestern Colorado. The Sand Wash Basin covers approximately 5,600 square miles, primarily in Moffat and Routt counties. Coalbed natural gas resources in the Sand Wash Basin have been estimated at 101 trillion cubic feet, approximately 90 percent within the Williams Fork formation. The economic viability of recovery of the gas is limited by the presence of large volumes of water in most coalbeds.

North Park Basin – The North Park Basin occupies approximately 2,250 square miles in north-central Colorado and includes oil and natural gas resources primarily in the form of coalbed natural gas, carbon dioxide, and recent interest in the resource potential of the Niobrara shale formation. See **Figure 3-7**, Oil and Gas Basins, in **Appendix B**, Figures.

Oil and Gas Potential. Potential for oil and gas development exists across the planning area and is described in detail in individual RFDS for each field office (BLM 2006a, 2007, 2008a, 2008b, 2008c, 2010b, 2012a).

Table 3.34, Acres of Oil and Gas Potential on Planning Area GRSG Habitat, shows oil and gas potential in the range-wide planning area and where that potential exists compared to GRSG habitat.

Table 3.35, Acres Open and Closed to Oil and Gas Leasing within GRSG Habitat in the Planning Area, and **Table 3.36**, Acres of Oil and Gas Leases within GRSG Habitat in the Planning Area, display data compiled in a baseline environmental report produced by the US Geological Survey and BLM (Manier et al. 2013). In each table, acres are presented by surface management agency and their presence within PGH and PPH in the planning area. Also see **Figure 3-8**, Oil and Gas Leases, in **Appendix B**, Figures.

Table 3.34. Acres of Oil and Gas Potential on Planning Area GRSG Habitat

Habitat Type	Oil and Gas Development Potential (Acres)			
	High	Medium	Low	Total
Total Planning Area (All minerals)	7,168,400	1,609,200	5,113,800	13,891,400
Total Planning area (federal minerals) includes federal surface/federal minerals and fee surface/federal minerals	4,865,700	1,100,800	3,847,700	9,814,200
PPH all minerals	1,649,800	231,900	396,000	2,277,700
PPH federal minerals	937,100	115,400	237,500	1,290,000

Habitat Type	Oil and Gas Development Potential (Acres)			
	High	Medium	Low	Total
ADH all minerals	2,918,100	417,800	584,700	3,920,600
ADH federal minerals	1,726,200	224,200	347,500	2,297,900
Source: BLM 2013a				

Table 3.35. Acres Open and Closed to Oil and Gas Leasing within GRSG Habitat in the Planning Area

Surface Management Agency	Acres Closed to Oil and Gas Leasing			Acres Open to Oil and Gas Leasing		
	Total	PGH	PPH	Total	PGH	PPH
BLM	96,100	65,300	30,800	1,500,300	641,600	858,700
USFS	0	0	0	19,400	14,200	5,200
Tribal and Other Federal	1,300	0	1,300	39,700	16,400	23,300
Private	200	0	200	600,900	222,500	378,400
State	300	0	300	50,100	13,300	36,800
Other	0	0	0	17,000	4,200	12,800
Source: Manier et al. 2013						

Table 3.36. Acres of Oil and Gas Leases within GRSG Habitat in the Planning Area

Surface Management Agency	Total Acres	Acres within PGH	Acres within PPH
BLM	552,600	221,100	331,500
USFS	300	300	0
Tribal and Other Federal	200	0	200
Private	221,700	81,800	139,900
State	25,500	5,600	19,900
Other	1,500	700	800
Source: Manier et al. 2013			

Carbon Dioxide

Currently within the planning area, a small amount of carbon dioxide (with condensate oil) is produced in the North and South McCallum fields within the KFO. A liquid carbon dioxide plant near the North McCallum headquarters facility buys carbon dioxide produced from the oil and gas lessee and ships it by truck to markets. The presence of recoverable CO2 is coincident with existing oil and gas in the KFO.

Solid Leasable Minerals

Oil Shale

Oil shale is found in the Green River Formation in Colorado, Wyoming and Utah including the planning area. The ROD for Oil Shale would make nearly 700,000 acres available in Colorado, Utah and Wyoming available for research and development of oil shale. In the planning area, there are currently two leases for research design and development within the WRFO. Neither of the oil shale research, development, and demonstration leases overlap PPH.

Sodium

The Piceance Basin of northwestern Colorado and adjacent states contains the world's largest and most economically significant deposit of a nahcolite, an evaporite mineral consisting of naturally occurring sodium bicarbonate. Within the planning area, all of the sodium resources are found

in the Parachute Creek Member of the Green River Formation. The sodium resource in the basin was estimated at 32 billion short tons (Dyni 1974) and 29 billion tons (Beard et al. 1974) The sodium resource exists solely within the WRFO within the planning area. See **Figure 3-9**, Sodium Potential and Sodium Leases, in **Appendix B**, Figures.

Coal

Along with oil and gas, coal is an important energy resource being actively developed in the planning area. Colorado coal has the second highest quality (low impurity content) in the nation. Most of the Colorado coals are bituminous and subbituminous.

The largest coal resources and active mining in the range-wide planning area are in the LSFO, followed by the WRFO and GJFO. Although the in-place coal resources in the CRVFO area are estimated at approximately 1.6 billion tons, the potential for commercial development of this resource is very low. The Green River Coal Region, which occupies most of Moffat County and the western portion of Routt County, is the largest coal-producing region in the planning area. Coal production in Routt and Moffat Counties accounts for more than 30 percent (16.5 million tons) of the total coal produced in the State (Carroll 2004).

Table 3.37, Active Coal Mines on BLM-Administered Lands, shows active coal mines in the Northwest Colorado District.

Table 3.37. Active Coal Mines on BLM-Administered Lands

Mine Name	BLM Field Office	County	Coal Field	Formation	Mine Type	Annual Production (tons)
Colowyo	LSFO	Moffat	Danforth Hills	Williams Fork	Surface	2.3 million
Trapper	LSFO	Moffat	Yampa	Williams Fork	Surface	2 million
Twentymile	LSFO	Routt	Yampa	Williams Fork	Underground, Longwall	7.6 million
Sage Creek	LSFO	Routt	Yampa	Williams Fork	Underground, Longwall	N/A
Deserado Mine	WRFO	Rio Blanco	White River Field	Williams Fork	Underground	4.9 million
Source: BLM Mineral Potential Reports for WRFO and LSFO						

Conditions on BLM-Administered Lands

The following subsections describe existing conditions on BLM-administered lands within the range-wide planning area and provide information on acres within the decision area that are open or closed to leasing and, if open, the acres of various lease stipulations that would apply. The descriptions address existing conditions relative to leasable fluid and solid minerals in relation to mapped PPH and ADH for the GRSG. Detailed information on existing conditions of leasable minerals and coal are provided in Chapter 3 and supporting appendices in each BLM field office's RMP.

The BLM manages 2,472,900 acres of federal mineral estate (1,744,100 acres of BLM-administered land with federal minerals and 728,800 acres of private or state surface with federal minerals, also known as "split-estate") in the range-wide planning area. Within PPH, the BLM manages 1,290,000 acres of federal minerals identified as having potential (56 percent). **Table 3.38,** Mineral Status in the Planning Area, breaks down federal mineral estate by surface ownership.

Table 3.38. Mineral Status in the Planning Area

Land Status	Acres
BLM/Federal Minerals	4,828,700
Private Surface/Federal Minerals	2,068,200
USFS/Federal Minerals	4,533,900
State/Federal Minerals	44,400
National Park Service/Federal Minerals	271,300
National Recreation Area/Federal Minerals	72,800
National Wildlife Refuge/Federal Minerals	32,100
State Forest/Federal Minerals	5,500
Department of Defense	200
Total	**11,857,100**
Source: BLM 2013a	

Fluid Leasable Minerals

Oil and Gas

Oil and gas resources on BLM-administered or National Forest System lands in the planning area by GRSG habitat are described in the tables.

Table 3.39, Acres of Federal Mineral Estate by PPH and PGH-Fluid Leasable Minerals, summarizes this information for the five BLM field offices within the planning area. Approximately 1,094,000 acres of federal mineral estate are leased within the decision area (**Table 3.40**, Acres of Leased and Unleased Federal Mineral Estate in GRSG Habitat-Fluid Leasable Minerals). The table also provides information on the amount of each category within PPH and PGH for the GRSG. Note that PGH does not include habitat connectors. ADH areas, including PPH and PGH plus habitat connectors, total nearly 1.1 million acres of leased and 764,200 acres of unleased lands with high potential for oil and gas.

Table 3.41, Acres of Oil and Gas Leasing Categories in Decision Area PPH and PGH, breaks down the acres within the decision area by whether they are open or closed to leasing and what stipulations are applied to leases.

Table 3.39. Acres of Federal Mineral Estate by PPH and PGH-Fluid Leasable Minerals

Field Office	BLM Surface		Other Surface		Leased		Unleased - High Potential for Oil and Gas	
	PPH	PGH	PPH	PGH	PPH	PGH	PPH	PGH
CRVFO	22,800	16,200	17,400	10,300	0	29,800	0	0
GJFO	5,500	8,900	4,100	4,500	3,900	8,400	1,600	500
KFO	185,200	18,300	115,900	25,500	118,100	6,200	52,200	800
LSFO	554,000	239,700	463,900	134,100	358,900	197,700	333,700	187,400
WRFO	121,900	175,300	75,800	81,600	135,100	154,400	59,500	73,200
TOTAL	**889,400**	**458,400**	**677,100**	**256,000**	**616,000**	**396,500**	**447,000**	**261,900**

Table 3.40. Acres of Leased and Unleased Federal Mineral Estate in GRSG Habitat-Fluid Leasable Minerals

Colorado Management Zone	Currently Leased		Unleased - High Potential - Federal Minerals		Unleased - Medium Potential - Federal Minerals	
	PPH	PGH	PPH	PGH	PPH	PGH
1	0	0	0	0	0	0
2	34,300	10,200	6,800	1,300	4,700	1,400
3	78,700	94,500	83,000	74,400	1,000	34,200
4	48,000	8,300	66,600	32,800	200	0
5	80,700	4,100	73,700	4,400	0	0
6	20,600	23,600	30,800	21,800	0	3,000
7	26,200	2,300	8,000	20,200	0	500
8	10,700	5,100	16,300	7,400	0	900
9	67,800	63,000	42,900	25,500	53,200	11,800
10	55,100	65,000	1,400	51,200	0	1,500
11	108,500	1,700	52,200	800	5,600	200
12	0	0			0	0
13	9,700	4,500			200	5,100
14	0	1,000	6,100	300	34,500	15,900
15	0	0	400	1,400	400	5,900
16	7,600	3,700	70	0	0	0
17	69,800	102,400	28,500	10,400	2,400	2,000
	Colorado MZs 18-21 represent linkage/connectivity areas and do not contain PPH but would be managed as PGH. Linkage/connectivity areas are represented in ADH.					
18	11,400		6,700		0	
19	69,300		44,600		300	
20	1,700		3,900		200	
21	4,800		0		0	

Table 3.41. Acres of Oil and Gas Leasing Categories in Decision Area PPH and PGH

Colorado Management Zone	Field Office or National Forest	Federal Minerals	Unleased Federal Minerals	Closed to Leasing	NSO	CSU	ROW Exclusion BLM Surface	ROW Avoidance BLM Surface	TL	Total Acres in Zone
1	LSFO	12,700	9,000	3,700	400	2,600	1,100	0	1,100	15,200
2	LSFO	137,800	62,900	30,800	9,100	39,500	9,600	15,900	88,600	172,800
3	LSFO	487,800	270,700	51,900	5,900	130,200	600	20,700	266,400	547,400
4	LSFO	155,500	99,600	0	6,000	28,700	0	0	118,000	244,400
5	LSFO	162,400	78,100	0	5,600	20,100	0	0	75,200	258,300
6	LSFO	99,400	55,600	1,200	11,000	64,200	0	0	95,400	307,900
7	LSFO	47,800	19,500	0	2,400	10,500	0	0	27,400	71,600
7	Routt National Forest	9,300	9,300	0	500	3,700	0	0	7,100	11,700
8	LSFO	40,400	24,700	0	4,400	30,900	0	0	23,300	252,300
9	WRFO	32,000	9,500	0	1,000	6,900	50	300	24,500	50,800
9	LSFO	236,100	125,500	4,500	36,100	106,700	1,400	1,700	181,900	372,400
10	WRFO	239,200	116,000	4,700	46,100	160,700	11,000	24,800	217,600	282,000
10	LSFO	1,500	300	0	0	30	0	0	300	3,700
11	KFO	214,400	107,300	60	25,800	62,900	0	0	142,400	412,000
11	Routt National Forest	800	800	0	200	200	0	0	800	800
12	KFO	11,800	11,800	0	0	2,600	0	0	11,700	18,300
13	Routt National Forest	1,000	1,000	0	100	100	0	0	400	1,000
13	KFO	123,100	109,000	0	11,100	30,000	0	0	110,000	268,700
14	CRVFO	69,000	65,400	2,600	38,000	64,600	0	0	40,400	97,300
14	Routt National Forest	900	800	0	200	60	0	0	200	800
14	LSFO	9,900	9,900	0	500	2,900	0	0	3,300	50,200
15	WRFO	12,100	12,100	0	5,700	5,400	0	1,000	12,000	47,600
16	WRFO	11,300	70	0	1,100	5,800	0	600	6,900	11,300
17	Roan Plateau	29,500	200	0	17,800	24,100	0	60	7,700	36,200
17	WRFO	160,300	30,100	0	12,000	74,900	300	6,300	86,200	228,000
17	GJFO	23,300	11,000	0	3,800	1,400	60	4,100	4,200	78,600
17	CRVFO	300	0	0	200	300	0	20	300	10,800
18	WRFO	18,000	6,700	0	12,400	14,400	0	7,600	9,600	19,200
19	Roan Plateau	2,100	1,500	0	1,900	1,900	0	10	1,100	3,900
19	WRFO	111,900	42,900	800	36,700	72,800	50	7,500	98,800	219,700

Colorado Management Zone	Field Office or National Forest	Federal Minerals	Unleased Federal Minerals	Closed to Leasing	NSO	CSU	ROW Exclusion BLM Surface	ROW Avoidance BLM Surface	TL	Total Acres in Zone
19	CRVFO	700	500	0	900	700	0	0	80	1,600
19	LSFO	10	10	0	0	0	0	0	0	50
20	LSFO	5,900	4,200	0	1,200	5,100	0	0	2,900	40,600
21	KFO	4,800	20	0	0	1,400	0	0	3,400	10,700
	Total	**2,473,010**	**1,296,000**	**100,260**	**298,100**	**976,290**	**24,160**	**90,590**	**1,669,180**	**4,147,850**

Carbon Dioxide

Carbon Dioxide is produced in the KFO from the McCallum and McCallum South Fields. Both fields are currently producing and lie entirely within PPH.

Solid Leasable Minerals

Oil Shale

Existing research, development and demonstration leases exist within the planning area in the WRFO but do not overlap with mapped GRSG habitat. For additional information, see the Oil Shale and Tar Sands Programmatic EIS (BLM 2013b).

Sodium

The WRFO is the only area of the planning area currently producing commercial quantities of sodium. There are presently eight sodium leases comprising approximately 16,600 acres on BLM-administered land in northwestern Colorado (BLM 2006b*)*. Solution mining operations have been constructed on two of these leases in Rio Blanco County. One solution mining operation was closed in 2004 due to market issues. The other mine has been operating since 1991 and produces approximately 90,000 to 100,000 tons of sodium bicarbonate annually. None of the existing operations or any existing undeveloped leases are present within mapped PPH or PGH for the GRSG. However, a total of 500 acres of PPH and 600 acres of PGH are open to non-energy mineral leasing, including sodium.

Coal

Federal coal resources are administered by the BLM, regardless of surface estate ownership, through lease sales under the Mineral Leasing Act.

A total of 2,473,000 acres of federal mineral estate underlie federal, state, and private lands within the decision area's GRSG habitat. Of this area, 1,744,100 acres are associated with BLM-administered surface lands. Current federal coal leases comprise 11,000 acres of GRSG habitat, or 4 percent of the total federal mineral estate in the planning area. Unleased areas of federal mineral estate found to be suitable for coal leasing or managed as open for leasing comprise 518,600 acres of GRSG habitat, or 21 percent of the total federal mineral estate within the planning area.

There are existing coal mines in the LSFO and WRFO within GRSG habitat. **Table 3.42**, Coal Potential within GRSG Habitat in the Planning Area, displays data compiled in a baseline environmental report produced by the US Geological Survey and the BLM (Manier et al. 2013). Acres are presented by surface management agency and their presence within PGH and PPH in the planning area.

Table 3.43, Acres of Federal Mineral Estate in GRSG Habitat-Coal, shows acres of existing and leases and acres acceptable for coal leasing in relation to PPH and PGH.

Table 3.42. Coal Potential within GRSG Habitat in the Planning Area

Surface Management Agency	Total Acres	Acres within PGH	Acres within PPH
BLM	1,067,900	434,600	633,300
USFS	10,500	10,400	100

Surface Management Agency	Total Acres	Acres within PGH	Acres within PPH
Tribal and Other Federal	22,800	0	22,800
Private	1,186,400	400,500	785,900
State	162,200	43,300	118,900
Other	17,300	4,000	13,300
Source: Manier et al. 2013			

Table 3.43. Acres of Federal Mineral Estate in GRSG Habitat - Coal

Field Office	BLM Surface		Other Surface		Currently Leased for Coal		Unleased - Suitable or Open for Coal Leasing	
	PPH	PGH	PPH	PGH	PPH	PGH	PPH	PGH
CRVFO	22,800	16,200	17,400	10,300	0	0	0	0
GJFO	5,500	8,900	4,100	4,500	0	0	0	700
KFO	185,200	18,300	115,900	25,500	0	0	45,000	0
LSFO	554,000	239,700	463,900	134,100	1,600	4,100	219,200	225,600
WRFO	121,900	175,300	75,800	81,600	0	5,300	10	28,100
Total	**889,400**	**458,400**	**677,100**	**256,000**	**1,600**	**9,400**	**264,210**	**254,400**

Conditions on National Forest System Lands

Limited development of leasable minerals, primarily oil and gas, has occurred on National Forest System lands within the planning area. Mineral resource use on the Routt National Forest has historically been widespread but sporadic. Mineral activity is presently concentrated in a few scattered areas. Activity has fluctuated with demand, and current low prices for many minerals make exploration and development uneconomical.

The principal leasable minerals in the areas that include GRSG habitat on the Routt National Forest are oil and gas, coalbed natural gas, and coal.

Fluid Leasable Minerals

Oil and Gas

Three large areas in the Routt National Forest have moderate potential, and five large areas have low potential for further conventional discoveries of oil and gas.

There are currently three oil and gas wells in the Routt National Forest, all of which are located on Yampa District. None of the wells are located in or near PPH or PGH. Also, there are three existing non-producing leases on the Routt National Forest, but they are entirely covered with an NSO stipulation.

Coalbed Natural Gas

One small area in the northwest part of the Routt National Forest where there is some PGH in the Elkhead Mountains has moderate potential for coalbed natural gas.

Solid Leasable Minerals

Coal

There are no existing leases for coal on the Routt National Forest within GRSG habitat.

3.7.2. Trends

Trends on BLM-Administered Lands

Fluid Leasable Minerals

Oil and Gas

CRVFO. Drilling on federal mineral estate in the CRVFO is expected to continue and expand as industry continues to define reservoir boundaries and spacing limitations. Infill drilling and stepout drilling are anticipated to be the major portion of future activity. However, other technically recoverable resources are of interest to industry. These interests include coalbed natural gas plays, the Niobrara play, and the Mancos Shale resources, the latter two at greater depths than the primary Mesaverde and Wasatch plays and largely developable with horizontal drilling. It is estimated that 99 percent of the drilling will take place in the area identified as high potential for the presence of oil and gas resources. Approximately 1 percent of future drilling will occur in areas of medium and low potential, and no drilling is predicted in the areas identified as no known potential (BLM 2008a). The areas within the CRVFO which contain GRSG habitat are identified as low potential.

GJFO. Recently there has been an increasing interest in horizontal drilling in the Mancos/Mowry shale play. Approximately 50 percent of the drilling proposals received by the GJFO since 2010 have been for horizontal wells targeting the shale formation. GRSG habitat in the GJFO has moderate to high potential identified for shale gas. Mineral lessees indicate there will be little interest in development of conventional or shale gas at current prices. However, exploration is expected to continue.

KFO. According to oil and gas operators, exploratory drilling in the Niobrara shales could continue for the next 5 to 20 years if commercial production is realized. All of the high potential areas identified within the KFO overlap PPH for GRSG.

LSFO. Recent trends in the LSFO toward increased numbers of wells per well pad, made possible by advances in directional drilling, are expected to continue. The majority of the LSFO is identified as high potential for oil and gas and more than 1 million acres of federal mineral estate managed by the LSFO is identified as PPH or PGH for GRSG.

WRFO. The majority of the future wells would be constructed for gas production from the low permeability Mesaverde Group. New development would likely occur based on exploratory drilling programs now being implemented within the WRFO. A majority of the WRFO is identified as high potential for oil and gas and more than 300,000 acres of federal mineral estate managed by the WRFO is identified as PPH or PGH for GRSG.

Coalbed Natural Gas

Future leasing trends in the KFO will likely include blocking up producing area extensions and all of the area underlain by coalbeds with coalbed natural gas potential. Further coalbed natural gas development is likely in the KFO based upon the continued testing of the existing and permitted wells; the availability of the existing limited pipeline; and the construction of new, and increased, pipeline capacity. If positive results continue, and methods for allowable disposal of excess water are developed, considerable coalbed natural gas activity may occur over the 250,000 acres of subsurface coal in northeast North Park.

Based on current conditions, coalbed natural gas well spacing in the LSFO would be 80 acres during the dewatering stage and 160 acres during production phase. The spacing requirements might change as additional data become available to evaluate the appropriate spacing requirement to capture the maximum efficiency in gas production.

Carbon Dioxide

Carbon dioxide production occurs exclusively in the KFO. Existing carbon dioxide fields (McCallum and South McCallum) in the KFO have been fully developed. Additional gas pipelines out of the North Park Basin, enhanced carbon dioxide processing capability, or an increased market would be needed for significant future activity. The remaining fields in the decision area are on the decline, and most are reaching their ultimate life (BLM 2008b).

Solid Leasable Minerals

Oil Shale

In addition to the existing research, development, and demonstration leases in the WRFO, the BLM is in the process of identifying lands which would be made available for commercial leasing. Those lands would be identified through the Oil Shale and Tar Sands Programmatic

EIS, which was released in November 2012. The technology for commercial production of oil shale is yet to be fully developed.

Sodium

The only potential development of sodium exists in the WRFO. Future development of sodium resources is likely to continue in the WRFO depending on the results of continued improvement of solution mining technology, and market-driven prices of sodium bicarbonate. The existing sodium mines do not overlap GRSG habitat.

Coal

The most important factors relating to coal development, other than its presence, include ease of access, development and production costs, and market demand. Coal production is expected to continue in the LSFO and WRFO. Future coal mining activities are likely in within GRSG habitat based on market-driven prices of coal and transportation

No mining activity is likely in Middle Park or in the Coalmont area of North Park in the KFO in the foreseeable future. A considerable volume of mineable and marketable coal remains on federal lands in the McCallum area of North Park, but the lack of reasonable-cost transportation in the area hinders the use of this resource.

Trends on National Forest System Lands

Fluid Leasable Minerals

Oil and Gas/Coalbed Natural Gas

Market conditions will dictate interest in oil and gas exploration, but it is anticipated that future interest will be minimal; therefore, there would be little to no impacts on current mapped PPH or PGH. Additionally, there is a small amount of overlap with mapped PGH and no overlap with mapped PPH on the Routt National Forest.

3.7.3. References

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3.8. Minerals (Locatable)

Locatable minerals are minerals for which the right to explore or develop the mineral resource on federal land is established by the location (or staking) of lode or placer mining claims and is authorized under the General Mining Law of 1872. Locatable minerals include metallic minerals such as gold, silver, copper, lead, zinc, molybdenum, uranium, and non-metallic minerals such as fluorspar, asbestos, talc, and mica.

Acquisition of locatable minerals is executed by staking a mining claim over the deposit and acquiring the necessary permits to explore or mine. Within a mining claim, the surface lands remain open to the public for other multiple uses. Placer claims, which are for minerals found in geologic sediments rather than in veins, are also managed under the General Mining Law of 1872. Miners locate claims in order to acquire the right to develop the mineral values in a specified area. For operations other than casual use, the claimant is required to submit a Notice of Intent or a Plan of Operations. Regulations require the claimant to prevent unnecessary or undue degradation of the land. The BLM and the USFS may recommend closures to mineral entry (a land use planning decision) by petitioning the Secretary of the Interior to withdraw areas from further location of mining claims or sites. The USFS may also request that the BLM recommend closures to mineral entry.

The amount of area that would fall under restrictions outlined in **Chapter 2**, Alternatives, and the impact of those restrictions on locatable mineral development are considered in **Chapter 4, Section 4.9**, Minerals - Locatable, in the analysis of each alternative.

3.8.1. Existing Conditions

Gold and uranium are the primary mineral resources found in the planning area, and are therefore the focus of discussion for this section.

Conditions of the Planning Area

Table 3.44, Acres of Locatable Mineral Claims within GRSG Habitat in the Planning Area, displays data compiled in a baseline environmental report produced by the US Geological Survey and the BLM (Manier et al. 2013). Acres are presented by surface management agency and their presence within PGH and PPH in the planning area.

Table 3.44. Acres of Locatable Mineral Claims within GRSG Habitat in the Planning Area

Surface Management Agency	Total Acres	Acres within PGH	Acres within PPH
BLM	32,900	13,500	19,400
USFS	0	0	0
Tribal and Other Federal	0	0	0
Private	17,500	6,900	10,600
State	1,700	1,500	200
Other	100	100	0
Source: Manier et al. 2013			

Conditions on BLM-Administered Lands

The BLM manages 2,472,900 acres of federal mineral estate (1,744,100 acres of BLM-administered land with federal minerals and 728,800 acres of private or state surface with

federal minerals, also known as "split-estate") in the range-wide planning area. Within PPH, the BLM manages 1,290,000 acres (56 percent) of the surface.

Approximately 124,800 acres of the total federal mineral estate for locatable minerals are withdrawn from location of mining claims in GRSG habitat. (**Table 3.45**, Locatable Minerals in the Planning Area). A total of 2,148,100 acres of the total federal mineral estate for locatable minerals are open to locatable mineral exploration and development.

Table 3.45. Locatable Minerals in the Planning Area

	Planning Area	PPH	ADH
Withdrawn from locatable mineral entry (BLM surface/federal minerals)	917,300	40,600	124,800
Open to locatable mineral exploration or development (BLM surface/federal minerals)	2,148,100	1,125,500	2,148,100
Source: BLM 2013a			

Gold

In the eastern portion of the CRVFO, there is one active claim within GRSG habitat. This placer claim is directly along the Colorado River and is less than 10 acres in size. The activity level of this claim is described as casual use, in which non-mechanized gold prospecting (panning) is carried out.

In the KFO, Independence Mountain in Jackson County includes two small individual gold placer claims. The Mitchell Placer Mine (including four small historic log cabins) is a small, early 20th century area of placer disturbances where no economic resources were found. Some casual use hand shoveling and panning/prospecting may continue to occur each year.

In the LSFO, the Eagle Mine (14 acres), operated by Jubilee Ventures, is a low potential, intermittent gold mine primarily producing gold ore. The production data for this mine is not available.

Uranium

In the KFO, there is a group of recently staked uranium mining claims on BLM-administered lands. These include claims in Jackson and Grand counties, and on National Forest System lands in Summit County.

The Troublesome area in Grand County included 502 uranium lode mining claims that were located as a group in 2005 on the Troublesome Formation (approximately 6 miles east/northeast of Kremmling). No mining or economic resources, and only trace mineralization, was discovered. These claims have since expired.

There is one notice for uranium exploration in the LSFO.

To date there has not been any development of potential uranium reserves within the WRFO. However, uranium mining claims have been staked recently in the northwestern portion of the WRFO, north of Rangely near US 40. Several claims have been staked encompassing approximately 44 square miles within two separate blocks of claims south of US 40.

Hard Rock

In 2003, 23 hard rock lode claims were located at the north end of Independence Mountain (the old Caprock claims) in Jackson County. This area was previously prospected and drilled for hard rock minerals (including molybdenum) in the late 1970s and early 1980s. Original claims by the Caprock Corporation lapsed in the late 1980s. The CeeArco Company has since filed claims at the same location as some of the previous claims.

Conditions on National Forest System Lands

Through an MOU with the BLM, the USFS manages most aspects of operation on National Forest System lands under the Mining Law of 1872 (as amended).

Gold

Placer gold was purported to be found in the eastern part of the planning area near the town of Steamboat Springs, at Hahn's Peak on National Forest System lands. The deposits are not within habitat for GRSG.

Uranium

Currently, there is one small mining operation on the Routt National Forest covered by a plan of operations.

The Routt National Forest has some areas with high-to-moderate potential for locatable minerals (Hausel and Sutherland 1999). The potential commercial production of these minerals is concentrated in a few areas. Much of the surface within the Routt National Forest was prospected during the late 1800s and early 1900s. Many areas show an almost continuous coverage by historic prospects and mines. Most mines and prospects were not developed to any great extent. A few mines yielded attractive base and precious metal assays and were developed into commercial ventures.

The USFS would work with the claimant to assure that standards and guidelines in the forest plan are met. The operation plan requires an environmental analysis and decision before the plan is approved.

3.8.2. Trends

Trends on BLM-Administered Lands

Although the price of gold and uranium has risen in recent years, the current trend is downward, and there is little current interest in developing any ore deposits for these minerals in GRSG habitat within the decision area.

Trends on National Forest System Lands

While most of the non-wilderness lands on the Routt National Forest are available under the 1872 mining law, little to no interest in mineral activities has been shown. Historically, there has not been any interest in locatable minerals in PGH or PPH.

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3.9. Minerals (Salable)

Salable minerals, also referred to as mineral materials, include common varieties of construction materials and aggregates, such as, sand, gravel, limestone aggregate, building stone, cinders (clinker), moss-covered rock (moss rock), roadbed, decorative rock, clay, and ballast material. Mineral materials are sold or permitted under the Mineral Materials Sale Act of 1947, as amended and regulated under 43 CFR 3600. The sale of mineral materials is discretionary.

Sand and gravel, as construction aggregate, is an extremely important resource. The extraction of the resource varies directly with the amount of development nearby – road building and maintenance, and urban development – as sand and gravel is necessary for that infrastructure development. Even more so than other resources, however, the proximity of both transportation and markets are key elements in the development of a deposit.

3.9.1. Existing Conditions

Mineral materials are sold at a fair market value or made available through free use permits to governmental agencies. Local government agencies and nonprofit organizations may obtain these materials free of cost for community purposes. County and State road construction divisions are the significant users of gravel and sand resources.

Conditions of the Planning Area

Sand and gravel are the primary mineral materials found in the planning area, and are therefore the focus of discussion for this section. **Table 3.46**, Acres of Mineral Material Disposal Sites within GRSG Habitat in the Planning Area, displays data compiled in a baseline environmental report produced by the US Geological Survey and BLM (Manier et al. 2013). Acres are presented by surface management agency and their presence within PGH and PPH in the planning area.

Table 3.46. Acres of Mineral Material Disposal Sites withinGRSG Habitat in the Planning Area

Surface Management Agency	Total Acres	Acres within PGH	Acres within PPH
BLM	35,900	14,600	21,300
USFS	0	0	0
Tribal and Other Federal	0	0	0
Private	17,900	6,900	11,000
State	1,700	200	1,500
Other	100	0	100
Source: Manier et al. 2013			

Conditions on BLM-Administered Lands

Approximately104,200 acres of the total federal mineral estate for mineral materials are closed to mineral material disposal (**Table 3.47**, Mineral Materials in the Planning Area). Approximately 26,100 acres (25 percent) are within PPH, and 40,400 acres (38 percent) are within PGH. The balance of the federal mineral estate is open for consideration of mineral material disposal.

Table 3.47. Mineral Materials in the Planning Area

	Planning Area	PPH	PGH	Other Areas (Linkage/ Connectivity Areas)
Closed for consideration for mineral material disposal	104,200	26,100	40,400	37,652
Source: BLM 2013				

There is no commercial development in the CRVFO within GRSG habitat, and there is low potential for salable minerals in the GJFO within GRSG habitat.

A small-to-moderate market for decorative stone and moss rock exists in the KFO, driven by primary and secondary home construction in the high value resort communities. High-quality decorative stone is not common in the planning area, but three separate rock collection areas are permitted for small sales.

Salable mineral development includes seven active free-use permits, mostly in Moffat County, the limestone quarry that produces road base on Juniper Mountain, and two common use areas for moss rock. In the LSFO, a small limestone quarry, operated by Moffat Limestone Company, is present on Juniper Mountain. The quarry supplies scrubbing materials to the power plants near Craig, Colorado. In 2011, the quarry produced 40,000 tons of mineral grade limestone and 31,000 tons of non-mineral grade limestone.

Sand and gravel are the only salable minerals found within the WRFO. Sand and gravel deposits are located along the White River and major tributary valleys. Other sources of sand and gravel in the WRFO include widespread colluvial deposits at the base of rock outcrops, and alluvial fans. There are large sand and gravel reserves near Meeker in the vicinity of Agency Park, and in the Little Beaver area.

Within the GRSG planning area, there are a total of 1,500 acres of mineral material sales locations in PPH, and 500 acres of mineral material sales locations within PGH.

Conditions on National Forest System Lands

On National Forest System lands, salable or mineral materials are processed by the USFS on an annual basis.

The USFS is responsible for administering mineral materials on The Routt National Forest. Salable minerals in the Routt National Forest include crushed aggregate, dimension stone, sand, and gravel.

Crushed Aggregate

Numerous sources of crushed aggregate are present in the Routt National Forest in the Elkhead Mountains, the Park and Medicine Bow Ranges, and the Flat Tops. Aggregate includes sandstone, volcanic rock, granite, basalt, landslide material, and glacial drift, which is typically used for roadway building, concrete, railroad ballast, rip rap, and fill. There is one historic gravel pit in the California Park area that is within PGH. This pit is less than 5 acres in size and has been reclaimed and is currently closed. It is unlikely that development would ever expand beyond the current footprint of the existing pit and there are no current requests to extraction from this site.

Dimension Stone

Some decorative dimension stone is produced and sold locally in the Routt National Forest in the Park Range, Elkhead Mountains, and Flat Tops. Moss or lichen-covered granite and sandstone are used for interior or exterior facing in homes or buildings.

Sand and Gravel

Numerous deposits of sand and gravel are located along the Elk and Colorado Rivers and their major tributaries within the Routt National Forest. Uses include concrete work and products, fill material, plastering sands, and snow and ice control.

Moss rock and gravel have been the primary products sold from the Routt National Forest. The sale of mineral materials is specifically discretionary by the line officer (District Ranger). Any new pits must have a Pit Development Plan that covers all phases of development, including reclamation. The Pit Development Plan must also be prepared pursuant to the NEPA and receive a decision prior to being authorized.

3.9.2. Trends

Trends on BLM-Administered Lands

In some areas, such as GJFO and CRVFO, it is unlikely there would be future mining for salable minerals in areas identified as PPH or PGH.

In the KFO, continuing trends of urbanization in eastern and southern Grand County and the concentration of ownership in agricultural lands into single large ranches in Grand and Jackson counties yield long-term concerns regarding the availability of sand and gravel in future decades. Some of the Grand County Free Use Permit pits are in their last years of material supply. Closures and reclamation of the old pits and replacement with new permitting of federal sources for the Grand County Road and Bridge Department is anticipated. Jackson County, with its low population base and long and expensive haulage from the limited gravel operations, is handicapped by limited budget. The Jackson County Road Department continues to search for new federal sources of gravel on BLM-administered lands in Jackson County. Demands are

expected to increase on BLM-administered lands for sand and gravel resources. Continuing demand for decorative stone will likely drive additional sales, and the permitting of new areas (as they are discovered or requested).

With the projected increase in oil and gas activities in the WRFO over the next 20 years, the need for additional sand and gravel resources for road improvements and other construction-related activities would likely increase.

In areas of high potential for sand and gravel, which are located near major highways (Hwy 40 between Craig and Steamboat Springs and Hwy 2 south of Steamboat Springs) and along the Little Snake River, it is likely that sand and gravel resources would be developed over the next 20 years.

Limestone

Production of limestone is expected to continue while the market for the product exists including Tri State Generation and Transmission Association, Craig Station, Craig, Colorado.

Trends on National Forest System Lands

Within PGH and PPH there has been a declining trend in the need for mineral materials on the Routt National Forest. There is only one development site within the GRSG habitat that was last used then closed and restored approximately 10 years ago.

3.9.3. References

BLM (United States Department of the Interior, Bureau of Land Management). 2013. Geographic Information Systems Data. Unpublished data. BLM, various field offices.

Manier, D. J., D. J. A. Wood, Z. H. Bowen, R. Donovan, M. J. Holloran, L. M. Juliusson, K. S. Mayne, S. J. Oyler-McCance, F. R. Quamen, D. J. Saher, and A. J. Titolo. 2013. Summary of Science, Activities, Programs and Policies that Influence the Rangewide Conservation of Greater Sage-Grouse (*Centrocerus urophasianus*). US Geological Survey Open-File Report 2013-1098. Ft. Collins, CO.

3.10. Travel Management

Travel management is integral to many activities taking place on public lands. Consideration of a comprehensive travel and transportation network involves all aspects of road and trail system planning and management taking into account road and trail locations, system users, and other natural resource management objectives.

The transportation system in the planning area consists of federal and state highways, paved and unpaved local roads, as well as unpaved primitive roads and trails.

3.10.1. Existing Conditions

Conditions of the Planning Area

The largest contiguous concentrations of GRSG habitat are located in Moffat, Jackson, and Grand Counties. GRSG habitat areas in the remainder of the planning area are generally smaller and less contiguous. Transportation routes are mainly concentrated around urban areas or where surface

activities, such as mineral extraction, require access. Portions of the planning area are remote and rugged, limiting motorized travel on roads and trails in those areas.

Table 3.52, Roads within GRSG Habitat in the Decision Area, and **Table 3.48**, Railroads within GRSG Habitat in the Decision Area, display data compiled in a baseline environmental report produced by the US Geological Survey and the BLM (Manier et al. 2013). This information provides a relatively coarse estimate of road/railroad mileage and acreage within the planning area. Each table presents miles and acres of roads by surface management agency and the presence of these roads within PGH and PPH in the planning area.

Table 3.48. Roads within GRSG Habitat in the Decision Area

Surface Management Agency	Miles of Roads			Acres of Roads		
	Total [1]	PGH	PPH	Total [1]	PGH	PPH
BLM	3,500	1,400	2,100	34,900	13,800	21,100
USFS	23	19.4	3.6	120	100	20
Tribal and Other Federal	200	100	100	1,400	500	900
Private	5,000	1,800	3,200	51,900	19,200	32,700
State	500	100	400	6,500	1,600	4,900
Other	100	0	100	1,100	200	900

Source: Manier et al. 2013

[1] Assumes footprint of 73.2 meters for interstate highways, 25.6 meters for primary and secondary highways, and 12.4 meters for other roads

Table 3.48, Railroads within GRSG Habitat in the Decision Area, and **Table 3.49**, Railroads within GRSG Habitat in the Decision Area, were compiled from data provided by the US Geological Survey using Tele Atlas ESRI StreetMap Premium data to provide an estimate of the distribution and acres of existing Interstates, major highways, primary and secondary routes, and railroads that are within GRSG habitat within WAFWA Management Zones II and VII. The data provides information that can extrapolate assumptive footprints and the potential indirect disturbance associated with each class of roadway and railroad. The footprint and intensity of use of each class of road may provide additional information that is useful in identifying indirect impacts. Data provided by the US Geological Survey was then used to estimate mileage and acres of existing Interstates, major highways, primary and secondary routes, and railroads that are within the Colorado MZs decision area. Approximately 53 percent of roads within the decision area are on private lands.

Table 3.49. Railroads within GRSG Habitat in the Decision Area

Surface Management Agency	Miles of Railroads			Acres of Railroads [1]		
	Total [1]	PGH	PPH	Total [1]	PGH	PPH
BLM	18	9	9	70	30	30
USFS	0	0	0	0	0	0
Tribal and Other Federal	0	0	0	0	0	0
Private	82	24	58	300	90	200
State	2	2	0	7	7	0
Other	0	0	0	0	0	0

Source: Manier et al. 2013

[1] Assumes footprint of 9.4 meters

Railroad mileage within the decision area is considerably less than roadways and also has less of an assumptive footprint. The majority of the railroad mileage is within private property, accounting for approximately 80 percent of the total miles and footprint.

Conditions on BLM-Administered Lands

GRSG habitat is generally accessible on BLM-administered lands via an extensive network of roads and trails. Travel surfaces range from paved roads to primitive dirt roads only accessible by high clearance four-wheel drive vehicles and OHVs to single-track routes accessible by motorcycles, foot, mountain bike, and/or horseback.

OHV Designations

Executive Order 11644 and CFR (43 CFR Part 8340) both require the BLM to designate all BLM lands nationally as open, closed, or limited for OHV use. Per the BLM's regulations for OHV management, all BLM lands within the planning area have been designated in one of three OHV designation categories, open, limited or closed. Open areas are those where cross-country travel by OHVs is allowed. Limited areas are those where the BLM limits motorized use to existing roads and trails, designated roads and trails, particular types of vehicles, specific seasons of use, or other types of limitations. Closed areas are those where OHV use is prohibited.

Table 3.50, Travel Area Designations on BLM-administered Lands within the Decision Area, summarizes the acreage of open, limited, and closed OHV areas in GRSG habitat for each of the five field offices. As can be seen in this table, the vast majority of BLM-administered lands with GRSG habitat in the planning area are available for OHV use under either an open or limited designation. Only a small portion of the BLM-administered lands with GRSG habitat in the planning area is closed to OHV use.

Table 3.50. Travel Area Designations on BLM-Administered Lands within the Decision Area

Designation	Total Size (Acres)	Area in PPH (Acres)	Area in PGH (Acres)
CRVFO			
Open	5,800	2,800	3,000
Limited	61,100	21,600	39,500
Closed	2,600	200	2,300
GJFO			
Open	11,800	5,500	6,300
Limited	2,500	0	2,500
Closed	0	0	0
KFO			
Open	162,900	152,200	10,700
Limited	54,600	46,300	8,300
Closed	500	500	0
LSFO			
Open	805,600	413,600	392,000
Limited	224,500	138,500	86,000
Closed	20,000	18,400	1,600
WRFO			
Open	0	0	0
Limited	610,300	288,000	322,300
Closed	10,800	7,500	3,300
Total			
Open	986,100	574,100	412,000

Designation	Total Size (Acres)	Area in PPH (Acres)	Area in PGH (Acres)
Limited	953,000	494,400	458,600
Closed	33,900	26,600	7,200
Source: BLM 2013			

Travel Management Planning

Within the BLM, travel management planning can be considered to take place in three phases: inventory, designation, and implementation. During the inventory phase, the BLM completes an inventory of all routes within a planning area. During the designation phase, the BLM designates a route system within a planning area through a NEPA process. The implementation phase includes route rehabilitation, signing, and enforcement. Within the planning area, two BLM field offices (LSFO and WRFO) are currently engaged in inventory and three BLM field offices (CRVFO, GJFO, and KFO) are currently engaged in designation. Some specific areas within these BLM offices (e.g., SRMAs) are already in the implementation phase.

Travel Management by Field Office

Current travel management by field office is described below.

Colorado River Valley Field Office

Current management identifies 2,800 acres of PPH as open to OHV travel, 200 acres as closed, and 21,600 acres as limited. Within PGH, 3,000 acres are inventoried as open, 2,300 as closed, and 11,200 as limited. The area closed to OHV travel is extremely small in respect to PPH lands available for fluid mineral leasing, representing only 0.1 percent of 22,800 total acres. Furthermore, most of these lands are mapped as low potential for oil and gas development. In relation to PGH, the area closed to OHV travel represents 14 percent of 16,200 total acres. Closures would not apply to authorized oil and gas exploration and development.

Grand Junction Field Office

The mapped GRSG habitat is largely accessible via an extensive network of roads and trails in the area. Travel surfaces range from paved roads to primitive dirt roads accessible only by high-clearance four-wheel-drive vehicles, OHVs, on foot, or horseback. Currently, all of the BLM-administered lands within PPH are managed as open to cross-country travel for all modes of transportation. Within PPH, 17 miles of travel routes have been inventoried on BLM-managed lands. In PGH, some 6,300 acres of BLM-administered lands are managed as open to cross-country travel, and 2,500 acres are managed with a seasonal closure (December 1 to May 1) to motorized use to protect wintering big game. During the rest of the year, motorized travel in that area is limited to existing routes. Within PGH, 32 miles of existing travel routes have been inventoried. Vehicular traffic within the mapped GRSG habitat is generally very light. Traffic temporarily increases during oil and gas drilling and completion operations. Slight seasonal increases in traffic also result during fall hunting seasons.

Kremmling Field Office

Under Alternative A, a small portion of PPH in Zone 11 and Zone 13 would be closed to OHV travel. Areas closed to OHV travel total 8,700 acres, or 0.02 percent of total BLM-administered surface estate within the KFO; a vast majority of these lands is outside of PPH and PGH. Any potential impacts on leasing and development of fluid minerals from travel management closures are negligible. Overall, most areas are open (307,300 acres; approximately 81 percent of BLM

land within the KFO) to OHV travel, or limited to existing routes (7,300 acres, 0.019 percent) or designated routes (54,500 acres, 14.4 percent).

Exception criteria also apply that would allow administrative access with BLM authorization when travel is approved in areas closed or limited to existing or designated travel. For instance, exceptions may be granted when OHV travel is necessary for valid existing rights or to access mineral and energy sites in areas where travel is not designated as open. Travel restrictions would primarily have an objective other than reducing adverse impacts on GRSG and their habitats. Routes could be constructed in PPH and PGH. A 3-percent disturbance cap would not be applied or affect construction of new roads.

Little Snake Field Office

Current management under the 2011 RMP includes designating areas as open, limited, or closed to vehicle use, consistent with the following guidelines:

- Enable access where needed
- Limits points of access to reduce the number of redundant roads and trails
- Reroutes, rehabilitates, or eliminates existing roads and trails that are damaging cultural or natural resources
- Reroutes roads and trails that are landlocked by private parcels
- Restricts access to meet resource objectives, such as seasonal road closures and installing gates
- Concentrates stream and riparian crossings
- Reduces habitat fragmentation
- Considers new construction and reconstruction of roads and trails
- Actively pursues access to specific parcels to improve access to BLM-administered lands for land management purposes

As an outcome of that process, the LSFO has made travel management designations for Colorado MZs within its boundaries. For both PPH and PGH, most lands are designated as limited (552,000 acres in PPH, 451,200 acres in PGH). Closed areas include 18,400 acres in PPH and 8,700 acres in PGH, while open areas comprise 30 acres of PPH and 19,700 acres of PGH.

White River Field Office

Under current management, no restrictions on travel in PPH are proposed. BLM roads within the WRFO are open to public travel at all times, subject to any limitations or restrictions outlined in the 1997 White River RMP. Travel restrictions would primarily have an objective other than reducing adverse impacts on GRSG and their habitats. Existing routes in PPH could be upgraded to a higher use category (e.g., from trail to primitive road or from primitive road to road). Routes could be constructed in PPH. Restrictions on public vehicle access could be applied as outlined in the 1997 White River RMP. Methods restricting access include installing lockable gates, barricades, and other deterrents, installing signs, and reclaiming and abandoning roads or trails.

Within the WRFO, 1,100 miles of routes are designated as limited and 20 miles designated as closed in mapped PPH. This translates to 288,000 acres of BLM-administered lands designated as limited and 7,500 acres designated as closed to motorized use in the PPH. Within mapped PGH, 1,300 miles are designated as limited and 10 miles designated as closed. This translates to approximately 322,300 acres of BLM-administered land designated as limited and 3,300 acres as closed to motorized use in PGH. No areas within the WRFO are designated as open.

Conditions on National Forest System Lands

The 1997 Routt National Forest Land and Resources Management Plan (Forest Plan) provides guidance on the overall transportation management philosophy and objectives. The plan identifies trails as the major component of the Routt National Forest transportation system. Motor vehicle use off of the designated system is prohibited. Off-road and off-trail travel by snowmobiles is allowed in areas not otherwise closed provided there is sufficient snow cover.

Maps showing the designated motor-vehicle transportation system are referred to as Motor Vehicle Use Maps. Each of the three districts on the Routt National Forest has Motor Vehicle Use Maps.

There are approximately 1,600 miles of roads within the Routt National Forest, not including State or US highways that may pass through the Forest. About 450 miles are maintained to a standard suitable for passenger cars, the rest require a high-clearance vehicle or an OHV. All open USFS roads can be used by OHVs with proper licensing and adherence to state laws.

There are approximately 1,500 miles of trails identified in the Routt National Forest inventory. Note that a portion of these trail miles are overlays on existing routes, such as forest roads that become winter trails when they are groomed for snowmobiling, so the actual number of unique trail miles is closer to 850. Of the 1,500 inventoried miles, 862 miles are designated for nonmotorized uses only.

Snowmobilers and skiers may travel on and off trail in areas that are not otherwise restricted. A portion of the Forest around Rabbit Ears Pass, adjacent to Highway 40, has been zoned into winter motorized and nonmotorized areas to mitigate potential conflicts between skiers and snowmobile users (USFS 2005).

GRSG habitat exists in four Colorado MZs in the Routt National Forest. Transportation networks in the zones vary and are described below:

<u>California Park and Slater Park area (Zone 7)</u>

This zone contains the largest contiguous segment of PGH on the Forest-about 6,700 acres within the California Park Special Interest Area. There is no PPH in the area. California Park is bisected by State Route 80. The only other motorized routes in the area are trails 1144 and 1147, which are open annually to vehicles 50 inches or less in width during the period July 1 to October 1. Non-motorized travel is permitted on these trails year-round. This area is used by snowmobiles and includes groomed snowmobile trails during the winter season.

<u>Lower Camp Creek area (Zone 11)</u>

This zone contains 800 acres of PPH. Most of the habitat is located within an area bounded by the Platte River to the north and east, and by the Forest boundary to the south and west. The identified GRSG habitat is traversed by forest road 939, which is open to vehicles of all types from July 1 to December 1 each year. Most of the area within and adjacent to the identified habitat has seasonal

access restrictions in place to protect deer and elk winter range. At the southern edge of the habitat area is a small developed recreation site with a parking lot, toilet, boat ramp, and information kiosk. This area is used most frequently in May and June for access to the Platte River for rafting.

South Hunt/Watson Creek and Western Gore Pass area (Zone 14)

This zone contains small areas of both PGH and PPH. A short section of road accesses private land in the South Hunt/Watson Creek area. The western Gore Pass area contains several short road segments that are open to all vehicle types from approximately June 15 to December 15 each year. No nonmotorized trails intersect or provide access to the habitat areas.

Lake Agnes and Pete Gulch/West Carter Creek/Diamond Creek areas (Zone 13)

This zone contains small areas of both PGH and PPH. A section of PGH to the west is bordered by Highway 40 on the eastern side, and crossed by a short segment of road that accesses private land at Lake Agnes. No Forest roads or trails intersect or provide access to the small segments of habitat in the eastern portion of this area.

3.10.2. Trends

BLM

The overall trends in travel management on BLM-administered lands within the planning area include an increase in OHV use, hiking, and mountain biking as populations increase within and adjacent to the planning area, and throughout Colorado. In years to come, it is expected that many areas currently designated as open to cross-country travel will need to be changed to limited or closed designations to minimize resource impacts.

Construction of new routes for oil and gas development is also expected to increase as demand for oil and gas resources increases. New oil and gas facilities will require new roads. Previously constructed roads may also require upgrading in width and ROW as drilling operations are converted to collection and production facilities. Recreationists will use these routes even though they are not designed to optimize recreation experiences.

Private property adjacent to BLM-administered lands will likely continue to be subdivided. Subdivision of private property has dramatically increased the number of adjacent property owners, and increased the number of new access routes to public lands within the planning area. The result is expected to be continued unauthorized creation of unmanaged user-created routes that impact other resources.

However, because of the remoteness of many areas within GRSG habitat, these areas have not yet experienced significant changes in travel routes and are not expected to in the near future.

USFS

In the Routt National Forest, the overall extent (measured in terms of miles) of the transportation network has shrunk over the last decade. This is partially due to a purposeful effort to abandon and reclaim roads that have served their purpose and are no longer needed, and partially due to the persistent challenge of maintaining a large system of roads and trails with limited resources. The road system is likely to continue to shrink moderately due to aging drainage structures and bridges and shifting Forest priorities. The number and extent of Forest trails is likely to remain stable or

increase moderately over the next 10 years. Snowmobiling as a winter recreational activity has increased considerably over the past 15 years on the Routt National Forest. This is most relevant to GRSG in the California and Slater Parks areas identified as PGH. These areas, however, are seasonal GRSG habitat and do not provide winter habitat for GRSG.

3.10.3. References

BLM (United States Department of the Interior, Bureau of Land Management). 2013. Geographic Information Systems Data. Unpublished data. BLM, various field offices.

Manier, D. J., D. J. A. Wood, Z. H. Bowen, R. Donovan, M. J. Holloran, L. M. Juliusson, K. S. Mayne, S. J. Oyler-McCance, F. R. Quamen, D. J. Saher, and A. J. Titolo. 2013. Summary of Science, Activities, Programs and Policies that Influence the Rangewide Conservation of Greater Sage-Grouse (*Centrocerus urophasianus*). US Geological Survey Open-File Report 2013-1098. Ft. Collins, CO.

USFS (United States Department of Agriculture, Forest Service). 2005. Final Environmental Assessment, Winter Recreation Management and Routt Forest Plan Amendment.

3.11. Recreation

Conditions on BLM-Administered Lands

BLM recreation management focuses on three basic components of recreation opportunities on public lands: 1) types of recreation opportunities and experiences that are provided, 2) the character of recreation setting within which they occur and retaining that character, and 3) services that can be provided by the BLM and its collaborating partners.

Recreation Management Areas

Recreation Management Areas are land units where recreation and visitor service objectives are recognized as a primary resource management consideration and specific management is required to protect the recreation opportunities. The Recreation Management Area identification is based on recreation demand and issues, recreation setting characteristics, resolving use/user conflicts, compatibility with other resource uses, and resource protection needs. The Recreation Management Areas are classified as either SRMAs or extensive recreation management areas (ERMAs).

SRMAs are administrative units where the existing or proposed recreation opportunities and recreation setting characteristics are recognized for their unique value, importance, and distinctiveness, especially compared with other areas used for recreation.

ERMAs are managed to support and sustain the principal recreation activities and the associated qualities and conditions of the ERMA. Management of ERMA is commensurate with the management of other resources and resource uses.

Special Recreation Permits

Under the authority of the Federal Lands Recreation Enhancement Act of 2004, the BLM uses the Recreation Permitting System to satisfy recreational demand within allowable use levels in

an equitable, safe, and enjoyable manner while, at the same time, minimizing adverse resource impacts and user conflicts.

Heritage Tourism

Many organizations regularly conduct GRSG viewing tours in Colorado, including:

- GRSG viewing tours in Moffat County (https://conservationco.org/2013/02/sage-grouse-tours/)
- The Birding Wire SG Tour Promotion in Craig (http://www.birdingwire.com/releases/281996/)
- GRSG Initiative tours in Colorado (http://sagegrouseinitiative.com/) (http://sagegrouseinitiative.com/events/11)
- Extreme Birding GRSG Tour Promotion (http://www.facebook.com/events/338755516170497/)
- Yampa Valley Sustainability Council GRSG Tour promotion (http://www.yvsc.org/have-you-seen-the-greater-sage-grouse-do-its-thing/)
- CPW GRSG touring promotion (http://dnr.state.co.us/newsapp/press.asp?PressId=8199)
- Summit County GRSG Tours (http://summitcountyvoice.com/2013/03/17/colorado-greater-sage-grouse-viewing-tours-offered/)
- Wings Birding Tours in several FOs (http://wingsbirds.com/tours/colorado-lekking-grouse/)

Conditions on National Forest System Lands

The Multiple Use Sustained Yield Act of 1960 (16 USC 528, Public Law 86-517) directs the USFS to manage recreation as a resource on par with timber, water, and wildlife resources. As the science of outdoor recreation management has evolved, managers have placed more emphasis on providing for experience opportunities rather than specific recreation activities. Accordingly, a primary objective of National Forest recreation management is to provide and secure an environment for visitors to achieve desired experiences while balancing other social, economic and environmental factors.

The Recreation Opportunity Spectrum is a widely used planning and management tool used to delineate and define outdoor recreation settings and related experience opportunities. The Recreation Opportunity Spectrum arrays recreation settings on a spectrum from primitive to urban. A given Recreation Opportunity Spectrum class or category describes the level of development, use, and management that exists or is desired for the area where that class is prescribed.

There are seven Recreation Opportunity Spectrum classes described in the Forest Plan: Primitive, Semi-Primitive Nonmotorized, Semi-Primitive Motorized, Roaded Natural, Roaded Modified, Rural, and Urban. For each of these classes, the Forest Plan also describes maximum use level guidelines, defined in terms of People At One Time per trail mile and per acre. For winter recreation (activities that require snow cover) two general Recreation Opportunity Spectrum classes are used: motorized and nonmotorized.

3.11.1. Existing Conditions

Conditions of the Planning Area

Typical recreational activities within the planning area include camping, hiking, horseback riding, mountain biking, OHV use, and cross-country skiing. Migrating and resident wildlife provide plentiful opportunities for hunting, photography, and observation. Renowned local rivers, streams, and lakes offer boating and cold-water fishing opportunities.

Recreation visitors to the planning area come from national and international locations, the Denver metropolitan area and Colorado's Front Range, and other local communities. For Colorado visitors, the region is an easily accessible weekend getaway with a diversity of outdoor activity offerings and recreation settings. Increased visitation to small towns and destination resorts contribute to the increased use of public lands within the planning area.

Hunting

Hunting, a popular activity throughout the planning area, is regulated in the planning area by CPW. Much of the hunting within the planning area takes place on BLM-administered and National Forest System lands. Elk hunting, in particular, attracts large numbers of hunters during the fall big game hunting season, which begins in late August and lasts into December. Hunting of GRSG is allowed during a fall hunting season, which lasts from September through January (according to regulations for the 2012-2013 hunting season). Possession of a small game permit allows hunters a possession limit of two to four birds, depending on the game unit in which the hunting occurs (CPW 2012). Game units where hunting of GRSG is permitted cover large portions of GRSG habitat in Moffat, Jackson, Grand, Routt, Summit, and Rio Blanco Counties (CPW 2012).

Conditions on BLM-Administered Lands

On BLM-administered lands in GRSG habitat within the planning area, recreational activities include camping, hiking, horseback riding, mountain biking, OHV use, and cross-country skiing. Migrating and resident wildlife provide plentiful opportunities for hunting, photography, and observation. Renowned local rivers, streams, and lakes offer boating and cold-water fishing opportunities.

Motorized recreation is an increasingly popular activity within the planning area. Of the 12 SRMAs that overlap with GRSG habitat, four are designated for OHV-related opportunities. Popular OHV recreation areas within GRSG habitat in the planning area include North Sand Hills SRMA and South Sandwash SRMA. Outside of SRMAs, OHV recreation is also a popular activity and is commonly associated with hunting.

Boating and camping are other popular activities within the planning area. Particularly high levels of visitation area are reported in the Upper Colorado River SRMA, which overlaps GRSG habitat in the BLM's KFO and CRVFO.

Recreation Management Areas

As mentioned above, SRMAs are administrative units where the existing or proposed recreation opportunities and recreation setting characteristics are recognized for their unique value, importance, and distinctiveness, especially compared with other areas used for recreation. There

are 12 SRMAs in the planning area that overlap portions of GRSG habitat (**Table 3.51**, Special Recreation Management Areas on BLM-administered Lands within GRSG Habitat):

- Bocco Mountain: provides motorized single-track opportunities
- Bull Gulch: provides primitive recreation opportunities
- Gypsum Hills: provides motorized recreation opportunities
- North Sand Hills: provides OHV riding opportunities and dispersed camping
- Upper Colorado River (managed as two separate SRMAs in the CRVFO and KFO): provides fishing, float boating, tubing, kayaking, canoeing, and camping opportunities
- Fly Creek: provides backcountry nonmotorized hunting opportunities
- Serviceberry: provides backcountry, nonmotorized hunting, and heritage interpretation/education opportunities
- Cedar Mountain: provides hiking, nature interpretation, and picnicking opportunities
- Little Yampa Canyon: provides river boating, big game hunting, camping, wildlife viewing, and interpretation/education opportunities
- Juniper Mountain: provides boating, hunting, camping, and hiking opportunities
- South Sandwash: provides OHV riding opportunities

Table 3.51. Special Recreation Management Areas on BLM-Administered Lands within GRSG Habitat

SRMA	Total Size (Acres)	Area in GRSG Habitat (Acres)
Bocco Mountain (CRVFO)	1,400	300
Bull Gulch (CRVFO)	8,300	200
Gypsum Hills (CRVFO)	16,900	1,900
North Sand Hills (KFO)	1,500	800
Upper Colorado River (CRVFO)	20,700	2,000
Upper Colorado River (KFO)	12,200	2,100
Fly Creek (LSFO)	12,100	9,200
Serviceberry (LSFO)	12,400	6,600
Cedar Mountain (LSFO)	900	900
Little Yampa Canyon (LSFO)	27,900	27,900
Juniper Mountain (LSFO)	1,800	1,800
South Sandwash (LSFO)	35,600	33,400
Total	**151,700**	**87,100**
Source: BLM 2013		

Within the planning area, there are 711,900 acres of ERMAs within PPH and 686,300 acres of ERMAs in general habitat (**Table 3.52**, Extensive Recreation Management Areas on BLM-Administered Lands within GRSG Habitat). ERMAs are managed to support and sustain the principal recreation activities and the associated qualities and conditions of the ERMA. Management of ERMA is commensurate with the management of other resources and resource uses.

Table 3.52. Extensive Recreation Management Areas on BLM-Administered Lands within GRSG Habitat

Field Office	Area in PPH (Acres)	Area in PGH (Acres)
CRVFO	23,300	41,900
GJFO	0	0
KFO	0	0
LSFO	566,600	464,200
WRFO	122,000	180,200
Total	**711,900**	**686,300**
Source: BLM 2013		

In areas outside of Recreation Management Areas within the planning area, recreational visitation is low when compared to other parts of the planning area. Recreational activities in these areas include hunting, fishing, OHV use, and a small amount of foot, equestrian, and mountain bike use.

Developed Recreation Facilities

Within GRSG habitat in the planning area, developed recreation sites and facilities have been constructed in order to enhance recreational opportunities, protect resources, manage activities, and reduce recreation use conflicts. These infrastructure developments range from campgrounds to trailheads with simple bulletin boards to developed river access sites. Many of these developments are located within SRMAs, where the BLM has made a commitment to the unique values, importance, and distinctiveness of the recreational opportunities in these areas.

Special Recreation Permits

Within the planning area, Special Recreation Permits are issued for a variety of activities, including fund-raising, outfitters and guides, off-road vehicle tours, horse trail and wagon train rides, cattle drives, OHV races, horse endurance rides, mountain bike races, rodeos, poker runs, orienteering, land speed records, Eco-Challenge events, vendor permits, river outfitting, and upland hunting. The most common Special Recreation Permits in GRSG habitat within the planning area include river outfitting (particularly in the Upper Colorado River SRMA) and upland hunting. These Special Recreation Permits often support the achievement of recreation objectives, and help BLM Colorado achieve its commitment to offering outstanding recreation opportunities to the public while ensuring good stewardship of public lands.

Conditions on National Forest System Lands

Routt National Forest

The Routt National Forest is located less than 150 miles from the Denver metropolitan area and is a popular destination for area residents and visitors from around the world. Attractions on the Forest include 30 campgrounds, 10 picnic grounds, a destination ski area and resort, approximately 850 miles of trails, and abundant dispersed (not associated with a specific developed site) recreation opportunities.

According to the National Visitor Use Monitoring Program, during fiscal year 2007 (October 2007-September 2008) the Routt National Forest supported an estimated 1,632,000 recreation visits (USFS 2012). About 1,000,000 of those visits were associated with downhill skiing, primarily at Steamboat Ski Resort. Spending associated with all recreation visits was estimated

at $219,399,000 (expressed in 2007 dollars). In addition to downhill skiing, the most popular recreation activities on the Forest include viewing natural features, viewing wildlife, hiking, and walking. Other popular activities include, but are not limited to, driving for pleasure, fishing, developed camping, OHV use, horseback riding, backcountry skiing, and snowmobiling.

Recreation use patterns vary substantially across the different geographic areas of the Forest. In general, the only areas of GRSG PPH or PGH that support recreation use are the California Park and Slater Park area (Zone 7) and the Lower Camp Creek area (Zone 11). The other areas of the National Forest with GRSG habitat are not functional recreation areas because they are very small areas, they lack specific recreation attractions, or they are on private lands or have other factors that limit public access. More details are provided in the specific area discussion below.

California Park and Slater Park area (Zone 7)

This zone contains the largest contiguous segment (6,700 acres) of GRSG PGH on the Forest. There is no PPH in the area. The California Park Special Interest Area is identified in the Forest Plan as an area of 23,000 acres, which is managed to protect its unique geological, zoological, historical, paleontological, and scenic values. Forest Plan management direction for the special interest area calls for allowing recreation use that emphasizes interpretation and education when it does not threaten the values for which the area was identified.

The general recreation management direction for this zone is to provide for relatively low-density motorized and nonmotorized activities in a natural setting. The predominant Recreation Opportunity Spectrum classes are semi-primitive nonmotorized, semi-primitive motorized, and roaded natural. There is a campground and a youth camp in the western portion of the area, but there are no developed recreation facilities within or near identified GRSG habitat. Summer motorized use is limited to trails 1144 and 1147 and open roads, as depicted on the Hahns Peak/Bears Ears District Motor Vehicle Use Map (USFS 2011). Winter motorized use occurs on groomed snowmobile trails as dispersed recreation across this area.

The general recreation use pattern in this area is one of light to moderate summer activity, including sightseeing, fishing and dispersed camping along National Forest Roads 110, 116, and 118, with much higher levels of big-game hunting-related use occurring from late August through late October. Eight outfitter/guides, operating under special use permits issued by the Forest, facilitate public hunting activities in the area.

Lower Camp Creek area (Zone 11)

This area contains 800 acres of GRSG PPH. Most of the habitat is located within an area bounded by the Platte River to the north and east, and by the Forest boundary to the south and west. Most recreation activity within and near the area of PPH is concentrated in the Platte River corridor, and specifically at the Routt Access developed recreation site, which functions as a put-in for Platte River float trips and access to the Platte River Wilderness.

The Routt Access site includes a parking lot, toilet, and kiosk/information board. The estimated People At One Time capacity at this site is 300 people, although peak use does not approach that number. Visitors who begin their river trips here must navigate a narrow canyon with technical rapids. In most years, the rapids are only navigable for a short period from late May through June when flow levels are optimal. Most use of this site occurs during that period. Visitor activity is generally limited to the immediate vicinity of the river put-in.

Recreation activity in the broader area is restricted in the winter and spring to protect deer and elk winter range. In the summer, the most popular recreation activity outside the river corridor is motorized travel on the designated system of forest roads. Motorized uses are restricted to open roads and trail segments identified in the Parks District Motor Vehicle Use Map (USFS 2011).

3.11.2. Trends

Conditions on BLM-Administered Lands

Colorado's population grew significantly (56 percent) between 1990 and 2010 (Colorado State Demography Office 2012), and an increasing number of people are living near, or seeking out, BLM-administered lands for a diversity of recreational opportunities characterized by the "mountain resort or outdoor lifestyle." The planning area is a year-round place to live and work; as a result BLM-administered lands are absorbing the increasing recreational demand and use.

Visitation and use near local communities is expected to continue to grow. Many local communities have public lands bordering them that are used as "backyard" recreation areas by local residents. Outside of the fall big game hunting seasons, when visitation is high everywhere, the greatest number of visitors to the planning area is near communities. This use continues to grow, accompanied by rapid growth in the communities themselves. OHV use, in particular, continues to increase across the planning area.

In more remote portions of the planning area, recreation use is not expected to change as dramatically as in more accessible areas. Hunting has been, and continues to be, the predominant recreational activity in these remote and less-developed areas. Interest in hunting these areas has generally remained steady and impacts on hunting opportunities in the planning area have been primarily from oil and gas development, which have caused changes to wildlife habitat and animal behavior patterns. Additionally, hunting opportunities for private hunters have been impacted by changes in land ownership, which have sometimes resulted in more difficult access to public lands. Some landowners in the area have implemented management strategies to improve and enhance wildlife habitat, which results in improved hunting opportunities. These trends are expected to continue.

River use has also been fairly consistent, with decreases in use during years of low river flows as a result of drought. This trend is expected to continue.

It is unlikely the demand for Special Recreation Permits in the planning area will change over the planning period. Permitted outfitter and guide use has remained consistent for the past 5 years.

Conditions on National Forest System Lands

Routt National Forest

National trends in outdoor recreation suggest the likely direction of change for recreation use on the Routt National Forest. A comprehensive USFS publication (Cordell 2012), prepared in support of the 2010 Renewable Resources Planning Act Assessment, identifies the following national trends:

- Between 2000 and 2009, the number of people that participated in nature-based, outdoor recreation grew by 7.1 percent.

- In the West, the majority of outdoor recreation activity takes place on public lands.
- Participation in activities related to "viewing and photographing nature" grew substantially over the last decade, while participation in hunting and fishing declined.
- Participation in summer and winter motorized activities grew during the first half of the decade and then declined to about the same level as in 2000.
- The five activities expected to grow the fastest in per capita participation over the next 50 years are developed and undeveloped skiing, challenge activities, equestrian activities, and motorized water activities.
- Activities expected to decline in per capita participation are visiting primitive areas, motorized off-road activities, motorized snow activities, hunting, and fishing.

It is important to note that even activities with declining per capita participation can show growth in the number of participants due to population increases. For the Routt National Forest, located in the growing Rocky Mountain West, participation in outdoor recreation activities is likely to continue to increase at or slightly above the national rate. Most evidence suggests that the Forest can continue to support modest increases in recreation use without unacceptable impacts on natural resources or experience opportunities. Maintaining deteriorating recreation infrastructure with limited resources is likely to be the biggest challenge over the next 10 years.

3.11.3. References

BLM (United States Department of the Interior, Bureau of Land Management). 2007f. Draft Oil Shale and Tar Sands RMP Amendments to Address Land Use Allocations in Colorado, Utah, and Wyoming and Programmatic Environmental Impact Statement. US Department of the Interior, Bureau of Land Management. Washington, DC.

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Cordell, H. K. 2012. Outdoor Recreation Trends and Futures: A technical document supporting the Forest Service 2010 RPA Assessment. Gen. Tech. Rep. SRS-150. Asheville, NC. US Department of Agriculture Forest Service, Southern Research Station. 167 p.

CPW (Colorado Parks and Wildlife). 2012. 2012 Colorado Small Game. Denver, CO. Internet Web site: http://wildlife.state.co.us/SiteCollectionDocuments/DOW/RulesRegs/Brochure/smallgame.pdf.

USFS (United States Department of Agriculture, Forest Service). 2011. Routt National Forest Motor Vehicle Use Map. Steamboat Springs, CO.

_____. 2012. Visitor Use Report, Routt National Forest. Last Updated May 23, 2012. Internet Web site: http://apps.fs.fed.us/nrm/nvum/results/ReportCache/Rnd2_A02011_Master_Report.pdf.

3.12. Range Management

The BLM administers public land grazing in accordance with the Taylor Grazing Act of 1934, while the USFS administers livestock grazing allotments according to the Multiple Use and Sustained Yield Act of 1960. Both agencies also administer livestock grazing allotments in accordance with the Wilderness Act of 1964, the NEPA, the Wild Free-Roaming Horse and Burro Act of 1971, the Clean Water Act of 1972, the ESA, and the Public Rangelands Improvement Act of 1976.

Both the BLM and the USFS issue livestock grazing permits for a period of up to 10 years that are generally renewable if it is determined that the terms and conditions of the permit are being met and the ecological condition of the rangelands are meeting the fundamentals of rangeland health. Forage is allocated on the basis of AUMs, which is the amount of forage necessary for the sustenance of one cow and its calf or its equivalent for a period of 1 month.

BLM Grazing Standards and Guidelines

In response to public concern about the management of livestock grazing on western public lands, the BLM began developing new regulations for livestock grazing administration. This process, which was characterized by the preparation of an EIS and extensive public involvement, resulted in new livestock grazing regulations which became effective August 21, 1995. One of the requirements of the regulations was that each BLM State Director would, in consultation with a Resource Advisory Council in the state, develop standards for public land health and guidelines for livestock grazing management. The BLM Colorado's Standards and Guidelines were approved by the Secretary of the Interior on February 3, 1997 (see **Appendix K**, BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado).

Standards describe conditions needed in order to sustain public land health, and relate to all uses of the public lands. Standards, based upon their associated indicators, are applied on a landscape scale and relate to the potential of the landscape. These include:

- *Standard 1*. Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, land form, and geologic processes. Adequate soil infiltration and permeability allows for the accumulation of soil moisture necessary for optimal plant growth and vigor and minimized surface run-off.

- *Standard 2*. Riparian systems associated with both running and standing water function properly and have the ability to recover from major disturbance (such as fire, severe grazing, or 100-year floods). Riparian vegetation captures sediment, and provides forage, habitat and bio-diversity. Water quality is improved or maintained. Stable soils store and release water slowly.

- *Standard 3*. Healthy, productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the species' and the habitats' potential. Plants and animals at both the community and population level are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations and ecological processes.

- *Standard 4*. Special Status, Threatened, and Endangered Species (state and federal), and other plants and animals (and their habitats) officially designated by the BLM are maintained or enhanced by sustaining healthy, native plant and animal communities.

- *Standard 5*. The water quality of all water bodies, including groundwater where applicable, located on or influenced by BLM-administered lands achieves or exceeds the Water Quality Standards established by the State of Colorado. Water Quality Standards for surface and ground waters include the designated beneficial uses, numeric criteria, narrative criteria, and anti-degradation requirements set forth under state law as found in (5 CCR 1002-8), as required by Section 303(c) of the Clean Water Act.

Guidelines are the management tools, methods, strategies, and techniques, such as best management practices, designed to maintain or achieve healthy public lands as defined by the standards. Grazing management practices must promote plant health by providing for one or more of the following:

- Periodic rest or deferment from grazing during critical growth periods
- Adequate recovery and regrowth periods
- Opportunity for seed dissemination and seedling establishment

The Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado (BLM Standards) are directed at improving resource conditions for soils, riparian systems, upland vegetation, wildlife habitat, Threatened and Endangered Species, and water quality (see **Appendix K**, BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado). The Standards are implemented through land health assessments, determination documents, environmental analysis documents, permit renewals, and other permit changes.

Management practices for livestock grazing have been focused on achieving BLM standards and meeting objectives for other resources (such as those associated with vegetation and soils) established for allotments. This has been accomplished by improving conformance with the guidelines for livestock management, such as changing the duration of grazing use and season of use, reducing AUMs, and improving grazing distribution. Generally, reducing the duration of grazing use, including rest or deferment grazing plans, and improving livestock distribution are the key to meeting rangeland objectives, especially those associated with riparian areas and wetlands. Grazing management has been improved by a variety of actions, such as adjustments in grazing permits (including adding terms and conditions designed to maintain or improve riparian zones and wetlands, utilization, herding and riding requirements, and placing salt and supplemental feed away from riparian zones), constructing water developments and pasture fencing, and ensuring compliance with maintenance of range improvements and grazing permits.

The BLM also administers the Wild Horse and Burro Program. Existing conditions for wild horses and burros in the planning area are discussed in **Section 3.13**, Wild Horse Management.

3.12.1. Existing Conditions

Conditions of the Planning Area

Management practices for livestock grazing on public lands in the planning area are focused on achieving standards and meeting objectives for other resources (such as those associated with vegetation and soils) established for allotments. Generally, reducing the duration of grazing use, including rest or deferment grazing plans, and improving livestock distribution are the key to meeting rangeland objectives, especially those associated with riparian areas and wetlands.

Grazing management has been improved by a variety of actions, such as adjustments in grazing permits (including adding terms and conditions designed to maintain or improve riparian zones and wetlands, utilization, herding and riding requirements, and placing salt and supplemental feed away from riparian zones), constructing water developments and pasture fencing, and ensuring compliance with maintenance of range improvements and grazing permits.

Table 3.53, BLM Grazing Allotments Not Meeting Land Health Standards within GRSG Habitat, through **Table 3.55**, Fences within GRSG Habitat in the Planning Area, display data compiled in a baseline environmental report produced by the US Geological Survey and the BLM (Manier et al. 2013). This data provides a rough estimate across GRSG habitat in the planning area. More accurate data are provided below for BLM-administered and National Forest System lands within GRSG habitat in the planning area. In each table, acres and miles are presented by surface management agency and their presence within PGH and PPH in the planning area.

Table 3.53. BLM Grazing Allotments Not Meeting Land Health Standards within GRSG Habitat

Surface Management Agency	Total Acres of Allotments Not Meeting Land Health Standards [1]	Acres within PGH	Acres within PPH
BLM	390,200	224,100	166,100
Tribal and Other Federal	1,100	1,100	0
State	29,900	5,800	24,100
Other	700	700	0

Source: Manier et al. 2013

[1] Only includes allotments not meeting Land Health Standards with grazing as the causal factor. Land health assessments are not a requirement of the USFS.

Table 3.54. Cropland within GRSG Habitat in the Planning Area

Surface Management Agency	Total Acres [1]	Acres within PGH	Acres within PPH
BLM	2,100	1,000	1,100
USFS	0	0	0
Tribal and Other Federal	0	0	0
Private	67,700	34,900	32,800
State	4,300	2,400	1,900
Other	100	0	100

Source: Manier et al. 2013

[1] Based on data provided by the National Agricultural Statistics Service

Table 3.55. Fences within GRSG Habitat in the Planning Area

Surface Management Agency	Total Miles [1]	Miles within PGH	Miles within PPH
BLM	2,300	800	1,500
USFS [2]	N/A	N/A	N/A
Tribal and Other Federal	0	0	0
Private	2,400	800	1,600
State	300	100	200

Surface Management Agency	Total Miles [1]	Miles within PGH	Miles within PPH
Other	0	0	0

Source: Manier et al. 2013

[1] Derived from a dataset that identifies pasture and allotment borders on BLM and USFS land as potential fences.

[2] Data not available.

Conditions on BLM-Administered Lands

The BLM manages livestock grazing on 997 allotments comprising approximately 4,205,600 acres on BLM-administered land in the planning area (**Table 3.56**, BLM-Administered Grazing Allotments within GRSG Habitat). Of the 997 allotments managed in the planning area, 792 include some lands within GRSG habitat. A total of 317,469 AUMs are currently permitted on these 792 allotments, with a total of 757 leases/permits.

Table 3.56. BLM-Administered Grazing Allotments within GRSG Habitat

Field Office	Number of Allotments	Acres			Permitted AUMs
		Non-habitat	PPH	ADH	
GJFO	33	253,200	5,400	31,200	10,919
WRFO	139	1,159,900	121,500	695,700	111,516
CRVFO	61	150,900	24,300	31,200	21,631
LSFO	277	382,600	552,400	1,716,500	141,661
KFO	232	205,600	189,600	393,800	31,742
Total	792	2,152,200	893,200	2,868,400	317,469

Source: BLM 2013

The livestock that graze on BLM-administered lands in GRSG habitat in the planning area are primarily cattle but also include sheep, bison, and some domestic horses. The season of use within the planning area is generally from May through October, with much of the use in spring (May and early June). Spring use occurs on the lower benches and is designed to coordinate with the end of calving on private lands and transitions from private land to USFS permits. Summer and fall use (late June through October) generally occurs at higher elevations.

In addition to the presence of livestock on BLM-administered land is the presence of range improvements. Range improvements include fences (and associated gates and cattleguards), corrals, and water developments. Fences are typically three- to four-strand barbed wire, one-strand barbed wire with net, or “sheep” wire. Fence posts are either wood or metal, typically spaced 12 to 16 feet apart and may include one to two metal or wooden stays between the posts. In some areas, high-tensile smooth wire fences have replaced barbed wire. Water developments vary widely, consisting of earthen ponds that fill by catching precipitation runoff, developed springs, and wells. Developed springs and wells commonly include short (tens or hundreds of feet) or long (thousands of feet) pipeline systems that distribute water to one or more metal, fiberglass, or rubber-tire tanks. Earthen ponds and developed springs are typically located in drainages and depressions while wells and their associated delivery tanks are typically located on uplands.

Active grazing use authorization, management actions, and long term rangeland health in each allotment are monitored and evaluated, based on existing data. Adjustments are made by agreement or decision in accordance with legislation, regulations, and policy to ensure that public land resources are maintained or improved for future commodity and non-commodity

values. Resource specialists use a variety of tools to monitor rangeland health including a series of rangeland health indicators that help them make determinations regarding the relationship between livestock grazing and the Colorado Standards for Public Land Health (see **Appendix K**, BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado).

In 1982, the BLM developed three selective Management Categories to prioritize grazing allotments according to management needs:

- *Improve (I)*. Managed in order to improve current unsatisfactory resource conditions or resolve potential resource conflicts and receive the highest priority for funding and management actions
- *Maintain (M)*. Managed in order to maintain current satisfactory resource conditions and actively managed in order to ensure that resource values do not decline
- *Custodial (C)*. Managed custodially while, at the same time, protecting existing resource values

These categories are designed to concentrate public funds and management efforts on allotments with the most significant resource conflicts, and the greatest potential improvement. The grazing allotments within the planning area were prioritized for management according to one of the three levels. The criteria used for placing allotments in a Management Category were the presence of resource conflicts or problems and the potential for improvement, as outlined in the BLM's Selective Management Policy. Allotment management plans provide greater detail in terms of livestock management objectives than the terms and conditions in the general grazing permit or lease. The allotment management plans are generally prioritized for those allotments designated for improvement but can also be developed for allotments in the maintenance or custodial categories

Conditions on National Forest System Lands

Routt National Forest

The Hahns Peak/Bears Ears, Parks, and Yampa Ranger Districts of the Routt National Forest manage grazing allotments in six counties of northwest Colorado (Garfield, Grand, Jackson, Moffat, Rio Blanco, and Routt). There are 159 grazing allotments on the Forest. Types of domestic livestock under permit include cattle, sheep, and horses. GRSG habitat (both PPH and PGH) falls within 24 different allotments as shown in **Table 3.57**, National Forest System Grazing Allotments within GRSG Habitat. The total amount of GRSG habitat on the Routt National Forest adds to 17,400 acres; a total of 13,500 acres are located within the 24 grazing allotments.

Table 3.57. National Forest System Grazing Allotments within GRSG Habitat

Ranger District	Number of Allotments	Acres			Permitted AUMs
		Non Habitat	PPH	ADH	
Yampa	5	31,000	600	800	3,329
Hahns Peak/Bears Ears	13	49,900	0	9,900	11,762
Hahns Peak/Bears Ears and Parks	5	23,200	200	1,000	3,245
Parks	1	16,600	800	800	1,146

Ranger District	Number of Allotments	Acres			Permitted AUMs
		Non Habitat	PPH	ADH	
Total	**24**	**120,600**	**1,600**	**12,500**	**19,482**
Source: USFS INFRA database 2012. Acres may not always add up due to database rounding errors in individual land ownership categories.					

All allotments on the Routt National Forest are managed under allotment management plans and annual operation instructions that implement livestock grazing standards and guidelines of the Routt National Forest Revised Forest Plan ROD (USFS 1998).

Maximum allowable use guidelines in the Forest Plan are moderate. This means that no more than 50 percent use of forage under a deferred rotation system and no more than 55 percent use of forage under a rest rotation system are permitted. Lower allowable use guidelines (40 to 45 percent) are applied to rangelands in unsatisfactory condition. Additional guidelines for riparian areas include leaving four to 6 inches of residual stubble in riparian areas at the end of the grazing season.

Of the 24 allotments within GRSG habitat, 10 of the allotments are sheep allotments, 11 are cattle allotments, and 2 are dual use (available to be used by both). The Clover Valley sheep allotment is presently vacant. Two of the cattle allotments currently under permit are stocked with yearling cattle, while the others are stocked with cow/calf pairs.

All of the cattle grazing allotments overlapping with GRSG habitat are managed under rotational grazing systems, and managed by riders, fenced pastures, or both. With the exceptions of South Hunt Creek and California Park, season-long grazing management systems include rotational grazing, deferred rotation between two to four pastures, deferred grazing, and rest rotation grazing (Long Park). All have grazing seasons that fall between the last week of May and early October.

Removal of livestock from grazing allotments is required when maximum allowable use is reached on key areas within the allotments. A key area is a portion of rangeland selected because of its location, grazing or browsing value or use. It serves as a monitoring and evaluation point for degree of grazing use and therefore guides the general management of the entire area of which it is a part. On cattle allotments, key areas are generally riparian areas and wet meadows because they are preferred by cattle, of high ecological value, and most susceptible to reaching allowable use soonest. In general, when key areas in a pasture reach maximum allowable use and cattle are removed, upland shrublands, including sagebrush habitats, are grazed well below allowable use levels. In most shrub sites on slopes greater than 15 to 20 percent or more than 0.25-mile from water sources, forage utilization by livestock is light to very light, averaging 25 percent or less. Localized heavy use of mountain shrublands and, occasionally, sagebrush stands can occur in areas where salt blocks are placed around water developments and at some fence corners to achieve needed livestock distribution. These sites are generally extremely small in extent relative to total acreage of greater sagebrush habitat.

There are 68 small stock water ponds and spring developments within GRSG habitat (67 in PGH and 1 in PPH), mostly on the cattle allotments. In addition, there are 13 other small ponds and spring developments near (within 0.25 to 0.5-mile) of GRSG habitat, including 7 in PGH and 6 in PPH. Stock water ponds are not fenced and are generally less than 0.25-acre in size. Spring developments consist of a fenced spring with collection box and a pipeline to a watering tank. Water tanks are equipped with devices to allow for escape of small mammals and birds, though they vary in design, and not all would be considered suitable for large birds such as GRSG.

GRSG habitat on the Routt National Forest, with the exception of the PGH area in California Park, is located at the lower elevation margins of the allotments and is therefore all adjacent to National Forest Boundary fence and sometimes also interior pasture fences. Much of the Forest boundary was fenced between the late 1930s and the 1960s. Most of the fence is four-strand barbed wire with wood posts, steel posts, or a mix of wood and steel. There are also some segments of wood buck and pole fence.

3.12.2. Trends

Conditions on BLM-Administered Lands

In general, livestock grazing has decreased in the planning area. Trends in livestock grazing reflect changes in livestock species, in permittees and their perspectives, and in permitted use and/or season of use.

Absentee ownership of base property associated with many of the allotments has increased, as has the number of permittees that do not rely on livestock grazing for their primary source of income. Changes in the types of permittees that run livestock in the planning area have resulted in diversification of perspectives. Some permittees have shifted the focus of their management to habitat improvement for wildlife and recreation as an alternative source of income. Trends in livestock grazing have also resulted from competition for forage by wildlife, increased gas development, and increased recreation demand. Of these trends, increased gas development and wildlife competition for forage have been the most important trends impacting livestock grazing operations and rangeland management in GRSG habitat on BLM-administered lands in the planning area.

Conditions on National Forest System Lands

Routt National Forest

Trends in livestock use of areas with GRSG habitat have been declining over the last several years, with voluntary reductions in AUM's on many allotments. These reductions were mostly as a result of the range condition resulting from drought and additional pressure from elk. However, there has been little change in permitted use and when range conditions improve, AUMs may increase in these areas.

3.12.3. References

BLM (United States Department of the Interior, Bureau of Land Management). 1997. BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado. BLM, Colorado State Office, Lakewood, CO. February 3, 1997.

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USFS (US Department of Agriculture, Forest Service). 1998. Routt National Forest-Record of Decision, Final Environmental Impact Statement and Revised Land and Resource Management Plan, February 1998. Internet Web site: http://www.fs.usda.gov/detail/mbr/landmanagement/planning/?cid=fsbdev3_025110. Accessed on September 27, 2012.

3.13. Wild Horse Management

The BLM protects, manages, and controls wild horses in accordance with the Wild Free-Roaming Horses and Burros Act of 1971 (PL 92-195, as amended by Congress in 1976, 1978, 1996, and 2004). The FLPMA directs the BLM to manage wild horses and burros as one of numerous multiple uses including mining, recreation, domestic grazing, and fish and wildlife. Wild horse and burro management is governed by 43 CFR subpart 4700. One of the BLM's top priorities is to ensure the health of the public lands so that the species depending on them, including the nation's wild horses and burros, can thrive. The BLM policies and regulations also direct that wild horses and burros are to be managed as self-sustaining populations of healthy animals.

Following passage of the Wild Free-Roaming Horses and Burros Act, herd areas were identified in the planning area as displayed on **Figure 3-10**, Wild Horse and Burro Herd Area and Herd Management Areas, in **Appendix B**, Figures.

Herd areas are locations where wild horse and burro populations were found when the Act was passed. HMAs are areas within the herd areas where it was decided through LUPs that there was enough forage, water, cover, and space to support a healthy wild horse or burro population.

3.13.1. Existing Conditions

Conditions of the Planning Area

Table 3.58, Acres of Wild Horse Areas within GRSG Habitat in the Planning Area, displays data compiled in a baseline environmental report produced by the US Geological Survey and the BLM (Manier et al. 2013). Acres are presented by surface management agency and their presence within PGH and PPH in the planning area. There are no wild burros in the planning area.

Table 3.58. Acres of Wild Horse Areas within GRSG Habitat in the Planning Area

Surface Management Agency	Total Acres [1]	Acres within PGH	Acres within PPH
BLM	161,300	68,200	93,100
USFS	0	0	0
Tribal and Other Federal	0	0	0
Private	18,300	11,900	6,400
State	3,200	1,800	1,400
Other	0	0	0

Source: Manier et al. 2013

[1] Includes Herd Areas and Herd Management Areas

Table 3.59. Herd Areas within GRSG Habitat on BLM-Administered Lands

Herd Area	BLM Field Office	Acres		
		Total	PGH	PPH
North Piceance	WRFO	76,300	13,600	0
West Douglas	WRFO	123,400	7,500	0
Douglas Mountain	LSFO	65,800	9,700	60
Source: BLM 2013				

The BLM manages two HMAs in the planning area, the Piceance-East Douglas HMA and the Sand Wash Basin Wild Horse HMA, both of which contain PGH and PPH. The third HMA is Little Book Cliffs Wild Horse Range. Little Book Cliffs does not have any of the GRSG habitat. Wild horse and burro populations in HMAs are managed within appropriate management levels and corresponding forage allocations (AUMs). The appropriate management level for each HMA is expressed as an acceptable range. Forage allocations for horses in the HMA are based on the maximum number of the appropriate management level range. Appropriate management levels, as well as the boundaries of each HMA, were established through previous LUPs to ensure that public land resources, including wild horse habitat, are maintained in satisfactory, healthy condition and that unacceptable impacts on these resources are minimized. Appropriate management levels are based on best available science and rangeland monitoring studies. HMA acreages by habitat type along with current appropriate management levels are shown in **Table 3.60**, Herd Management Areas within GRSG Habitat on BLM-Administered Lands.

Table 3.60. Herd Management Areas within GRSG Habitat on BLM-Administered Lands

Herd Management Area	BLM Field Office	Acres			Appropriate Management Level
		Total	PGH	PPH	
Piceance-East Douglas	WRFO	158,200	6,900	31,800	135-235
Sand Wash Basin HMA	LSFO	153,100	62,035	91,100	163-362
Source: BLM 2013					

Piceance-East Douglas Herd Management Area

The 1975 White River Resource Area Management Framework Plan identified two wild horse units: the Piceance Basin and the Douglas Herd Unit. The Douglas Herd Unit included what is now the East Douglas portion of the Piceance-East Douglas HMA and the West Douglas Herd Area. The East and West Douglas areas were physically separated by completion of a State Highway 139 ROW fence in 1983. In 2007, the BLM completed the West Douglas Herd Area Plan Amendment to the 1997 White River RMP to discontinue maintaining the wild horse population in the West Douglas Herd Area. The wild horses are presently distributed among the Piceance-East Douglas HMA, the West Douglas Herd Area, and the North Piceance Herd Area. A wild horse management plan for the Piceance-East Douglas HMA was approved in June 1981 (BLM 1981).

The wild horse population within the Piceance-East Douglas HMA is managed with an appropriate management level of 135 to 235 adult wild horses. The estimated population of wild horses within the HMA was 183 in the spring of 2012 based on a helicopter inventory. Various factors including drought conditions, historic grazing, wildfires, and wild horse population growth may adversely affect habitat and in some instances herd health. The appropriate management level, objectives, and management actions may be modified in future multiple use decisions for the grazing allotments contained within an HMA. Wild horses that establish home ranges outside of HMA or Herd Area boundaries are removed during gathers. Wild horses are removed from

private lands at the request of the landowner and after reasonable efforts to keep the animals off private lands have failed.

Sand Wash Basin Herd Management Area

The wild horse population within the Sand Wash HMA is managed with an appropriate management level of 163 to 362 adult wild horses. The most recent count of the HMA showed 327 adult horses. The HMA is gathered when the high end of the appropriate management level is exceeded and the population is reduced to 163 adult animals.

Conditions on National Forest System Lands

Routt National Forest

There are no wild horse and burro management areas or populations present in the Routt National Forest planning area.

3.13.2. Trends

Conditions on BLM-Administered Lands

Current conditions within the planning area show that wild horse populations continue to grow, often exceeding appropriate management levels. Wild horses will continue to be removed to maintain appropriate management levels and rangeland health.

3.13.3. References

BLM (United States Department of the Interior, Bureau of Land Management). 1981. BLM-Little Snake Field Office, Piceance-East Douglas HMA Herd Management Plan. June 1981.

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3.14. Special Designations

Special designations on BLM-administered and National Forest System lands identify locations of unique value that require special management attention. Designations such as ACECs are specific to the BLM. Others, including Wilderness Areas, WSAs, Wild and Scenic Rivers, National Scenic and Historic Trails, Scenic Byways, and Watchable Wildlife Areas, are common designations used by both the BLM and USFS. Special designation areas are found throughout the planning area and have the potential to influence BLM and USFS management decisions relative to GRSG on those lands.

Areas of Critical Environmental Concern

The BLM uses the ACEC designation to highlight areas where special management attention is necessary to protect and prevent irreparable damage to important historic, cultural, and scenic values; fish or wildlife resources; or other natural systems or processes [43 CFR 1610.7-2(b)]. The ACEC designation may also be used to protect human life and safety from natural hazards.

Wilderness, Wilderness Study Areas, and Inventoried Roadless Areas

The Wilderness Act of 1964 (Public Law 88-577) established the National Wilderness Preservation System. Wilderness areas are natural environments that have not been significantly modified by human activity; provide opportunities for solitude and/or primitive and unconfined recreational experiences; and are important for maintenance of species diversity, protection of threatened and endangered species, protection of watersheds, scientific research, and various social values. Wilderness areas are protected from development, timber cutting, and the operation of motorized vehicles and equipment.

On BLM-administered land, the FLPMA directs the BLM to inventory, study, and recommend which lands under its administration should be designated as wilderness. The result is an inventory of WSAs. A WSA is a roadless area greater than 5,000 acres designated by the BLM as having wilderness characteristics, thus making it worthy of consideration by Congress for designation as a National Wilderness Area. During the time Congress considers whether to designate a WSA as permanent wilderness, the BLM is required to manage the WSA in a manner designed to prevent the impairment of the area's suitability for wilderness designation. The BLM's authority to conduct wilderness reviews, including the establishment of new WSAs, expired on October 21, 1993, pursuant to Section 603 of the FLPMA.

Inventoried Roadless Areas are undeveloped areas of National Forest System land typically exceeding 5,000 acres that meet the minimum criteria for wilderness consideration under the Wilderness Act. Inventoried Roadless Areas may contain improvements such as motorized trails, fences, outfitter camps, and evidence of historical logging activities. As required by 36 CFR 219.17, Inventoried Roadless Areas are identified during Forest Plan development or revision and are qualified for study if they are 5,000 acres in size or larger or, if less than 5,000 acres, contiguous to an existing Wilderness Area and contain no classified roads, which are roads intended for long-term highway vehicle use.

Wild and Scenic Rivers

In order to accomplish the goal of protecting wild and scenic waterways, Congress established the National Wild and Scenic Rivers System (National System) through the Wild and Scenic Rivers Act of 1968.). To qualify for nomination to the National System, a waterway, waterway segment, or tributary must be in a free-flowing condition and must be deemed to have one or more outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values.

The Wild and Scenic Rivers Act directs all federal agencies to give consideration to potential national wild, scenic, and recreational river areas in all planning for use and development of water and related land resources and that each waterway in the National System be administered in a manner that protects and enhances its outstandingly remarkable value. The existing uses of a waterway are allowed to continue, and future uses may be considered so long as existing or proposed uses do not conflict with the goal of protecting waterway values.

National Scenic and Historic Trails

The National Trails System Act of 1968 (Public Law 90-543, as amended) authorized the creation of a National Trail System composed of National Scenic Trails, National Historic Trails, and National Recreation Trails. Only Congress can designate National Scenic Trails and National Historic Trails. National Recreation Trails are designated by the Secretary of the Interior or the Secretary of Agriculture.

Scenic Byways

Scenic Byways include All-American Roads, National Scenic Byways, Colorado State Scenic and Historic Byways, and BLM-designated Backcountry Byways. The program seeks to recognize, preserve, and enhance selected roads throughout the US.

Watchable Wildlife Areas

The federal Watchable Wildlife Program is a cooperative nationwide effort among 13 organizations, including the BLM and USFS, designed to foster the conservation of wildlife and wildlife habitats. There are 201 Watchable Wildlife Areas in the State of Colorado, and approximately 60 are found within the planning area.

Special Interest Areas

The USFS uses the special interest area designation to identify areas of National Forest System land with unusual characteristics, such as scenic, historical, geological, botanical, zoological, or paleontological characteristics. Management emphasis is on protecting or enhancing, and where appropriate, developing and interpreting for public education and recreation. Many uses are allowed in special interest areas, including recreation, livestock grazing, mineral leasing, and road construction, as long as the uses do not degrade the characteristics for which the areas are designated. The California Park Special Interest Area, which includes Slater park, was designated in large part due to the zoological values of the area, specifically including GRSG and Columbian Sharp-Tailed Grouse. A management plan for the California Park Special Interest Area was prepared in 2003 and it includes management goals for GRSG within the Special Interest Area (USFS 2003).

Research Natural Areas

Research Natural Areas provide a spectrum of relatively undisturbed areas representing a wide range of natural variability within important natural ecosystems and environments. Research Natural Areas can also be areas with special or unique characteristics or scientific importance. Research Natural Areas are also selected to:

- Serve as reference areas for evaluating the range of natural variability and the impacts of management in similar environments
- Maintain representative and key elements of biological diversity at the genetic, species, population, community, and landscape levels
- Serve as areas for the study of ecosystems and ecological processes including succession
- Provide on-site and extension educational activities
- Serve as baseline areas for measuring ecological change

3.14.1. Existing Conditions

Conditions of the Planning Area

GRSG habitat is widely distributed throughout the planning area. The highest concentrations of PPH and PGH are found in the Wyoming Basin Management Zone, with particularly large and contiguous habitat areas in Moffat, Jackson, and Grand counties. Habitat areas in the remainder of the field offices and National Forest are generally smaller and less contiguous. See **Table 3.61**, Special Designations in ADH, and **Figure 3-11**, Special Designations (**Appendix B**, Figures).

Table 3.61. Special Designations in ADH

Designation	Agency	Total	Area within ADH
ACECs	BLM	16	33,200 acres
WSAs	BLM	12	13,600 acres
Wild and scenic river segments (eligible and suitable segments only)	BLM/USFS	27	52 miles
Special Interest Areas	USFS	2	24,200 acres
Inventoried Roadless Areas	USFS	4	62,400 acres
National Scenic and Historic Trails	BLM/USFS	1	1.7 miles
Watchable Wildlife Areas	BLM/USFS	0	0
Source: BLM 2013			

Conditions on BLM-Administered Lands

ACECs

There are 16 ACECs on BLM-administered lands in the planning area (the USFS equivalent designation of an ACEC is a Zoological Area). Each BLM ACEC is designated for the purpose of protecting unique values in that area. **Table 3.62**, ACECs within GRSG Habitat on BLM-Administered Lands, summarizes the size and values unique to each ACEC.

Table 3.62. ACECs within GRSG Habitat on BLM-Administered Lands

ACEC	BLM Field Office	Total Acres	Acres within PPH	Acres within ADH	Relevant and Important Values
Anvil Points	CRVFO	5,000	0	200	Scenic, botanical, wildlife values, and natural processes
Blacks Gulch	WRFO	800	0	50	Paleontology
Blue Hill	CRVFO	3,700	300	900	Cultural resources, erosive soils
Bull Gulch	CRVFO	10,400	0	200	Scenic qualities and botanical values
Deer Gulch	WRFO	1,800	0	1,700	Sensitive plants and remnant vegetation associations

ACEC	BLM Field Office	Total Acres	Acres within PPH	Acres within ADH	Relevant and Important Values
East Douglas Creek	WRFO	47,600	800	1,900	Important biologically diverse plant communities, riparian habitats, and Colorado River cutthroat trout habitat
East Fork Parachute Creek	CRVFO	6,600	0	5,000	Scenic qualities, fish and botanical resources, and natural processes
Irish Canyon	LSFO	5,700	2,800	6,500	Endangered plant species, cultural resources, scenic qualities
Kremmling Cretaceous Ammonite ACEC/ Research Natural Area	KFO	200	200	200	Significant marine invertebrate fossils
Moosehead Mountain	WRFO	8,900	6,200	8,600	Important biologically diverse plant communities, riparian habitats, and cultural resources
North Park Natural Area ACEC/Research Natural Area	KFO	300	300	300	Endangered plant species
Raven Ridge [1]	WRFO	5,000	0	300	Threatened, endangered, and sensitive plants, remnant vegetation associations, fragile soils, and paleontology
South Cathedral Bluffs [1]	WRFO	1,300	300	300	Sensitive plants and remnant vegetation associations
Trapper/Northwater Creek [2]	CRVFO/ WRFO	4,800	0	4,600	Fish resources and natural processes
White River Riparian	WRFO	1,000	0	100	Important biologically diverse communities and critical habitat
Yanks Gulch/Upper Greasewood Creek	WRFO	2,700	0	2,500	Threatened, endangered, and sensitive plants, and remnant vegetation associations
Total		**105,800**	**10,900**	**33,350**	

Source: BLM 2013

[1] Includes additions designated in the 1997 White River ROD and Approved RMP.

[2] Approximately 1,066 acres of ADH within the Trapper/Northwater Creek ACEC are managed by the WRFO. The remaining 3,526 acres of ADH are managed by the CRVFO.

Anvil Points ACEC

This ACEC was designated in the 2007 Roan Plateau ROD/RMP for its scenic, geologic, wildlife, and botanical values (BLM 2007a). The qualities and character of the area's scenic viewshed are both locally and regionally important. Wildlife and botanical values within the ACEC include crucial habitat for peregrine falcons, golden eagles, and Townsend's big-eared bat, as well as two Candidate and two BLM sensitive plant species that are globally and regionally rare.

Blacks Gulch ACEC

This ACEC was designated in the 1997 White River ROD/RMP (BLM 1997) for paleontological values and is coincident with Colorado's Black's Gulch Natural Area. It is within the Wasatch Formation, which is characterized as a Potential Fossil Yield Class 5, meaning that it is a highly fossiliferous geologic unit that consistently and predictably produces either vertebrate or scientifically significant invertebrate or plant fossils. The area is the best fossil vertebrate locality of Lysite age (middle early Eocene) in Colorado and has produced hundreds of good specimens.

Blue Hill ACEC

This ACEC was designated in the Glenwood Springs 1984 ROD/RMP (BLM 1984). This ACEC is a sensitive area for cultural and Native American resources with the potential to yield information important to the understanding of prehistory and history. The area is also classified as a critical watershed because of the severe erosion hazard of the area's soils and the negative impact they could have on cultural resources and water quality.

Bull Gulch ACEC

This ACEC was designated in the Glenwood Springs 1984 ROD/RMP for its scenic qualities due to its unique and diverse topography, unique geological forms, and sharp contrasting colors (BLM 1984). This ACEC also supports several sub-occurrences of Harrington's penstemon (*Penstemon harringtonii*), a BLM sensitive plant.

Deer Gulch ACEC

This ACEC was designated in the 1997 White River ROD/RMP to protect the area's sensitive plants and remnant vegetation associations (BLM 1997).

East Douglas Creek ACEC

This ACEC was designated in the 1997 White River ROD/RMP (BLM 1997) to protect important biologically diverse plant communities, riparian habitat, and Colorado River cutthroat trout habitat. Colorado River cutthroat trout, a BLM Sensitive species, occupy several streams within the East Douglas Creek ACEC, including East Douglas Creek, Bear Park Creek, Cathedral Creek, Lake Creek, and Solider Creek. These creeks are all small headwater streams but do persist in supporting self-sustaining populations of trout.

East Fork Parachute Creek ACEC

This ACEC was designated in the 2007 Roan Plateau ROD/RMP for its scenic qualities, fish and botanical resources, and natural processes (BLM 2007a). The area contains a scenic 200-foot-high waterfall and box canyon, Colorado River cutthroat trout habitat, a BLM sensitive plant species, a Green River Shale endemic plant, and four significant plant communities (BLM 2008).

Irish Canyon ACEC

This ACEC was designated as a Natural Area by the Colorado Natural Areas Program in 1990. The canyon supports populations of several plant species of special concern: Yampa beardtongue, ligulate feverfew, tufted cryptanth, and woodside buckwheat. The presence of mountain clover in Irish Canyon is the only such occurrence in the LSFO. High-quality examples of northwestern Colorado plant communities are found on the floor and canyon walls, and Irish Lakes represent one of the few natural playa lakes in Colorado. Rock art and other archaeological sites are also found in the canyon (BLM 2010).

Kremmling Cretaceous Ammonite ACEC/Research Natural Area

This ACEC is managed for research and preservation of fossil resources. The area contains a rich fossil assemblage of giant ammonites and other extinct species of marine fauna. In addition to the geologic importance of the Kremmling Cretaceous Ammonite ACEC/Research Natural Area, the area contains substantial habitat for GRSG (BLM 2007b).

Moosehead Mountain ACEC

This ACEC was designated in the 1997 White River ROD/RMP (BLM 1997) to protect biologically diverse plant communities, riparian habitats, and cultural resources. To prevent damage to watershed resources and wildlife habitat, 77 percent of the Moosehead Mountain ACEC is closed to motorized vehicle use.

North Park Natural Area ACEC/Research Natural Area

This ACEC was designated in order to protect North Park phacelia (*Phacelia formosula*), a federally endangered plant. The population is critically imperiled globally and within the State of Colorado due to its rarity (CNHP 2007).

Raven Ridge ACEC

This ACEC was designated in 1985 through the Raven Ridge Amendment to the White River Management Framework Plan (BLM 1985) and was expanded in the 1997 White River ROD/RMP (BLM 1997). It is coincident with Colorado's Raven Ridge Natural Area. The Raven Ridge ACEC was designated to protect special status plants, remnant vegetation associations, fragile soils, and paleontological resources. The area is located near the boundary between the Piceance and Uinta Basins. Raven Ridge effectively links the endemic floras of these two physiographic basins, resulting in a rich collection of rare endemic plants. The White River beardtongue is a currently a candidate for listing under the ESA and Graham's beardtongue is proposed for listing. BLM Sensitive species include the Debris milkvetch, Rollins' cryptantha, and Ephedra buckwheat. Portions of the ACEC are within the interface between the Wasatch and Green River Formations, which is classified as a Potential Fossil Yield Class 5. About 15 to 20 vertebrate fossil localities, primarily early primate specimens, have been documented within the Raven Ridge ACEC.

South Cathedral Bluffs ACEC

This ACEC was designated in 1987 through the Piceance Basin RMP (BLM 1987) and was expanded in the 1997 White River ROD/RMP (BLM 1997). It is also coincident with Colorado's South Cathedral Bluffs Natural Area. The area was designated for sensitive plant species, including the Cathedral Bluff dwarf gentian, the Piceance bladderpod, and the Cathedral Bluff meadow-rue. In addition, the area is the type locality for both the Cathedral Bluff meadow-rue

and the Piceance bladderpod. A type locality is the location where a species was first discovered and is scientifically important because it is used as a reference site.

Trapper/Northwater Creek ACEC

This ACEC was designated in 2008 through the Roan Plateau RMPA (BLM 2007a) and is managed by both the WRFO and the CRVFO. Both Trapper Creek and Northwater Creek contain genetically pure populations of naturally reproducing Colorado River cutthroat trout. The ACEC also contains a Colorado endemic plant, the hanging garden sullivantia. Rare plant communities, including the Indian ricegrass shale barrens community and the mountain big sagebrush/Thurber fescue community, are also found within the area.

White River Riparian ACEC

This ACEC was designated in the 1997 White River ROD/RMP (BLM 1997) and consists of numerous small parcels managed by the BLM within the 100-year floodplain of the White River. These areas contain important biologically diverse communities associated with riparian habitats and provide nesting and roost habitat for bald eagles, a BLM Sensitive species. The White River Riparian ACEC also contains designated critical habitat for the endangered Colorado pikeminnow below the Taylor Draw Dam.

Yanks Gulch/Upper Greasewood Creek ACEC

This ACEC consists of three distinct parcels that were designated in 1987 through the Piceance Basin RMP (BLM 1987) and carried forward in the 1997 White River ROD/RMP (BLM 1997). The Yanks Gulch/Upper Greasewood Creek ACEC is coincident with Colorado's Yanks Gulch Natural Area. The area was designated as an ACEC to protect special status plants, including occupied habitat for federally threatened Dudley Bluffs bladderpod and Dudley Bluffs twinpod. The area also contains four high quality examples of remnant plant communities representative of pre-settlement vegetation in the Piceance Basin. Two of these remnant plant communities are known to grow only on the Green River Formation.

Wilderness and Wilderness Study Areas

There are 12 WSAs on BLM-administered lands within GRSG habitat in the planning area. These WSAs comprise 13,600 acres of habitat, of which 4,800 acres fall within PPH. Until Congress considers whether to designate a WSA as permanent wilderness, the BLM is required to manage the WSA in a manner designed to prevent the impairment of the area's suitability for wilderness designation. See **Table 3.63**, WSAs within GRSG Habitat on BLM-administered Lands.

Wild and Scenic Rivers

There are no designated wild and scenic rivers in the planning area. There are, however, 24 river segments on 12 different rivers or creeks on BLM-administered lands in GRSG habitat that have been determined to be eligible for inclusion in the National Wild and Scenic Rivers System, based on an initial evaluation. These eligible segments account for 32.6 miles on BLM lands within the planning area. There are 3 additional segments on the Yampa River that have been found suitable for inclusion in the National Wild and Scenic Rivers System, accounting for 19.1 miles on BLM-administered land within GRSG habitat in the planning area. See **Table 3.64**, Eligible and Suitable Stream Segments within GRSG Habitat on BLM-Administered Lands.

A final suitability determination of Wild and Scenic Rivers occurs through the RMP/EIS process. One BLM field office within the planning area, the LSFO, has completed suitability determinations. The other four BLM field offices within the planning area have yet to complete suitability determinations, but have identified eligible segments within their field offices. Rivers identified as suitable will then be managed to protect identified outstandingly remarkable values until Congress either approves or rejects the recommendation for their inclusion in the National Wild and Scenic River System. Only Congress can designate a Wild and Scenic River. Decisions in the RMP simply identify segments that are suitable for inclusion in the system, and provides for management to preserve the values that made them eligible or suitable.

Table 3.63. WSAs within GRSG Habitat on BLM-administered Lands

Name	BLM Field Office	Vegetation	Acres within PPH	Acres within ADH
Bull Canyon WSA	WRFO	Pinyon-juniper, sagebrush, riparian vegetation	1,100	1,200
Bull Gulch WSA	CRVFO	Pinyon-juniper, aspen, Douglas fir, blue spruce, ponderosa pine	0	1,500
Castle Peak WSA	CRVFO	Grasslands, sagebrush, aspen, spruce-fir forest	200	1,100
Cross Mountain WSA	LSFO	Pinyon-juniper, sagebrush	700	800
Diamond Breaks WSA	LSFO	Pinyon-juniper, sagebrush	900	1,800
North Sand Hills Instant Study Area [1]	KFO	Sagebrush, aspen	50	50
Peterson Draw WSA	LSFO	Pinyon-juniper, ponderosa pine, sagebrush, native grass communities	0	200
Platte River Contiguous WSA	KFO	Pinyon-juniper, Douglas fir, sagebrush	10	10
Vale of Tears WSA	LSFO	Pinyon-juniper, ponderosa pine, sagebrush, native grass communities	0	600
West Cold Spring WSA	LSFO	Pinyon-juniper, sagebrush, grasses, Douglas fir, limber pine, riparian vegetation	1,500	3,600
Willow Creek WSA	WRFO	Douglas fir, riparian vegetation, pinyon-juniper, sagebrush, saltbush, greasewood, grasses	400	1,900
Windy Gulch WSA	WRFO	Douglas fir, pinyon-juniper, sagebrush	0	800
Total			**4,860**	**13,560**

[1] The FLPMA directed the BLM to identify and study for wilderness characteristics. Section 603 of the FLPMA included those areas that were formally identified as natural or primitive areas prior to November 1, 1975, which then were also identified as "Instant Study Areas." These areas are sometimes referred to as "603 WSAs" (Manual 6330 – Management of Wilderness Study Areas [BLM 2012d]).

Table 3.64. Eligible and Suitable Stream Segments within GRSG Habitat on BLM-Administered Lands

River or Creek	BLM Field Office	Number of Stream Segments	Eligible or Suitable	Length on BLM within PPH or PGH (total miles of all segments)	Preliminary Classification	Outstandingly Remarkable Values
Blue River [1]	KFO	3	Eligible	1.14	Recreational	Wildlife, Recreational, Biodiversity
Colorado River, Segment 6	CRVFO	1	Eligible	2.76	Recreational	Scenic, Recreational, Wildlife, Botanical
Colorado River	KFO	4	Eligible	3.83	Recreational	Recreational, Scenic, Geologic, Wildlife, Historic
East Fork Parachute Creek	CRVFO	2	Eligible	4.49	Wild	Scenic, Fish, Scenic, Botanic
East Middle Fork Parachute Creek	CRVFO	1	Eligible	0.42	Wild	Fish, Botanic
Egeria Creek	CRVFO	1	Eligible	0.36	Recreational	Historic
First Anvil Creek	CRVFO	2	Eligible	0.39	Wild	Scenic, Fish, Botanic
Golden Castle Creek	CRVFO	1	Eligible	1.05	Wild	Fish, Botanic
JQS Gulch	CRVFO	1	Eligible	1.14	Scenic	Fish, Botanic
Muddy Creek	KFO	1	Eligible	3.43	Recreational	Wildlife
Northwater Creek	CRVFO	1	Eligible	2.80	Wild	Fish, Botanic
Second Anvil Creek	CRVFO	2	Eligible	1.77	Wild	Recreational, Botanic
Sulphur Gulch	KFO	1	Eligible	3.04	Recreational	Paleontologic
Trapper Creek	CRVFO	3	Eligible	5.98	Wild	Recreational, Scenic, Fish
Yampa River Segment 1	LSFO	1	Suitable	1.9	Recreational	Fish population, Recreation
Yampa River Segment 2	LSFO	1	Suitable	13.9	Scenic	Fish population, Recreation
Yampa River Segment 3	LSFO	1	Suitable	3.3	Wild	Fish population, Recreation, Geologic, Scenic
Total		**27**		**51.7**		

Source: BLM 2013

[1] One (1) additional segment along the Blue River was originally identified as eligible (Blue River Segment 1). A re-examination of the land ownership and management status revealed that Segment 1 of the Blue River is on National Forest System land rather than on BLM-administered lands. As a result, this segment has been dropped from consideration by the BLM, and is not studied for suitability in this report.

National Scenic Byways

Portions of three scenic byways, the Colorado River Headwaters National Scenic Byway, the Dinosaur Diamond Prehistoric Highway, and the Cache La Poudre-North National Scenic Byway, traverse GRSG habitat in the planning area.

The 69-mile Colorado River Headwaters National Scenic Byway bisects the planning area, following the Colorado River from Grand Lake west to State Bridge.

The 101-mile-long Cache la Poudre-North Park National Scenic Byway begins east of Walden on Colorado Highway 14 and extends east to downtown Fort Collins. The byway was once a transit corridor for Native Americans and early Euro-American explorers (US Department of Transportation 2013). The 480-mile Dinosaur Diamond Prehistoric Highway traverses the planning area near the community of Rangely, Colorado.

Watchable Wildlife Areas

There are no formal Watchable Wildlife Areas on BLM-administered lands in the planning area. The Hebron Waterfowl Management Area in the KFO is promoted as a Watchable Wildlife Area; however, no formal management plan exists.

Conditions on National Forest System Lands

Routt National Forest

Special Interest Areas

Special Interest Areas on the Routt National Forest are managed to protect or enhance their unique characteristics, to maintain their special interest values, and to provide interpretative opportunities, where appropriate. While there are seven special interest areas scattered across the National Forest, only two of them contain PGH or PPH (**Table 3.65**, Special Interest Areas within GRSG Habitat on National Forest System Lands).

Table 3.65. Special Interest Areas within GRSG Habitat on National Forest System Lands

Name	Total Acreage	Acreage within PGH	Acreage within PPH
California Park	23,000	6,700	0
Camp Creek	1,200	0	10
Total	**24,200**	**6,700**	**10**
Source: USFS 2013			

California Park (Colorado MZ 7). This special interest area is a large, high-mountain park located in the northwest portion of the National Forest, about 20 miles north of Hayden, Colorado. The area was designated as a special interest area because of its geological, zoological, historical, paleontological, and scenic values. Many species exist in the area, such as greater sandhill crane, sharp-tailed grouse, and boreal toads. The area also contains unique features such as sulphur springs, fossils, and buffalo skulls. Roughly 29 percent of this special interest area is located in PGH.

Camp Creek (Colorado MZ 11). This special interest area is located in the northeast portion of the Forest, roughly 15 miles north of Walden, Colorado. This area was designated as a special interest area because of its geological, botanical, zoological, and historical values. The area supports a

highly diverse ecosystem, including old growth Douglas fir, limber pine, and ponderosa pine. Willow and aspen communities also exist, which support a wide variety of Neotropical migratory songbirds as well as moose. Approximately 1 percent of the western edge of the special interest area is located in PPH.

Research Natural Areas

Research Natural Areas on the National Forest are selected to provide a spectrum of relatively undisturbed areas representing a wide range of natural variability within important natural ecosystems and environments and areas with special or unique characteristics of scientific importance. There are three Research Natural Areas scattered across the National Forest; however, none of them contain PPH or PGH.

Inventoried Roadless Areas

Inventoried Roadless Areas on the Routt National Forest were identified as having special values for semi-primitive recreation opportunities and biological diversity. There are 32 Inventoried Roadless Areas on the National Forest that collectively comprise roughly 502,200 acres (37 percent) of the land base. Of the 32 Inventoried Roadless Areas, four contain PGH (**Table 3.66**, Inventoried Roadless Areas within GRSG Habitat on National Forest System Lands).

Table 3.66. Inventoried Roadless Areas within GRSG Habitat on National Forest System Lands

Name	Total Acreage	Acreage within PGH	Acreage within PPH
Nipple Peak South	13,800	400	0
Shield Mountain	10,200	800	0
Sugarloaf North	15,100	1,000	0
Sugarloaf South	23,300	700	0
Total	**62,400**	**2,900**	**0**
Source: USFS 2013			

Nipple Peak South (Colorado MZ 7). This Inventoried Roadless Area is located in Routt County northwest of Steamboat Springs on the Hahns Peak Ranger District. Cover types within the area include spruce-fir (19 percent), lodgepole pine (17 percent), aspen (50 percent), shrubs (less than 1 percent), grass/forb (9 percent), non-vegetated (3 percent), and water/wetland (2 percent). The area is used primarily for dispersed recreation (primarily big game hunting with some snowmobile use in the winter) and seasonal livestock grazing. The entire area has medium potential for oil and gas; however, no current leases exist. The entire area has low potential for locatable minerals, and no salable mineral sites exist. Approximately 400 acres (2.6 percent) of the Inventoried Roadless Area are located within PGH.

Shield Mountain (Colorado MZ 7). This Inventoried Roadless Area is located is located in Routt County north of Steamboat Springs on the Hahns Peak Ranger District. The primary vegetation type is aspen, with some lodgepole pine and open parks at lower elevations. Higher elevations on northern aspects are stocked with over-mature spruce and lodgepole pine. The predominant use of the area is livestock grazing, with roughly 13,800 sheep grazing for 26,504 sheep months and 82 cows grazing for 219 cow months on a seasonal basis. Recreation use is low in the summer, while use in the fall hunting season is high due to the abundance of big game. There is little to no winter use due to the difficulty of access. Approximately 800 acres (7.6 percent) of the Inventoried Roadless Area are located within PGH.

Sugarloaf North (Colorado MZ 7). This Inventoried Roadless Area is located in Routt County northeast of Craig, Colorado, on the Hahns Peak Ranger District. The primary vegetation type is spruce-fir with pockets of aspen and lodgepole pine intermixed, along with their associated understory vegetation. The area contains numerous grass/forb meadows, many of which are wet and are associated with streams or ponds. The eastern portion of the area is used for nesting and rearing grounds by sandhill cranes, a state-listed endangered species. A seasonal road closure is in effect on Forest Development Road 150 to protect the cranes during the critical nesting and rearing periods. Recreational use of the area is generally low, except during the big game hunting season when it is high. Livestock grazing occurs on a seasonal basis. The majority of the area has high potential for oil and gas; however, no leases exist. Although the entire area has low potential for locatable minerals, the area contains three salable mineral sites. Approximately 1,000 acres (6.8 percent) of PGHare located in the Inventoried Roadless Area.

Sugarloaf South (Colorado MZ 7). This Inventoried Roadless Area is located in Moffat and Routt Counties northeast of Craig, Colorado, on the Hahns Peak Ranger District. The predominant vegetation type in the area is aspen with small pockets of spruce. Open parks of sagebrush and rabbit brush are also characteristic of the area. The area is used primarily by sheep herders and fall hunters seeking a remote hunting experience. Approximately 700 acres (3 percent) of the Inventoried Roadless Area are located in PGH.

Wilderness Areas

Wilderness Areas on the Routt National Forest are managed to protect natural conditions and to offer varying degrees of solitude where natural processes and conditions have not been significantly influenced by human use. The Routt National Forest manages seven Wilderness Areas, or portions thereof, for a total of 265,100 acres of wilderness. None of these areas contain PGH or PPH.

Wild and Scenic Rivers

There is no PGH or PPH within any Wild and Scenic River segments on the Routt National Forest.

National Scenic and Historic Trails

A short portion (1.7 miles) of the Continental Divide National Scenic Trail crosses GRSG habitat in the planning area. The vast majority of this portion of the National Scenic Trail occurs on private lands, with a short segment on National Forest System lands. This National Scenic Trail is officially administered by the Secretary of Agriculture in consultation with the Secretary of the Interior (*Federal Register* 150, August 5, 1981, page 39867).

Portions of the Continental Divide National Scenic Trail cross the planning area. The trail traverses the KFO from west to east, roughly following the southern Jackson County boundary. At US Route 34, it turns south along the eastern edge of the planning area. The trail is primarily on National Forest System lands, with very little crossing BLM-administered lands. A multi-agency effort is underway to complete the Muddy Pass section of the trail between Rabbit Ears Pass and Indian Creek. The potential routes may incorporate BLM-administered lands. Currently, trail users hike along Jackson County Road 53 near Indian Creek, which bisects public lands, in order to access the next designated portion of the trail. The trail is officially administered by the Secretary of Agriculture in consultation with the Secretary of the Interior (*Federal Register* 150, August 5, 1981, page 39867).

3.14.2. Trends

Trends on BLM-Administered Lands

Areas of Critical Environmental Concern and Wilderness Study Areas

Over the past 25 years, an increasing human population in the region and the associated increases in land use and development have increased impacts on natural systems, recreation opportunities, and cultural resources throughout the region, including the areas of mapped GRSG habitat. The primary impacts in the planning area have resulted from energy development activities, residential development, and recreation activities. A growing awareness of these impacts has led to more focused efforts to protect and manage diminishing resources. Special designations have become a primary tool for this focused management. ACEC inventories and designations are being actively pursued by the BLM field offices to identify and protect natural, recreational, and cultural resources in the area.

Oil and gas development is expected to challenge the characteristics for which many ACECs in the planning area were established. Lease stipulations on activities authorized prior to the establishment of the special designation areas may allow surface-disturbing activities. These activities will conflict with the unique resources for which the areas were designated. The popularity of recreational OHV use due to the uniqueness of landscapes in the planning area is expected to continue to draw OHV users.

Should any WSAs be released from wilderness consideration by Congress, subsequent planning documents would prescribe how these lands would be managed.

Wild and Scenic Rivers

River-related recreation is increasing in parts of the planning area, including along the Colorado River. River-based recreation relies on certain flow rates to support the activity. For example, fishing requires a certain flow rate to support the fisheries, and whitewater boating relies on certain flow rates to create a whitewater experience. Flow rates that are necessary to support river-related recreation may become at risk as demand for additional water diversions occurs at upstream locations to satisfy growing populations on the Western and Eastern Slopes. It is generally difficult, however, for the BLM to ensure the protection of outstandingly remarkable values in fragmented stream segments.

National Scenic and Historic Trails and Scenic Byways

Driving for pleasure is expected to increase along the Colorado Headwaters National Scenic Byway. The BLM is collaborating with the Colorado Headwaters National Scenic Byway Committee to educate the public about, advertise, and develop an interpretive plan for the byway (BLM 2007c).

Trends on National Forest System Lands

Routt National Forest

The overall acreage of the special designation areas on the National Forest has remained stable over the last decade. This is partially due to limited motorized access, as well as existing management restrictions that are in place either locally (via Forest Plan direction) or nationally. In

2012 there was a slight increase (approximately 100 acres) in the amount of PGH in the California Park Special Interest Area as a result of a land donation to the USFS.

3.14.3. References

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3.15. Water Resources

Water on public lands is regulated by the Clean Water Act, Safe Drinking Water Act, Public Land Health Standards, the Watershed Conservation Practices Handbook and other laws, regulations, and policy guidance at the federal, state, and local levels. The Clean Water Act (33 USC 1251 etc.) requires maintenance and restoration of the physical, biological, and chemical integrity of waters of the US. Sections 208 and 319 of the Clean Water Act recognize the need for control strategies for nonpoint source pollution. Soil and water conservation practices and best management practices are recognized as the primary control mechanisms for nonpoint source pollution on

BLM-administered and National Forest System lands. The US EPA supports this perspective in their guidance, "Nonpoint Source Controls and Water Quality Standards" (August 19, 1987).

Water resources include surface and ground water sources, including streams, water bodies, riparian areas, and wetlands. Factors such as the amount of precipitation and run-off, water storage and withdrawals, pollution from outfalls, soil erosion, and overall conditions of the uplands and riparian areas affect surface water resources. Recharge, withdrawal, and infiltration of contaminants affect groundwater resources. The BLM and USFS management decisions regarding energy development, lands and realty actions, grazing, recreation, and forestry can result in potential impacts on water resources.

3.15.1. Existing Conditions

Conditions of the Planning Area

The planning area is split into several hydrological units. **Table 3.67**, Hydrologic Basins in the Planning Area, displays the level three hydrological units, or basins, within the planning area and within GRSG habitat. The largest tracts of land within PPH in the planning area fall within the White-Yampa basin, followed by the Colorado Headwaters, North Platte, and Upper Green basins.

Table 3.67. Hydrologic Basins in the Planning Area

Level 3 Basin	Acres within the Planning Area	Acres within PPH	Acres within ADH
North Platte	1,310,400	384,200	449,700
White- Yampa	6,180,400	1,432,100	2,741,200
Upper Green	506,400	129,900	367,300
South Platte	178,100	0	0
Lower Green	49,000	10,100	14,600
Colorado Headwaters	6,213,100	410,100	575,700
Upper Arkansas	1,700	0	0
Gunnison	384,900	0	0
Upper Colorado – Dolores	501,000	0	0

Freshwater is scarce and therefore extremely valuable in semi-arid western Colorado. Surface water is the primary source of fresh water in the planning area. The major sources of surface water in the planning area are the Colorado River and its tributaries, the North Platte River, Laramie River, Yampa River, Little Snake River, Green River, and White River. About 862 miles of rivers exist in the planning area, of which 177 miles fall within GRSG habitat. The rivers within GRSG habitat in the planning area are the White, Colorado, North Platte, Yampa, and Green Rivers, as well as a small portion of Plateau Creek. **Table 3.68**, Rivers in GRSG Habitat within the Planning Area, displays the rivers within the planning area for which some portion falls within GRSG habitat.

Table 3.68. Rivers in GRSG Habitat within the Planning Area

River Name	Miles within Planning Area	Miles within PPH	Miles within ADH
White River	94	0	31
Colorado River	259	22	33
Plateau Creek	23	0	2
North Platte River	35	26	27

River Name	Miles within Planning Area	Miles within PPH	Miles within ADH
Yampa River	147	29	70
Green River	32	0	15

Smaller watercourses in the planning area include streams that can be ephemeral, intermittent, or perennial. About 8,705 miles of streams exist in designated GRSG habitat within the planning area.

Lakes, wetlands, ponds, and reservoirs are also important sources of water within the planning area. Lakes can be permanent or temporary. Wetlands and floodplains vary in extent and depth throughout the year. Permanent waters can also be in the form of ponds and reservoirs developed for human or livestock consumption.

Conditions on BLM-Administered Lands

Surface Water Sources

Due to the semi-arid nature of BLM-administered lands within the planning area, surface waters are extremely valuable. There are 3,169 miles of streams and 31 miles of rivers in GRSG habitat on BLM-administered lands within the planning area. Of these miles, 1,613 miles of stream and 13 miles of rivers fall within PPH. Surface water flow volumes differ greatly throughout the year and across the planning area. Flows in unregulated rivers and streams have large seasonal variations, with the largest flows generally occurring during spring or early summer as a result of snowmelt and after intense summer and fall thunderstorms. Snowmelt in spring and summer rainstorms provide the major source of runoff for perennial streams, with groundwater inflow along gaining stream segments being a contributor during the remainder of the year. Interrupted and intermittent streams in the planning area are common. Some streams have significant flows in the alluvial aquifer with only limited surface expression. Although these watersheds are large with high water yields, surface expression of the creeks is limited to high stormwater runoff or to areas where permeability of the alluvium is reduced and water is forced to the surface. Perennial streams contain some water all year for an average water year. Most of the streams on BLM-administered land in the decision area are intermittent and flow from March to July. However, streams can still contain water during other months due to stored water being fed to the streams from shallow groundwater sources or floodplains.

Ephemeral streams do not flow during an average water year, but do flow in response to large precipitation events. Large ephemeral stream segments in the planning area generally have their headwaters at lower elevations (i.e., below 8,000 feet) and do not have gaining reaches from groundwater sources. Frequently these ephemeral drainages occur as steep and relatively straight channels that are actively incising across upper reaches. Many of these systems are tributaries to intermittent and perennial streams. Intermittent streams flow during spring runoff for an average water year but dry up later in the summer.

Riparian areas are ecosystems that exist along rivers, streams, or waterbodies. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Typical riparian areas are lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers, streams, and shores of lakes and reservoirs with stable water levels. Excluded are such sites as ephemeral streams or washes that do not exhibit vegetation dependent on free water in the soil. Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support and which, under normal

circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include marshes, swamps, lakeshores, sloughs, bogs, wet meadows, estuaries, and riparian areas. A description of current conditions in riparian and wetland areas within the planning area can be found in **Section 3.5**, Vegetation. Healthy surface water sources, such as ponds, lakes, and wetlands, provide habitat for insects and animals that are predators of mosquitos. Areas that both have standing water and do not support predators of mosquitos can be areas where mosquito populations increase.

Water developments can be important sources of surface water for wildlife. Water developments can function for multiple uses. They provide additional and alternative sources of water for wildlife and livestock and can decrease use of riparian areas. Within the planning area, most of the water developments are intended for livestock, followed by water developments intended for agriculture. However, wildlife will often take advantage of available water developments.

Surface water availability can be impacted on BLM-administered lands in the planning area by a number of factors occurring on or upstream of BLM lands. These include industrial uses such as oil and gas, agriculture, and large-scale diversions, as well as naturally occurring climactic variations.

Surface Water Quality

Water quality typically varies as a function of flow conditions and can be impacted by water uses (e.g., agriculture, oil and gas development, and surface disturbance), vegetation, groundwater interaction, and pollutants discharged into water bodies from point and non-point sources. The quality of runoff in ephemeral and intermittent stream channels is largely dependent upon the amount of salts, sediments, trace elements, and organic materials that accumulate in dry stream channels between flow periods. Periodic flushing of accumulated salts, trace elements, and sediments occurs during peak flow events, which often represent the only time that water quality samples can be collected. Factors that could govern the accumulation of salt, trace elements, and sediments include physical properties of the watershed (e.g., topography, geology, and climate), land use in the watershed, and seasonal fluctuations in temperature and precipitation.

Water quality classifications in the planning area are established by the Colorado Department of Public Health and Environment, Water Quality Control Division to maintain and improve the quality of Colorado's surface waters. These classifications are based on current conditions and the beneficial uses of each particular river or stream (e.g. agriculture, aquatic life, and recreation). Classifications result in basic numerical and site-specific narrative standards that define the chemical, biological, and physical qualities of waters needed. Aquatic life beneficial uses can be for warm or cold water and are based on the abundance of species present. Recreation beneficial use is protected based on human health and current and expected recreational uses of surface waters. Agriculture beneficial use is protective for irrigating crops and livestock watering. Domestic water supply beneficial uses are for any surface waters that are suitable or intended to become suitable for potable water supplies. Surface water quality standards are reviewed and revised every 2 years by the Colorado Department of Public Health and Environment, Water Quality Control Division, the most recent of which occurred in 2012. Since then, CDPHE has updated the list of surface water quality standards and stream segments that are impaired or in need of additional monitoring for waters within BLM-administered lands. This list is called the Section 303(d) List of Water-Quality-limited Segments Requiring Total Maximum Daily Loads or the Monitoring and Evaluation List.

There are 1,196 miles of segments on BLM-administered lands within the planning area on the Section 303(d) list, of which 51 miles fall within identified GRSG habitat, and 14 miles fall within PPH. For the segments within identified GRSG habitat, the most common impairments cited are for sediment, selenium, and iron (BLM 2010; BLM 2012).

Ground Water

The Safe Drinking Water Act presumes that aquifers are underground sources of drinking water, unless they are specifically exempted or if they have been shown to fall outside the definition of are underground source of drinking water. The geology of an area determines the occurrence, movement, and chemical characteristics of groundwater. Groundwater quality and chemistry depends on the lithology and mineral composition of the aquifer and any upgradient formations that the groundwater flowed through. Aquifer properties such as hydraulic conductivity and primary and secondary porosity also influence water quality based on the residence time of the groundwater in the subsurface. In the planning area, much of the surficial geology consists of consolidated sedimentary formations with water-bearing properties that are largely dependent on secondary porosity from faults, fractures, and joints. The mineral content of several of the sedimentary formations underlying the range-wide planning area includes relatively high amounts of soluble minerals and salts. These soluble zones include sodium bicarbonate (nahcolite) and sodium chloride (halite) deposited in lacustrine mudstones. Groundwater recharge primarily occurs at higher elevations where precipitation exceeds evapotranspiration. This excess precipitation remains at the surface as overland flow, or recharges groundwater systems.

Groundwater near the land surface is available for plants and can contribute to the alluvium of stream systems. Alluvial aquifers are present along the larger perennial, intermittent, and interrupted flow segments and are generally composed of coarse sand and gravel deposits alternating with layers of clay, silt, and sand (Van Liew and Gesink 1985). The alluvial aquifers also serves as either a recharge or discharge zone for underlying bedrock aquifers. Groundwater discharge occurs as a result of permeability changes at or near the ground surface (geologic contacts between formations or rock units) or from the surface expression of faults, fractures, or joints in underlying bedrock aquifers. These discharge areas are often manifested as groundwater springs or gaining stream segments.

Surface expression of groundwater occurs naturally through springs that originate from confined bedrock aquifers and unconfined alluvial aquifers. Springs from confined aquifers typically arise from relatively deep groundwater that follows fractures, old well bores, faults, or joints to the surface. Variations in permeability across alluvial aquifers in the Piceance Creek Basin could be responsible for the groundwater-dominated hydrographs of Piceance and Yellow Creeks. In the planning area, perched groundwater zones occur locally within the Uinta Formation and other formations. These perched groundwater zones manifest themselves as springs and seeps above the valley floors in outcrop areas (Weeks and Welder 1974; Cole et al. 1995).

Conditions on National Forest System Lands

Water, riparian, and wetland existing conditions vary by the different geographic areas that contain GRSG habitat. **Table 3.69**, Streams on National Forest System Lands, lists information for perennial and intermittent streams on National Forest System lands in the range-wide planning area, and **Table 3.70**, Freshwater Pond and Lacustrine on National Forest System Lands, lists information for ponds and lakes on National Forest System lands in the range-wide planning area.

Table 3.69. Streams on National Forest System Lands

Stream Name: Intermittent or Perennial	Miles		
	PGH	PPH	Total
Perennial Streams	25.2	0.4	25.6
Intermittent Stream	37.9	2.6	40.5
Ditches	4.4	0	4.4
Source: Data from GIS, from the National Hydrography Dataset, high resolution flow lines, with attribute adjustments to correct ditch/stream errors done by the Medicine Bow - Routt National Forests, 2013			

Table 3.70. Freshwater Ponds and Lacustrine on National Forest System Lands

Water Body Name	Acres		
	PGH	PPH	Total
Perennial Lake/Pond	7.2	4.0	11.2
Intermittent lake/pond	0.7	0	0.7
Reservoir	0	0	0
Swamp/Marsh	1.0	0	1.0
Source: Data from GIS, from the National Hydrography Dataset, high resolution waterbodies, 2013			

Streams on National Forest System lands typically peak in the spring in response to snowmelt, and slowly decline to base flow in late July or August. Summer thunderstorms can result in short-term increases in stream flow during the summer months. While perennial streams generally flow year-round, the intermittent streams frequently run dry following spring peak flows. Ditches in the analysis area typically divert water for irrigation. Ditches can significantly affect stream flows by diverting most or all of the water out of a perennial or intermittent stream. Occasionally ditches can augment stream flows by delivering water diverted out of one stream into another stream. Ditches used for irrigation typically start diverting in the spring, may stop diverting during haying operations, and then may begin diverting again in the fall depending on the agricultural practices of the water user.

Lakes and ponds on the USFS lands may reflect stock water developments, large beaver complexes, or naturally occurring lakes and ponds. Perennial lakes and ponds rarely go dry while intermittent lakes and ponds fill up in response to snowmelt and then typically go dry with the progression of summer. All of these features are used by wildlife and livestock for watering, and may provide some aquatic habitat.

Surface water quality standards are reviewed and revised every 2 years by the Colorado Department of Public Health and Environment, Water Quality Control Division, the most recent of which occurred in 2012. The list of water quality standards and stream segments was updated in 2012. No impaired streams are present on National Forest System lands within GRSG habitat.

The fact that no streams are listed as impaired by the State of Colorado in GRSG habitat indicates that all streams and water bodies are currently meeting State Water Quality Standards, and that there are no known water quality impacts.

Each general geographic location of National Forest System lands is discussed in further detail below.

California Park and Slater Park Area. Water resources in the analysis area reflect 1) natural geologic processes of the area (soils and geology), 2) the effects of beaver, and 3) past and present

management impacts. Bedrock geology consists primarily of volcanic dikes and outcroppings that form the ridgetops and high points. These high points overlay sedimentary layers comprised primarily of interbedded shales and sandstones. Due to the nature of the shales and sandstones, mass movement is visible throughout the park, frequently referred to as 'mobile real estate.' The mobile real estate often impinges on stream channels delivering large quantities of sediment to the stream system, and causing continuous adjustment of the channels. Adjustments include lateral migration and erosion of slump blocks that impinge on the channel. Similar to the effects of mass movement, beaver dams can also cause lateral channel migration, downcutting through sediments deposited in old beaver dams, and affect riparian condition by reducing the shrub component. Beavers can also benefit streams by creating ponds that slow down stream velocities and bank erosion, provide fish habitat, and banks that promote riparian vegetation growth. The effects of past and present beaver activity can be seen throughout the stream system.

As a result of the shale and sandstone bedrock geology, many of the stream banks are composed of clay soils with little rock content. The lack of rock fragments means that the stream banks are highly dependent on riparian vegetation to stabilize the stream banks and make them resistant to erosion during high flows. Stream banks in much of California Park, particularly in lower First Creek and lower Elkhead Creek, are highly dependent on riparian vegetation to maintain stream bank stability.

It is believed that historical grazing practices and vegetative treatments, including spraying, have significantly affected the upland vegetation, increased bare soil, and resulted in increased surface runoff and channel instability. Stream channels develop the width, depth, and gradient necessary to transport the water and sediment supplied by the watershed. Altering the natural hydrologic regime through increased water yield can cause channel instability.

There is evidence of historic downcutting throughout the entire stream system in the California Park area. The volcanic dike on Elkhead Creek downstream of the confluence with First Creek is acting as a nickpoint that has prevented further downcutting. The downcutting has worked its way upstream through the stream system, and signs of active downcutting can be seen in many of the headwater tributaries and streams higher in the watershed. Downcutting has resulted in lowering of the water table and loss of stream access to floodplains (entrenchment) in many locations, particularly lower First and Elkhead creeks. This in turn has caused a shift in channel type and initiation of a new pattern of channel evolution. As a result of the natural processes coupled with historic impacts, several of the perennial and intermittent stream segments within GRSG habitat were rated functional at risk (BLM 1993). Management plans have been developed to address current management actions and improve riparian and stream conditions. A stream restoration plan has been developed to address all of California Park; implementation began in 2012 and is expected to continue in 2013 and beyond.

South Hunt/Watson Creek Area. Water resources in this area are limited to steep headwater stream channels with narrow floodplains and riparian areas. The greatest impacts on available water resources come from ditch diversions, which can reduce stream flow available to support aquatic life and riparian plant communities. In general, the water resources in these areas are considered to be in good condition.

Western Gore Pass area including Long Park. Water resources in this area are generally confined to steep gradient streams with little to no floodplains, and bordered by narrow riparian areas. Due to the steep topography, management impacts are minimal, and water resources are generally in

good condition. One isolated tributary segment to Crowner Creek was rated functional at risk (BLM, 1993) due to poor riparian vegetation and vigor, and vertical instability.

Lake Agnes Area. Water resources in this area are limited to steep headwater stream channels with narrow floodplains and riparian areas. The greatest impacts on available water resources come from ditch diversions which can reduce stream flow available to support aquatic life and riparian plant communities. In general, the water resources in these areas are considered to be in good condition.

Pete Gulch, West Carter Creek, and Diamond Creek Areas. Water resources in this area are generally confined to steep gradient streams with little to no floodplains and bordered by narrow riparian areas. Due to the steep topography, management impacts are minimal, and water resources are in good condition.

Lower Camp Creek Area. A portion of this habitat borders the North Platte River. The greatest impact on water resources in this area comes from recreation including white water boating and fishing, and upstream water diversions which can limit water availability for water resources. While some management impacts may exist, the overall existing condition for water resources is considered to be good with only isolated areas of concern.

3.15.2. Trends

Conditions on BLM-Administered Lands

Activities associated with recreation, energy development, and grazing result in the greatest impact on water supply and quality within GRSG habitat, thereby affecting trends of water resources.

Within GRSG habitat, recreation activities have resulted in surface disturbance that require mitigation to prevent water resource damage. Types of damage include erosion, sediment production and gully creation, and riparian and terrestrial vegetation destruction. OHV activity has increased significantly in more easily accessible wildland urban interface boundaries as well as more remote areas, due in part to population growth. Expansion of the wildland urban interface is anticipated to have long-term impacts on surface water quality and flow.

The BLM primarily monitors riparian and wetland conditions and does limited chemical analyses. The overall conditions of riparian areas and wetlands within the decision area are improving primarily due to more intensive range management techniques. In the past, heavy use of small riparian segments or wetlands for grazing occurred. In order to help meet the Public Land Health Standards related to riparian areas and wetlands, grazing plans, upland improvements, and allowable uses are being developed based upon the unique qualities and needs of these areas. In the more recent drought years, many riparian areas and wetlands actually continued to improve as permittees opted not to use their allotments or shortened their grazing season. Some riparian areas, however, were grazed heavier as upland water developments dried up and livestock stayed along streams and rivers.

Irrigation rights are expected to continue to be bought and sold, with some new property owners informally changing how rights are being used. Due to the continued population growth and land sales, more agricultural water rights may be converted to municipal and industrial uses. These changes may greatly impact the hydrology of streams, riparian areas and wetlands on BLM-administered lands. There are several acres of public wetlands that are supported or created by private irrigation practices.

Oil and gas development is also expected to have impacts on ground and surface water resources (BLM 2012). The BLM will continually strive to protect and improve water quality, and to reduce non-point source pollution. Phase II of the Stormwater Regulations requires more permitted actions on BLM-administered lands to develop erosion control plans and to reduce non-point source pollution resulting from ground disturbances. Federal lands are among the most manageable in terms of potential improvement because they must be managed in accordance with all applicable laws, rules, regulations, policies, standards, and guidelines. However, BLM-administered lands are often a small percentage of a watershed. Improving stream segments with limited public ownership, and mostly private water rights, would be more difficult. Section 303(d) of the CWA requires that states, Native American tribes, and federal agencies establish priority rankings for waters on the lists of impaired waters, and develop total maximum daily loads for these waters. Currently, none of the listed streams within the planning area have TMDLs that involve the BLM.

Conditions on National Forest System Lands

In general, water resources are considered to be in good condition across the Routt National Forest. The area of greatest concern with GRSG habitat is in the California Park and Slater Park areas because portions of these watersheds show an upward trend, while other portions show a static or downward trend. A conceptual watershed restoration plan has been developed for the California Park area and implementation began on along Armstrong Creek in 2012 and will continue in 2013-2014 (Bidelspach 2011). Other portions of the Forest with GRSG habitat are considered to be at or near the desired condition. Where concerns exist such as the tributary to Crowner Creek, management plans have been developed to reduce current management impacts and improve riparian and stream condition.

3.15.3. References

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3.16. Soil Resources

The BLM and USFS land management and resource use decisions influence long-term soil health, stability, and productivity. Many management activities and resources uses depend on suitable soils for the type, location, and use level of that resource, including livestock grazing, mineral activities, fire management, road and travel management (including OHV use), recreation, wildlife habitat, riparian habitat, special status species, fisheries, water quality, and forestry. Consequently, soil attributes and conditions are important to BLM and USFS management decisions.

Soils are defined by the interaction of the processes that form them, including parent material (geology), climate, topography, biologic organisms, and time. Of these, soil surveys indicate that climate and topography have the primary influences on soil formation (US Department of Agriculture, Natural Resources Conservation Service 2000). Climate largely influences soil development processes including the rate of rock weathering, decomposition of plant materials, accumulation of organic matter, and nutrient cycling. Climate also has a strong influence on soil moisture and temperature, which in turn affects the rates of addition, removal, translocation, and transformation of material within the soil. Topography influences site conditions, such as precipitation amounts and effectiveness, drainage, runoff, erosion potential, and temperature.

Soils are classified by their degree of development into distinct layers and their dominant physical and chemical properties. These characteristics are used to groups soils into 1 of 12 orders which are based on defining soil properties, such as organic matter, dominant sediment particle (silt, sand, or clay), amount of mineral material present, water and temperature regimes, and unique properties such as salt content or volcanic ash layers. These soil characteristics, in combination with climate, determine whether sagebrush can exist in a given location, and what which variety of sagebrush communities are able to thrive. Since the presence of GRSG is heavily dependent upon the presence of sagebrush, and sagebrush type and viability are dependent on soil type and quality, soils are an important element in GRSG habitat.

3.16.1. Existing Conditions

Conditions of the Planning Area

Soil productivity within the planning area varies widely due to the diversity of soils and site characteristics, including varying climatic, vegetative, topographic, and geologic conditions. The range-wide planning area is divided primarily by two ecoregions in which soils can be generally characterized: the Southern Rockies to the east and the Colorado Plateau to the west. In addition, portions of the Wyoming Basin ecoregion lie in the north, along the Wyoming/Colorado border. In these ecoregions the dominant soil orders are mollisols, alfisols, inceptisols, and entisols (US Department of Agriculture, Natural Resources Conservation Service 2009).

The planning area is characterized by high elevations and rugged mountains (Chapman et al. 2006). Due to low soil temperatures, the chemical reactions that release plant nutrients from minerals take place slowly. The rate of biologic activity is also limited by temperature, resulting in a slow rate of biologic decomposition, seed germination, and root growth. These factors combine to give the soils low fertility. However, in specific areas, particularly in valley bottoms, soils can have a dark, thick, fertile surface that supports a variety of vegetation.

The soils in the planning area vary from calcareous to alkaline and surface texture ranges from strongly alkaline loams, sandy loams, loams, to clay loams underlain by sandy loam to clay textures, and rock outcrop complexes. Precipitation varies greatly with elevation and aspect (Western Region Climate Center 2008). Permeability ranges from very slow to moderately rapid, and erosion hazard for most soils is moderate, with some ranked as severe. Some of these soils are highly saline. The depth of the soils range from 0 to 60 inches depending on slope and aspect. Some soils have a very high runoff potential and erosion hazard rating.

Many of the soils in the Colorado Plateau ecoregion have developed from alluvium that was deposited over time as the Colorado, Dolores, and Gunnison Rivers and their tributaries eroded through the surrounding mountain ranges. The mountain ranges contained various lithologies, including sandstones, siltstones, and marlstones associated with the Uinta Formation and the Green River Formation, and the claystones, shale, and sandstones associated with the lower part of the Green River Formation, the Mesaverde Group, the Wasatch Formation, the Fort Union Formation, and the Mancos Shale (BLM 2007a). Soils derived from Mancos Shale or from other saline sedimentary formations tend to be high in salts and trace elements like selenium. Due to the salt content in these soils, vegetative cover can be sparse, resulting in soil particles not being anchored in place; thus, the soil is easily eroded by wind and water (BLM 2007a).

The most productive soils in the planning area are those in valley bottoms and at higher elevations. The valley bottoms receive additional moisture because they concentrate run-off from adjacent uplands, and because water will percolate laterally into the subsoil from stream channels. Most valley bottoms support grass hay production. Areas at higher elevations receive a greater amount of precipitation during the growing season (BLM 1984b). Soils that feature shallow claypans, hardpans, or salts pose substantial constraints to land use and management.

Biological Soil Crusts

Biological soil crusts (also known as cryptogamic, cryptobiotic, microbiotic, or microphytic soil crusts) are a complex mosaic of cyanobacteria, green algae, lichens, mosses, microfungi, and other bacteria. These biological crusts cover open spaces between vascular plants on relatively barren soils, and are found where vascular plant cover is sparse. Crust cover is generally greatest at lower elevation sites in semiarid areas (Belnap et al. 2001). The vertical and horizontal vascular plant structure of many semi-arid vegetation communities optimizes growth of biological soil crusts. Vascular plants create windbreaks and shade, influencing how much moisture and light reach the soil surface. They also trap leaf litter, keeping the interspaces free of substantial or persistent litter cover. Biological crusts in many regions are best developed in interspaces between shrubs. Invasive exotic plants generally decrease the biological crust cover in most ecosystems (Belnap et al. 2001). Stable or embedded rocks at or near the soil surface can increase soil crust cover by perching water and armoring the surface from physical disturbances. Biological soil crusts have not been mapped in the range-wide planning area. In general, more stable, fine-textured soils (such as silty loams) support greater crustal cover than less stable, coarse-textured soils (Belnap et al. 2001). North and east slopes generally favor crustal development.

Biological crusts are well adapted to severe growing conditions; however, they are extremely susceptible to physical disturbances, domestic livestock grazing, and recreational activities (such as hiking, biking, and off-road driving). Fire can also damage the crust. Low-intensity fires, however, do not remove all of the crust structure, which allows for regrowth without significant soil loss. Shrub presence (particularly sagebrush) may increase fire intensity, thereby decreasing the likelihood of early vegetative or crust recovery after a burn (BLM 2009). Within the range-wide planning area, there are many areas where historic rangeland vegetation treatments (taking place around the 1950s) included ripping or plowing the soils, breaking apart the biological crusts. These crusts will remain broken during the life of the Approved Plan, regardless of current land conditions.

Disturbance of biological crusts results in decreased soil organism diversity, nutrients, stability, and organic matter. Trampling of the biological soil crust may reduce the number of crust organisms found on the surface and increase run-off and the rate of soil loss without apparent damage to vegetation. Burial of crusts by sediments kills non-mobile photosynthetic components (mosses, lichens, and green algae) of the crust.

Soil Erosion

Soil erosion is a concern throughout the western US, especially in semi-arid rangelands. The potential for soil erosion increases with increasing slope. The quantity of soil lost by water or wind erosion is influenced by climate, topography, soil properties, vegetative cover, and land use. While erosion occurs under natural conditions, rates of soil loss may be accelerated if human activities are not carefully managed (BLM 2007b). Recreational trails can quickly turn into widely braided ruts, especially in wetlands and at stream bank crossings. The resulting gully erosion can rapidly erode substantial quantities of previously stable soils (BLM 2007b).

It is possible to control rates of soil erosion by managing vegetation, plant residues, and soil disturbance. Vegetative cover is the most significant factor in controlling erosion because it intercepts precipitation, reduces rainfall impact, restricts overland flow, and improves infiltration. Biological soil crusts are especially important for protecting the soil and controlling erosion in desert regions; however, they are easily disturbed by grazing and human activities.

Natural Resources Conservation Service soil map unit descriptions rate soils in the planning area according to their susceptibility to water and wind erosion. Wind erosion is particularly a hazard when surface litter and vegetation are removed by fire or other disturbances. Soils are considered fragile or of high erosion hazards if they contain the following characteristics:

- Soils rated as highly or severely erodible by wind or water, as described in soil survey reports
- Landslide Areas, as identified in soil survey reports
- Soils on slopes greater than 35 percent

Soil Compaction

Soil compaction is a complex process that depends upon the nature of the loading and moisture content of the soil, as well as on characteristics such as particle size, organic matter content, structure, and percent of coarse fragments. Soil compaction occurs in response to pressure exerted by machinery or animals. The risk for soil compaction is greatest when soils are wet. Compacted soil allows less water to infiltrate, resulting in greater overland flow of water for

longer periods of time. The overland flow has greater energy to detach and transport soil particles, resulting in increased soil erosion.

Conditions on BLM-Administered Lands

Soil and soil condition of BLM-administered lands containing GRSG PGH vary widely. A characterization of the major soil types found within GRSG habitat includes rock outcrops, very steep mountains, mesa breaks, and alluvial fans ranging down to mesas, terraces and benches, and a combination of clay and sandy loams, including clay loams, loamy sands, stony loams, and sandy loams. Erosion hazards of these soils range from moderate to severe and some soils are considered fragile.

Restrictions are imposed on other activities or uses of the BLM-administered lands within the planning area to improve soil conditions. These include ensuring rapid revegetation of disturbed areas, limiting vegetation manipulations or treatments in sensitive watersheds to spraying, aerial seeding, or designed grazing systems. Also, in order to protect sensitive watersheds, restrictions include limiting surface-disturbing activities from sensitive watersheds where they were contributing to, or had the potential for contributing to, water quality degradation, providing buffer strips between streams and surface-disturbing activities (such as mining, road building, and clear-cutting), and controlling OHV use in sensitive watersheds. General restrictions include reducing erosion or run-off on disturbed sites, placing timing restrictions on surface-disturbing activities in order to avoid spring thaw and run-off seasons, and constructing snow management structures for watershed improvement.

Farmlands exist on GRSG habitat on private lands within the planning area. Many of these farmlands are irrigated hayfields and pastures. Of these farmlands in GRSG habitat, the majority are in Routt, Jackson, Grand, Rio Blanco, and Moffat Counties. Some of these private agricultural lands could have BLM-administered mineral resources. These split-estate areas (private surface but public minerals) are very rare and typically include small portions of irrigated pastures.

Conditions on National Forest System Lands

The major soil types on National Forest System lands in the planning area consist of shallow (10 to 20 inches) to very deep (greater than 60 inches), well drained soils. Many soils have formed in alluvium from fine grained sandstones, shales, and some basalts. Some soils formed in thin, noncalcareous, very gravelly or channery materials weathered residually from granite, sandstone, gneiss, or in places from tuff. The soil locations include plateaus, hills, mountain slopes, eroded side slopes and foot slopes. Some soils have varying amounts of rock fragments. Surface textures vary but are predominately loam and sandy clay loam with some very gravelly sandy loams with varying amounts of rock fragments. Subsurface textures vary as well and include sandy clay loams and clay loams.

In some locations, the soils have a dark thick surface soil supporting mainly big sagebrush, serviceberry, mountain snowberry, elk sedge, Gambel's oak, and aspen. Other vegetation consists of mountain brome, wheatgrass, western wheatgrass, Idaho fescue, Arizona fescue, mountain muhly, fringed sagebrush, slimstem muhly, blue grama, pine dropseed, sagebrush, junegrass, needle and thread, and bluegrass. These soils are generally used for livestock and wildlife grazing, with the Lower Camp Creek area being used for native pastureland. These soils are found in both PPH and PGH.

Detrimental soil disturbance usually occurs where cattle congregate, in locations of water development, and salting areas. There are several water developments in this area. However, overall detrimental soil disturbance is within the threshold set by the soil quality standards. Ground cover is sufficient to control accelerated erosion. Soil quality and productivity are being maintained.

Riparian area soils vary, but are generally very deep, somewhat poorly drained, and formed in alluvium from igneous and sedimentary rocks. Surface textures also vary, but are predominantly loam and sandy loam. Subsurface textures are sandy loam to clay loam. In some locations, riparian area soils are hydric. In general, riparian areas support planeleaf willow and water sedge on drier soil types and water sedge and beaked sedge on the wetter soil types. Other plants in these communities include rush, elkslip marsh marigold, bluejoint reedgrass, tufted hairgrass, elephant head, and cinquefoil.

Detrimental soil disturbance within the riparian areas is within the threshold set by the soil quality standards. Ground cover is sufficient to control accelerated erosion. Soil quality and productivity are being maintained.

3.16.2. Trends

Soil quality and quantity has degraded over time due to compaction and disturbance related to livestock grazing and mineral development. Implementation of the BLM's Standards for Rangeland Health Guidelines has reduced the potential for soil erosion in overgrazed areas and requirements for commercial operations to reclaim and restore damaged soils have slowed or reversed soil degradation (see **Appendix K**, BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado). Additionally, vegetation ground cover has been reduced due to invasive species, which increases soils susceptibility to wind and water erosion. Some invasive species also add salt or other elements that change the soil chemistry and affect the site potential.

The overall objective for management for soil resources is to maintain or improve the ability of the soil to support vegetation and allow water and nutrients to be cycled by either macro- or microorganisms, all of which promote and improve the health of the land. Degradation by excessive grazing, erosion, or land developments will cause a reduction in soil function, as one or perhaps many of the soil properties are changed, thereby affecting the functions necessary for healthy soil. In general, soils are being managed to meet or exceed Colorado land health standard #1 which states that soils must exhibit infiltration and permeability rates that are appropriate to soil type, climate, land form, and geologic processes of the area, and that adequate soil infiltration and permeability allow for the accumulation of soil moisture necessary for optimal plant growth and vigor and minimize surface runoff (see **Appendix K**, BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado).

On National Forest System lands, active management has been implemented in PGH in the California Park and Slater Park areas to improve soil conditions and reduce bare ground by implementing sub-soiling actions to alleviate soil compaction and restoration planting to increase ground cover. This has resulted in improving soil conditions in the restoration area.

3.16.3. References

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3.17. Air Quality

This section describes air quality conditions in the planning area. Air pollutants addressed in this assessment include criteria pollutants, hazardous air pollutants, and compounds that could cause visibility impairment or contribute to atmospheric deposition.

Clean, breathable air, expansive vistas, and minimal acidification of the lands, streams, and lakes are significant goals pursued by the BLM and USFS. The Clean Air Act and FLPMA require the BLM, USFS, and other federal agencies to comply with local, state, Native American tribal, and other federal agency air quality standards and regulations. The FLPMA further directs the Secretary of the Interior (BLM) to take any action necessary to prevent unnecessary or undue

degradation of the lands (Section 302 (b)), and to manage the public lands "in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values" (Section 102 (a)(8)).

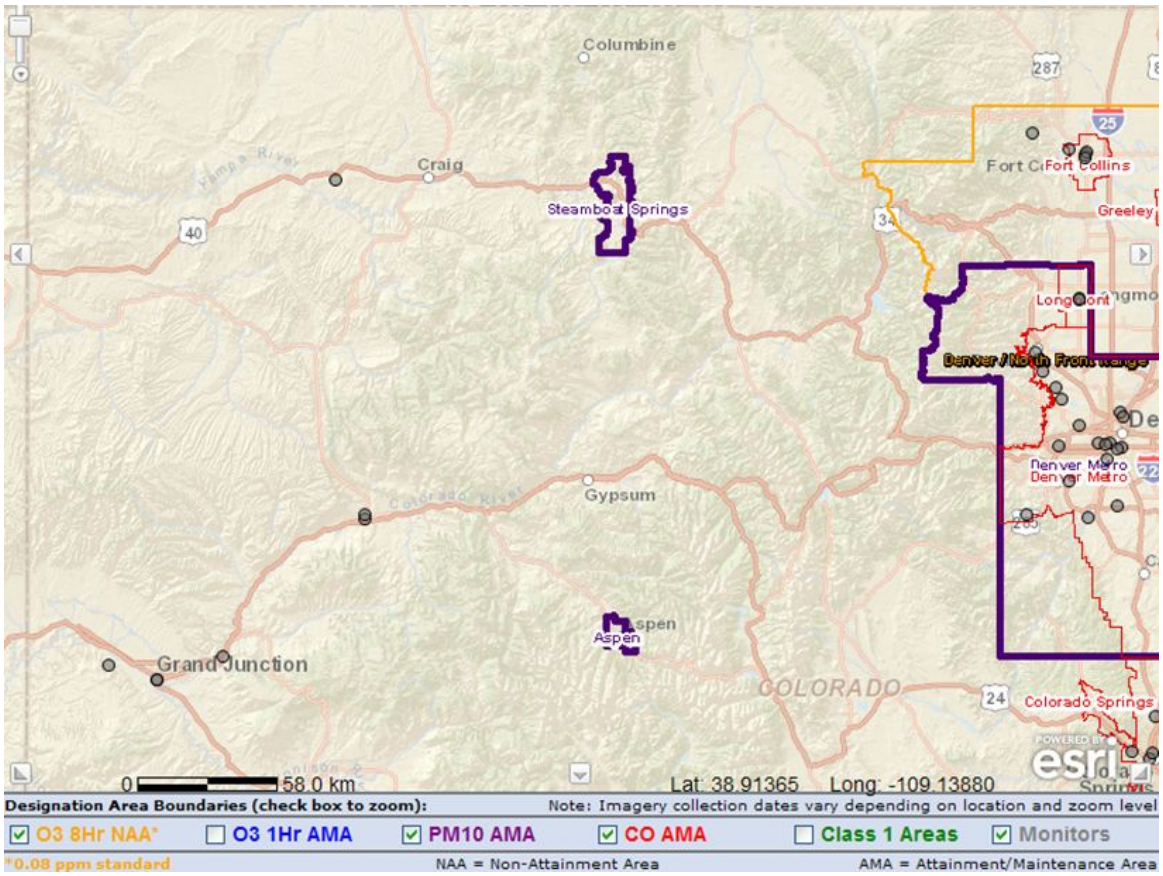
Air resource management is accomplished by establishing desired outcomes (goals and objectives) and allowable uses (management actions) in BLM RMPs that, at a minimum, must ensure authorized activities are in compliance with regulatory standards. The BLM, within the scope of its authority to do so, may also go beyond simple regulatory requirements in order to prevent unnecessary or undue degradation of the public lands and their associated resources. For example, an objective for reducing atmospheric pollution might include requiring advance designed engines as COAs in a BLM permit. The Routt National Forest Plan contains similar direction (USFS 1997, p. 1-4).

3.17.1. Existing Conditions

Conditions of the Planning Area

With respect to the National Ambient Air Quality Standards, the US EPA classifies all locations in the US as attainment (including unclassified), nonattainment, or maintenance areas. These classifications are determined by comparing actual monitored air pollutant concentrations to their applicable federal standards. **Diagram 3-8**, Nonattainment Areas and Monitoring Locations Within or Near the Planning Area, shows all the nonattainment areas adjacent to or within close proximity of the planning area. Note that a very small portion of the North Front Range 8-hour ozone nonattainment area lies within the planning area boundaries.

Diagram 3–8 Nonattainment Areas and Monitoring Locations Within or Near the Planning Area



Source: Colorado Department of Public Health and Environment, Water Quality Control Division, 2012.

Air Quality Monitoring

The majority of the planning area is contained within the Western and Mountain Counties monitoring districts maintained by the Colorado Department of Public Health and Environment, Water Quality Control Division. The 2010 annual monitoring data report describes the Mountain Counties as those that are generally located on or near the Continental Divide. They consist of mostly small towns located in tight mountain valleys. Currently, there are six particulate matter less than 10 microns in diameter (PM10) monitoring sites operated by the air pollution control district in the Mountain Counties region. There is one ozone monitor (operated by the city of Aspen, Colorado) in the region. The report describes the western counties as generally smaller towns, usually located in fairly broad river valleys. Grand Junction is the only large city in the area, and the only location that monitors for carbon monoxide and air toxics on the western slope. In 2008, Rifle, Palisade, and Cortez began monitoring for ozone. The BLM also maintains two ozone monitors within the region at Rangely and Meeker. There are one carbon monoxide, five ozone, eight PM10, and one particulate matter less than 2.5 microns in diameter (PM2.5) active monitoring sites within the planning area.

The National Park Service and USFS also maintain networks of ozone monitors within or adjacent to the planning area. **Table 3.71**, Air Quality Monitoring Data and National Ambient Air Quality Standard Percent Comparison, shows the most recent monitoring data available for stations in or around the planning area (excluding National Park Service and USFS monitors).

Table 3.71. Air Quality Monitoring Data and National Ambient Air Quality Standard Percent Comparison

Location	Pollutant (standard) [1]	Concentration				Percent NAAQS [2]
		2007	2008	2009	2010	
Grand Junction	CO - 1 hr. (9 ppm)	2.8	7.1	2.3	1.7	18.9
Grand Junction	CO - 8 hr. (35 ppm)	1.8	1.5	2.2	1.1	3.1
Aspen	O3 - 8 hr. (75 ppb)				0.063	84.0
Colorado National Monument	O3 - 8 hr. (75 ppb)	0.067	0.067	0.064	0.063	84.0
Gothic	O3 - 8 hr. (75 ppb)	0.067	0.067	0.067	n/a	89.3
Meeker	O3 - 8 hr. (75 ppb)	n/a	n/a	n/a	0.066	88.0
Palisade	O3 - 8 hr. (75 ppb)	n/a	0.07	0.064	0.067	89.3
Rifle	O3 - 8 hr. (75 ppb)	n/a	0.066	0.062	0.065	86.7
Rangely	O3 - 8 hr. (75 ppb)	n/a	n/a	n/a	0.058	77.3
Rio Blanco County	O3 - 8 hr. (75 ppb)	n/a	n/a	n/a	0.072	96.0
Aspen	PM10 - 24 hr. (150 g/m3)	52	53	47.3	44.7	29.8
Clifton	PM10 - 24 hr. (150 g/m3)	62	96	93	98	65.3
Glenwood Springs	PM10 - 24 hr. (150 g/m3)	28	n/a	n/a	n/a	18.7
Grand Junction (Pitkin Avenue)	PM10 - 24 hr. (150 g/m3)	118	120	105	107	71.3
Grand Junction (South Avenue)	PM10 - 24 hr. (150 g/m3)	72	83	77	76	50.7
New Castle	PM10 - 24 hr. (150 g/m3)	50	n/a	n/a	n/a	33.3
Parachute	PM10 - 24 hr. (150 g/m3)	64	88	89	87	58.0
Rifle	PM10 - 24 hr. (150 g/m3)	55	67	68	67	44.7
Silt (County Road 233)	PM10 - 24 hr. (150 g/m3)	27	n/a	n/a	n/a	18.0
Silt (County Road 327)	PM10 - 24 hr. (150 g/m3)	23	n/a	n/a	n/a	15.3
Silt (Owens Drive)	PM10 - 24 hr. (150 g/m3)	27	n/a	n/a	n/a	18.0
Grand Junction (South Avenue)	PM2.5 - 24 hr. (35 g/m3)	22.7	25	30.6	34.5	98.6
Grand Junction (South Avenue)	PM2.5 - Annual (15 g/m3)	9.18	9.43	9.44	9.28	61.9

Source: Colorado Air Quality Data Report, Colorado Department of Public Health and Environment 2007, 2008, 2009, 2010

[1] CO = carbon monoxide; O3 = ozone; ppm = parts per million; g/m3 = micrograms (one-millionth of a gram) per cubic meter; ppb = parts per billion; PM2.5 = particulate matter less than 2.5 microns in diameter; PM10 = particulate matter less than 10 microns in diameter

[2] Percent National Ambient Air Quality Standard is based on last year of available monitoring data for each site

The limited data available for PM2.5 do not provide a reasonable basis for establishing area-wide baseline conditions. Additionally, the available monitoring data do not provide for definitive trending analysis for any of the pollutants. The National Park Service data available for ozone for Class 1 and sensitive Class II areas within or adjacent to the planning area suggests the ambient air quality in the area is between 86 and 99 percent of the National Ambient Air Quality Standard for ozone. For the majority of the planning area the monitored ozone values provide evidence that ozone is a pollutant of concern.

Air Emissions

The current emissions inventory for the planning area is based on the most recent Colorado Department of Public Health and Environment, Water Quality Control Division, county inventory data (2008). Counties that have a majority of land area contained within the planning area are included and summarized in **Table 3.72**, Planning Area Emissions Inventory. Although Larimer County has a substantial portion of land area within the planning area, no emissions are included in the inventory because it is assumed the majority of Larimer County emissions correspond to the major population centers that lie to the east outside of the planning area. These areas include the cities of Fort Collins and Loveland, and would also include those emissions associated with visitors to Rocky Mountain National Park.

Table 3.72. Planning Area Emissions Inventory

Planning Area County	Pollutants Inventoried by Colorado Department of Public Health and Environment, Water Quality Control Division, (tons per year)					
	CO	Nitrogen Dioxide	SO_2 Sulfur Dioxide	PM_{10}	Volatile Organic Compounds	Benzene
Eagle	21,709	3,769	80	4,256	14,948	72
Garfield	35,464	13,546	279	6,338	55,727	267
Grand	9,565	1,695	75	2,429	19,315	39
Jackson	4,527	509	5	608	20,996	16
Mesa	40,688	9,048	2,879	8,050	39,828	161
Moffat	25,876	19,855	4,031	7,401	32,503	153
Pitkin	7,379	882	10	967	11,566	25
Rio Blanco	15,446	4,615	67	5,358	33,647	100
Routt	10,776	8,732	2,582	4,856	26,362	31
Summit	13,132	1,751	21	1,678	11,627	47
Total Emissions	**184,562**	**64,402**	**10,028**	**41,942**	**266,521**	**911**
Source: Colorado Department of Public Health and Environment, Water Quality Control 2008						

Visibility Monitoring

The typical threshold of significance in visibility monitoring or prediction is an increase in the number of days above natural conditions where the 98th percentile value of the haze index is greater than 0.5 deciview (approximately a 5-percent change in light extinction), which is considered to contribute to regional haze visibility impairment. Similarly, where the haze index exceeds 1 deciview (approximately a 10-percent change in light extinction), visibility impairment will occur (Federal Land Managers' Air Quality Related Values Work Group 2010). The visibility data presented in **Table 3.73**, Current Visibility Conditions (5-year average, 2006–2010), are from the IMPROVE network. **Diagram 3-9**, Standard Visual Range Trends for Areas in **Table 3.73**, Current Visibility Conditions (5-year average, 2006–2010), provides long-term Standard Visual Range trend data for each area outlined in this table.

Table 3.73. Current Visibility Conditions (5-year average, 2006–2010)

Site Name	Class	State	Monitor Name	20% Clearest Days (deciviews)	20% Haziest Days (deciviews)
Black Canyon of the Gunnison National Park	1	CO	WEMI1	2.3	9.9
Great Sand Dunes National Park	1	CO	GRSA1	3.6	10.9
Mesa Verde National Park	1	CO	MEVE1	3.1	11.2

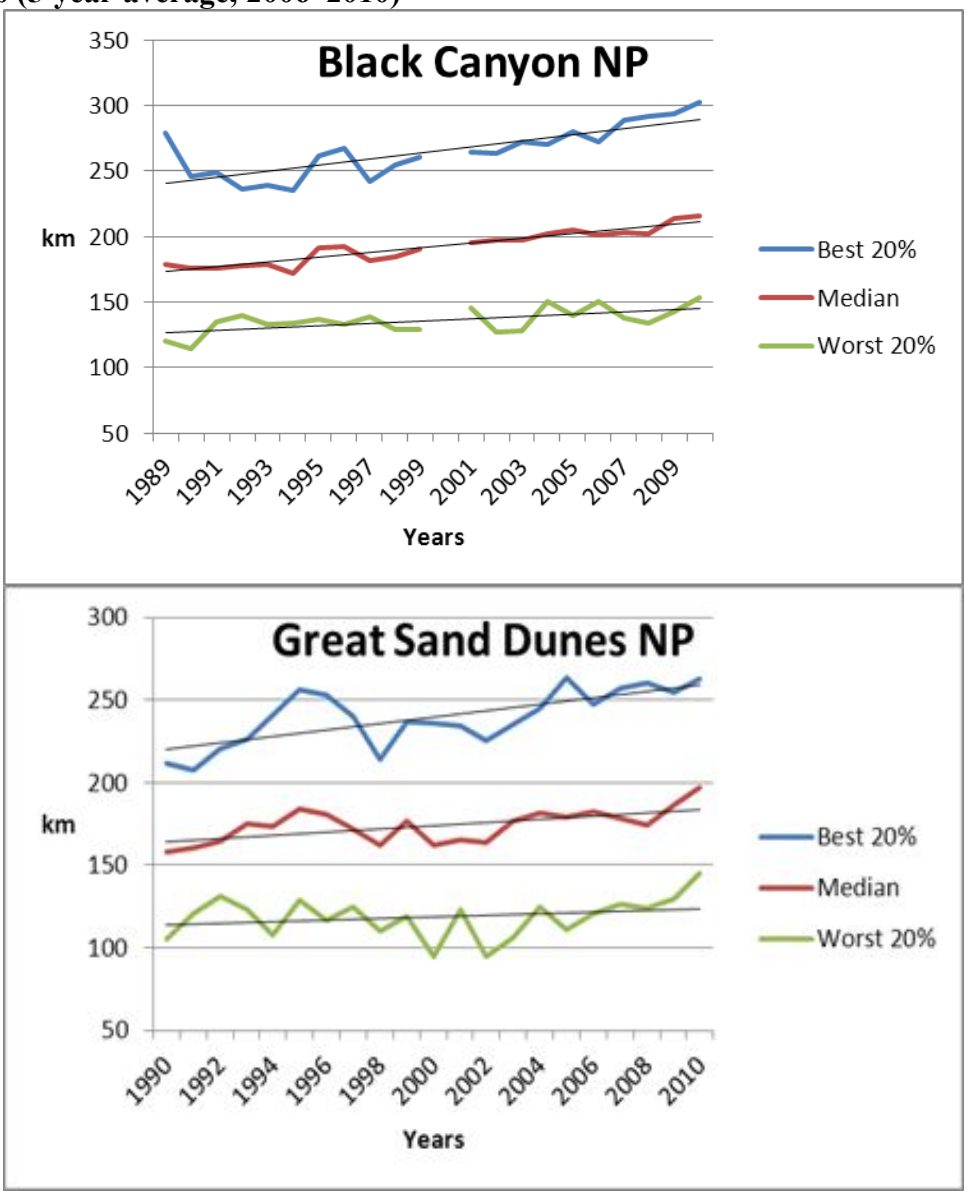
Site Name	Class	State	Monitor Name	20% Clearest Days (deciviews)	20% Haziest Days (deciviews)
Rocky Mountain National Park	1	CO	ROMO1	1.9	12.0
White River National Forest	1	CO	WHRI1	0.3	10.7
Mount Zirkel Wilderness	1	CO	MOZI1	0.5	9.4
Arches National Park [1]	1	UT	NA	2.8	10.9
Canyonlands National Park	1	UT	CANY1	2.9	11.0

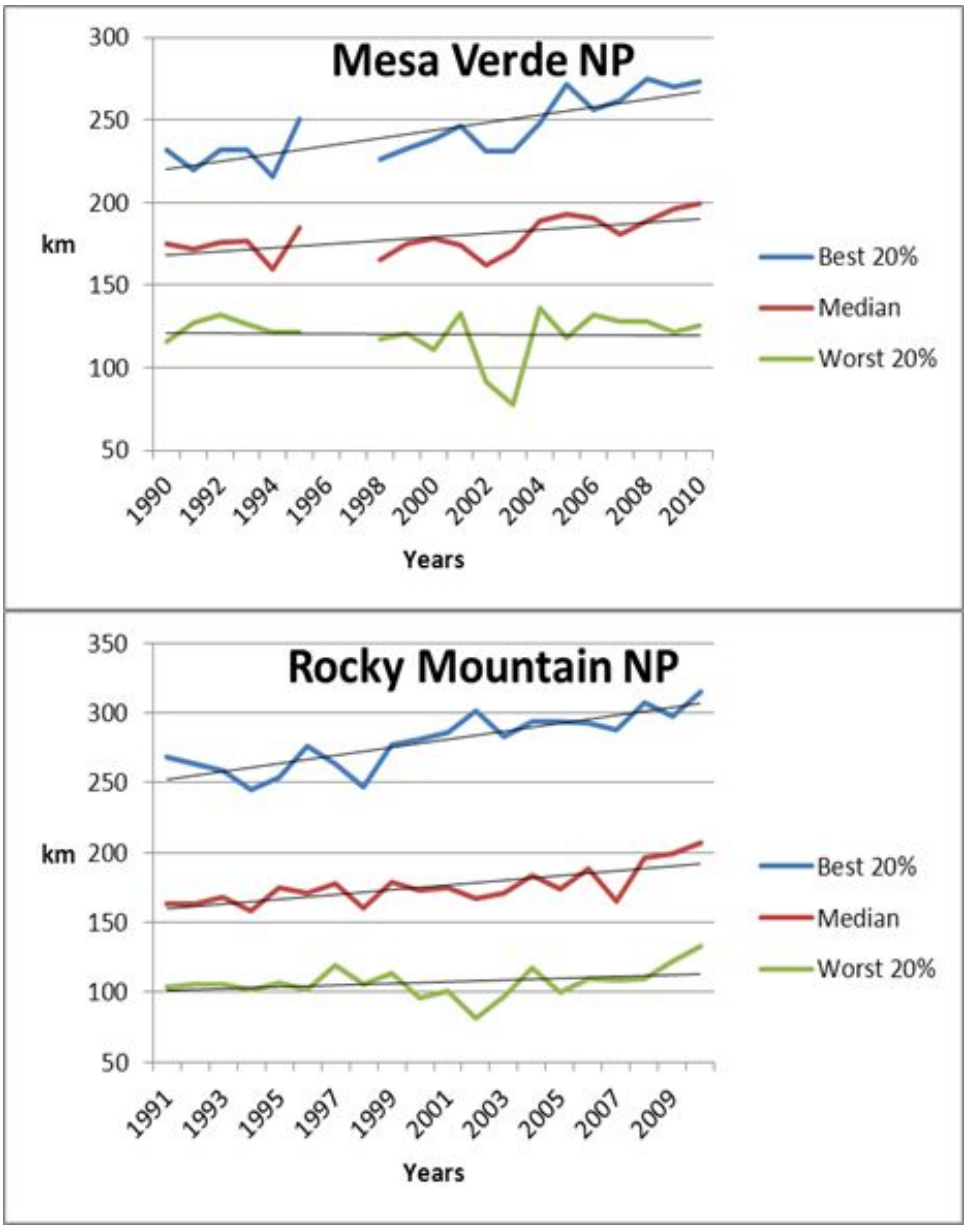
Source: Interagency Monitoring of Protected Visual Environments 2011

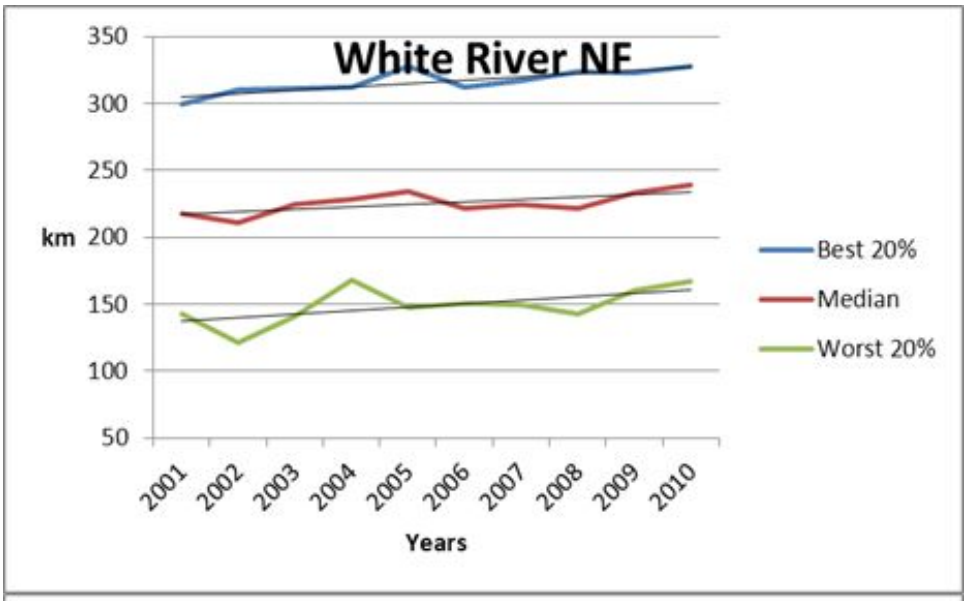
Note: With the exception of Arches National Park, all of the data are based on the revised (new) IMPROVE algorithm.

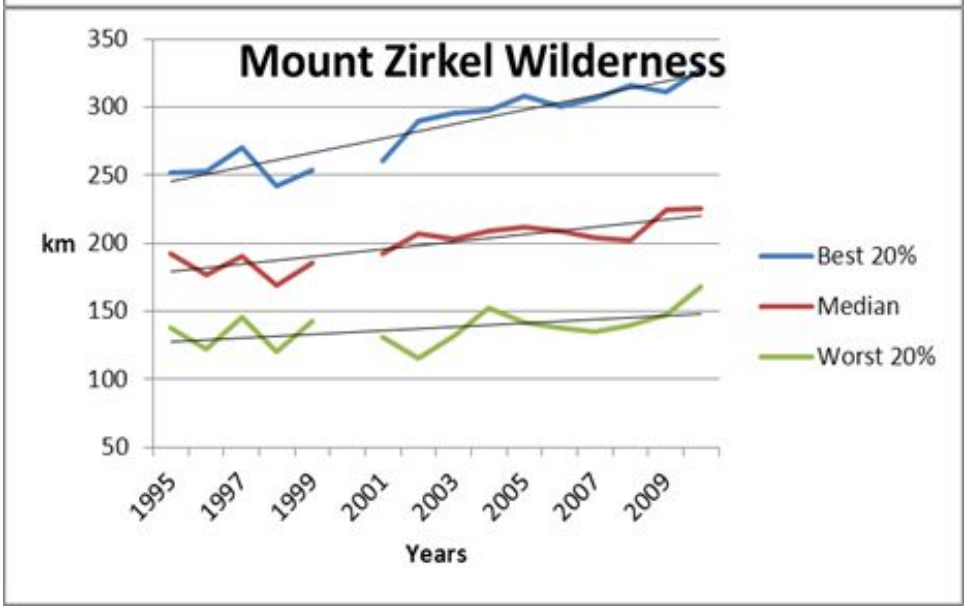
[1] National Park Service 2006–2010 5-Year Average Visibility Estimates

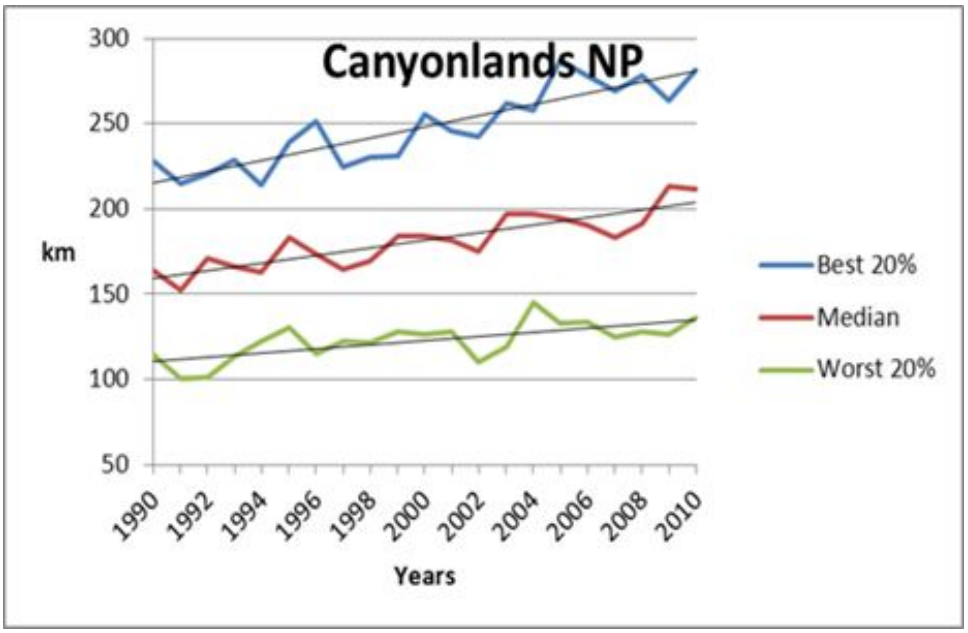
Diagram 3–9 Standard Visual Range Trends for Areas in Table 3.73, Current Visibility Conditions (5-year average, 2006–2010)




Mesa Verde NP
km
300
250
200
150
100
50
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Years
Best 20%
Median
Worst 20%
Rocky Mountain NP
km
350
300
250
200
150
100
50
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
Years
Best 20%
Median
Worst 20%


White River NF
350
300
250
km 200
150
100
50
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Years
Best 20%
Median
Worst 20%


Mount Zirkel Wilderness
350
300
250
km 200
150
100
50
1995
1997
1999
2001
2003
2005
2007
2009
Years
Best 20%
Median
Worst 20%



Deposition Monitoring

Ecological thresholds for air pollution, such as critical loads for nitrogen and sulfur deposition, are not currently included in the formal regulatory process for emissions controls in the US, although they are now considered in local management decisions by the National Park Service and USFS.

Thresholds for various deposition parameters or critical loads have been established by the National Park Service and USFS in several guidance documents (e.g., Federal Land Managers' Air Quality Related Values Work Group 2010). For water sensitivity within the planning area, the USFS has established guidelines for surface waters with Low Acid Neutralizing Capacity (ANC) that states: 1) for surface waters that have a baseline of less than 5 microequivalents per liter Acid Neutralizing Capacity, no more than 1 microequivalent per liter decrease in Acid Neutralizing Capacity would be acceptable; and 2) for surface waters that have a baseline of equal to or greater than 25 microequivalents per liter Acid Neutralizing Capacity, the limit of acceptable change is not more than 10 percent from the baseline. The National Park Service has established modeling Data Analysis Thresholds that trigger a management concern.

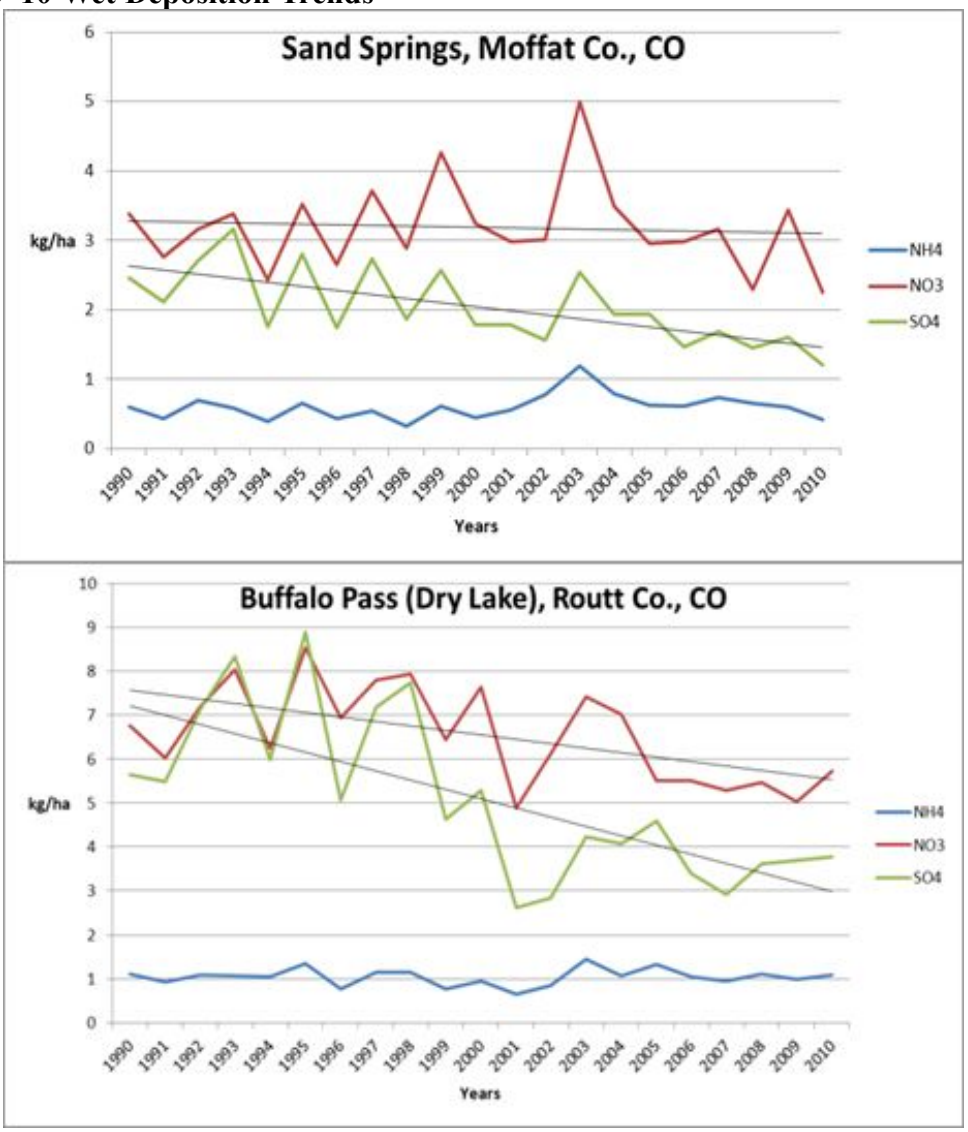
Adverse impact determinations are considered on a case-by-case basis for modeled deposition values that are higher than the threshold. Federal land managers will continue to use scientific data and information, in conjunction with modeling, to evaluate whether or not an adverse impact would occur.

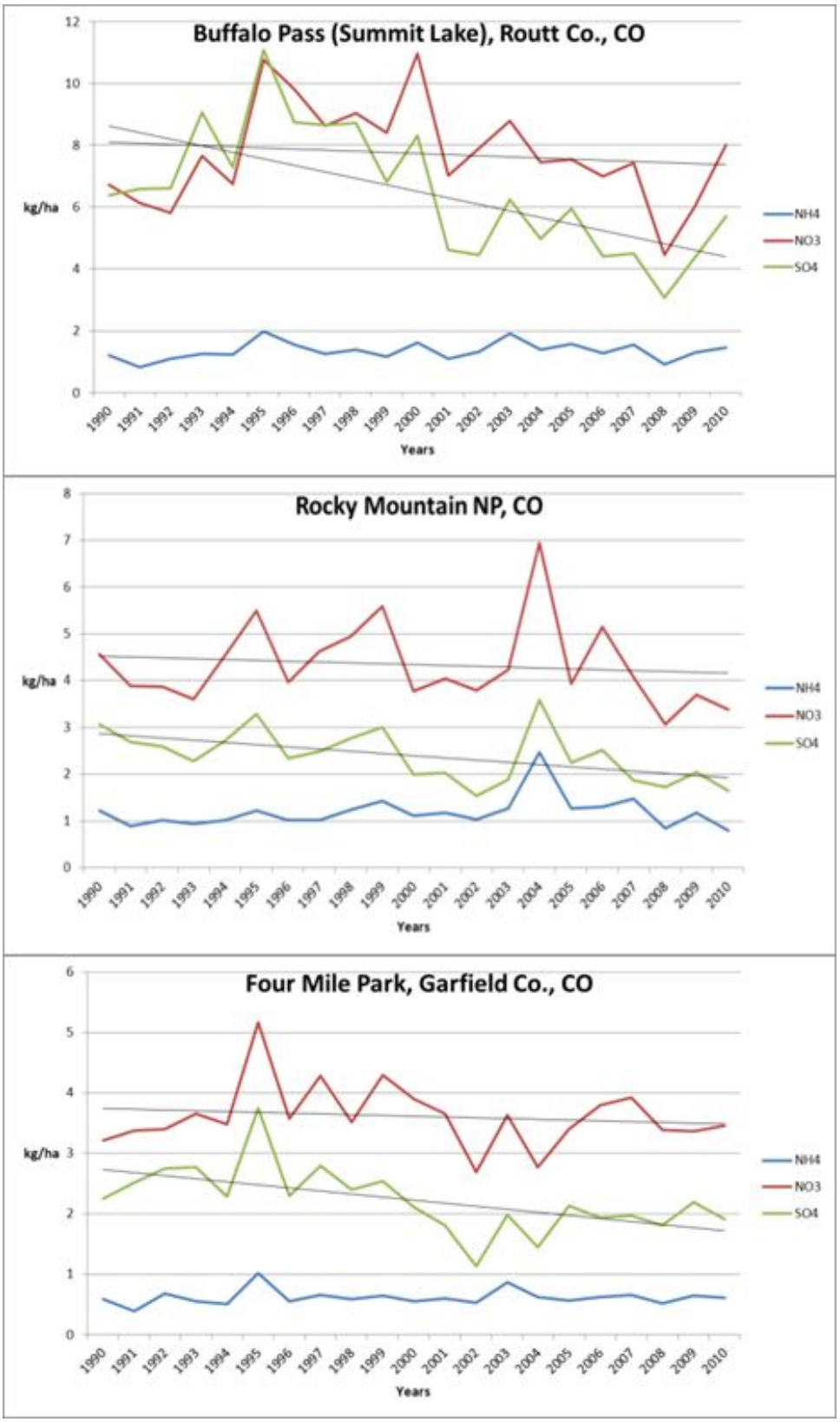
Where specific impact analyses require reference to historical deposition rate data, it is included in **Chapter 4**, Environmental Consequences. **Diagram 3-10**, Wet Deposition Trends, and **Diagram 3-11**, Dry Deposition Trends, show the current trends for wet and dry deposition monitoring within or adjacent to the planning area. Total deposition (the sum of both wet and dry deposition) data are only available at two sites within the region where the deposition monitors are collocated; this is presented in **Diagram 3-12**, Total Deposition Trends.

Conditions on BLM-Administered Lands

Conditions on BLM-administered lands are as described above for conditions of the planning area. Authorized activities on BLM-administered lands that produce PM10 and PM2.5, nitrogen oxides, volatile organic compounds, carbon monoxide, sulfur oxides, hazardous air pollutants, and greenhouse gas pollutants include wildfires, prescribed burns, and slash pile burns; mechanical thinning and other vegetation management activities; vehicle travel on paved and unpaved roads; trails and open areas; energy development, mineral extraction, and mining operations; livestock grazing; and camping and other recreational activities.

Diagram 3–10 Wet Deposition Trends




Buffalo Pass (Summit Lake), Routt Co., CO
kg/ha
Years
NH4
NO3
SO4
Rocky Mountain NP, CO
kg/ha
Years
NH4
NO3
SO4
Four Mile Park, Garfield Co., CO
kg/ha
Years
NH4
NO3
SO4

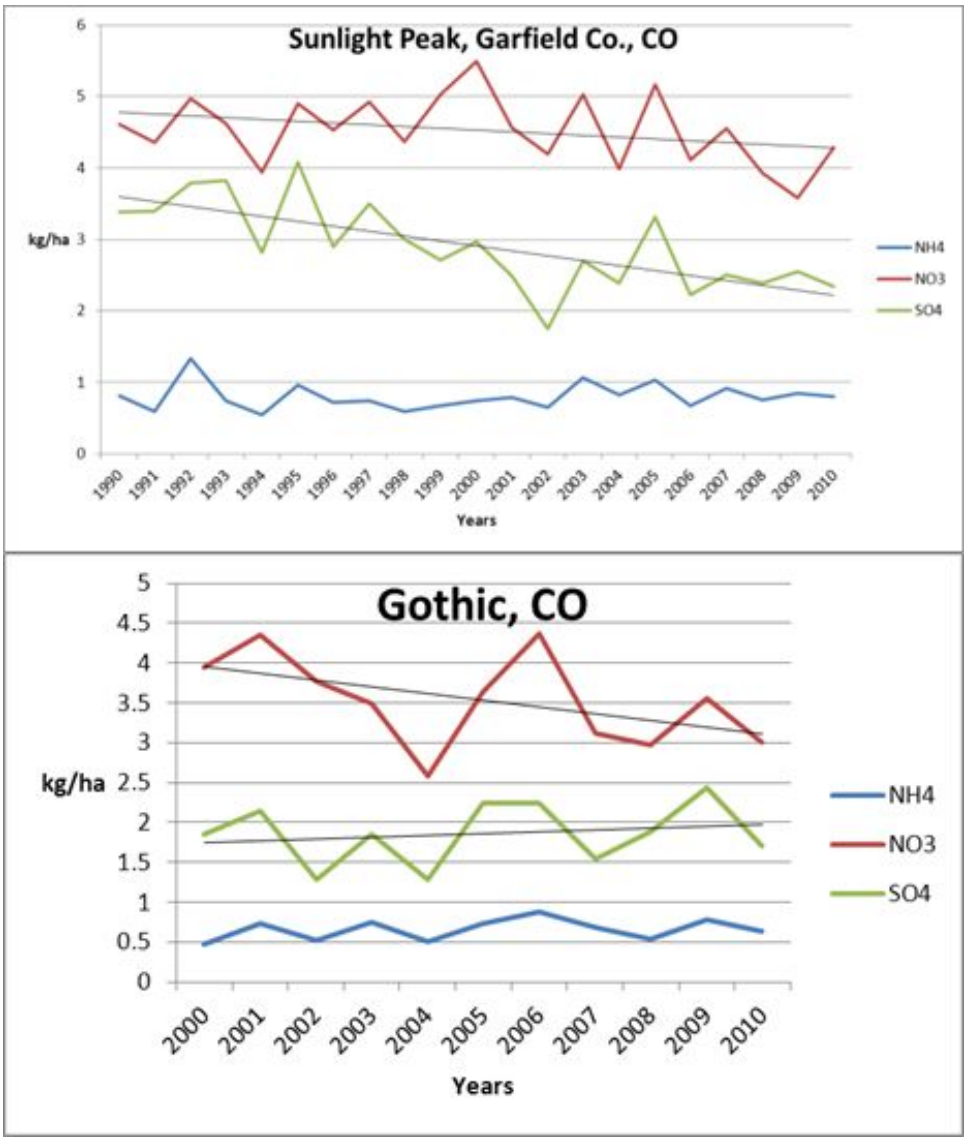
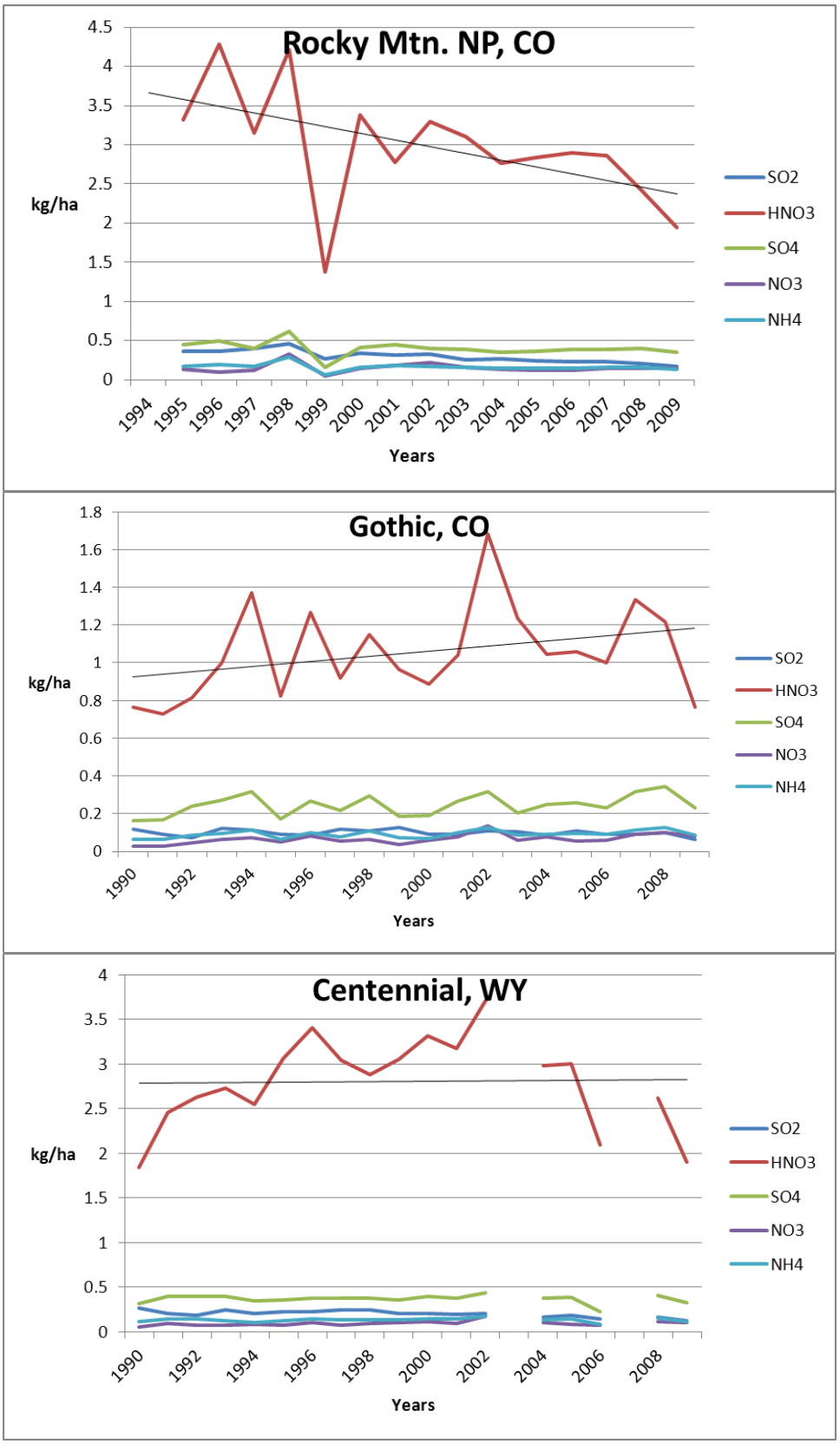


Diagram 3–11 Dry Deposition Trends


Rocky Mtn. NP, CO
kg/ha
Years
SO2
HNO3
SO4
NO3
NH4
Gothic, CO
kg/ha
Years
SO2
HNO3
SO4
NO3
NH4
Centennial, WY
kg/ha
Years
SO2
HNO3
SO4
NO3
NH4

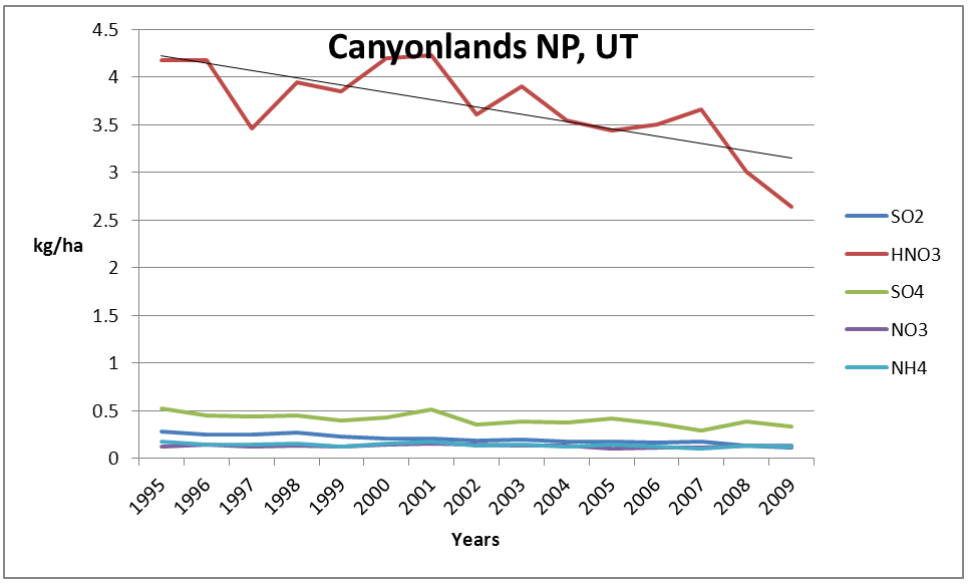
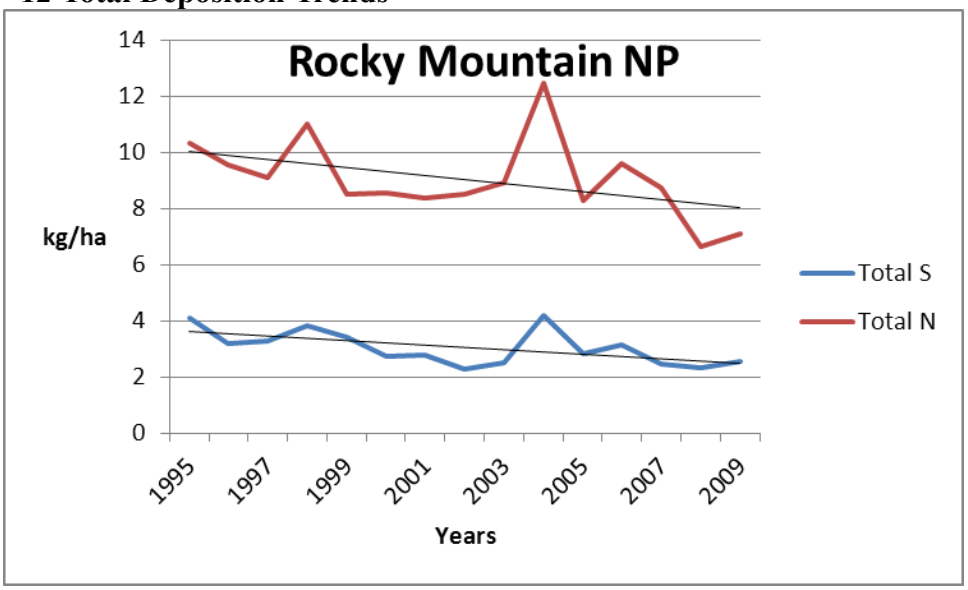
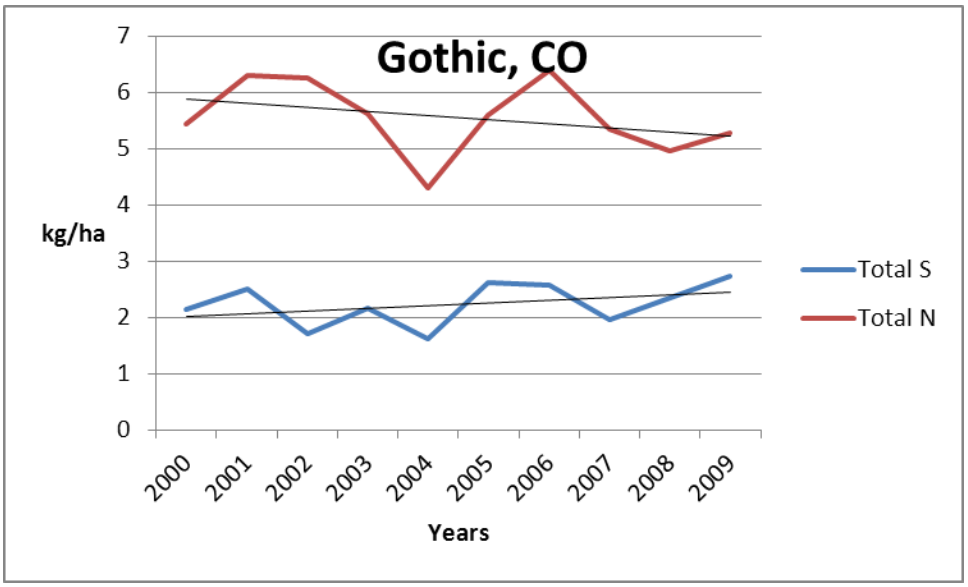


Diagram 3–12 Total Deposition Trends





Conditions on National Forest System Lands

Routt National Forest

Most of the air quality monitoring (wet deposition, dry deposition, and visibility) conducted in the Routt National Forest is and has been associated with the National Atmospheric Deposition Program and the National Trend Network. Two National Atmospheric Deposition Program monitoring sites are located in the Hahns Peak/Bears Ears Ranger District. Both sites, described in more detail below, were established in the 1980s to monitor air quality conditions in and adjacent to the Mount Zirkel Wilderness Area.

Recently, Routt County, Colorado, contracted for assistance with planning and implementing air quality programs designed to reduce the impacts of oil and gas development on ambient air quality and to comply with existing state and federal air quality standards and regulations. The USFS and the National Park Service have contracted to upgrade existing air quality monitoring infrastructure in Walden, Colorado, (Jackson County) to monitor the impacts of oil and gas development on air quality and criteria pollutant (particulate matter, sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone, and lead) concentrations in Colorado, Utah, and Wyoming; the Walden site is part of a Three-State Pilot Study.

Like other parts of the country, the sources of air pollution in and adjacent to the Routt National Forest vary. Most of the sources of local air pollution are associated with automobiles and coal-fired, electrical-power generation. However, other sources of air pollution, such as oil and gas development, smelter operation, and wildland fires, also contribute to air quality degradation.

<u>Air Quality - Existing Infrastructure</u>

Buffalo Pass, Summit Lake (CO97) – The CO97 monitoring site became operational on February 7, 1984, and continues to collect wet- and dry-precipitation samples, ozone samples, and air visibility data. This site is located near Buffalo Pass (Park Range) at an elevation of 3,234 meters (10,607 feet). Air quality samples collected at this site are precipitation sulfates, nitrates, chlorine, phosphates, sodium, potassium, calcium, magnesium, and ammonium. In addition, each sample is analyzed to determine pH and conductivity. CO97 is equipped with an IMPROVE MOZI1

device (filters) that measures changes in air visibility based on changes in atmospheric particulate matter concentrations. CO97 also is equipped to measure atmospheric mercury and is part of the Mercury Deposition Network and the National Trends Network.

Buffalo Pass, Dry Lake (CO93) – The CO93 monitoring site became operational on October 18, 1986, and continues to collect wet- and dry-precipitation samples, ozone samples, and air visibility data. This site is on the west side Buffalo Pass (Park Range) at an elevation of 2,538 meters (8,325 feet). Air quality samples collected at this site are precipitation sulfates, nitrates, chlorine, phosphates, sodium, potassium, calcium, magnesium, and ammonium. In addition each sample is analyzed to determine pH and conductivity. CO93 is part of the National Trends Network.

State and Local Air Monitoring Stations Network monitoring station in Walden, Colorado – This monitoring station is located about 12 miles north of Walden near the small town of Cowdrey, Colorado. This station is part of the Three-State Pilot Study (Colorado, Utah, and Wyoming) designed to better monitor the impacts on air quality associated with oil and gas development in the three-state region. Air quality metrics measured at this station are ambient concentrations of ozone, nitrogen oxides, sulfur dioxide, and carbon monoxide. In addition, concentrations of atmospheric particulate matter less than or equal to 10 microns are measured. Finally, metrics such as air temperature, relative humidity, solar radiation, wind speed, and wind direction are measured at this station. Data collected at this station is submitted hourly to the US EPA's Air Quality System.

3.17.2. Trends

Because of limited available data, it is only possible to trend air quality-related values for a few locations. For those locations, ambient air quality concentrations are below standards, visibility is typical of clear skies associated with remote areas in the western US, and there have been improvements in total deposition at Rocky Mountain National Park in recent years. Future changes to air quality conditions in the 62-mile radius of the planning area would occur according to the intensity and expansion or reduction of activities that produce air pollutants; however, the use of air pollution mitigation techniques can also minimize air quality impacts and, in some cases, reduce emissions from sources. Proposed activities on BLM-administered lands and the mitigation measures planned for those activities must be evaluated on a case-by-case basis to determine if an air quality impact could occur, and whether the activity would be in compliance with air quality regulations. At this time, future impacts on air quality within the planning area from non-BLM sources (e.g., power plants and fireplaces) are uncertain; however, it is not anticipated that existing sources would increase their emissions in the future. In addition, major sources such as power plants are operating under state-administered air permits and are subject to periodic inspections.

Visibility

The majority of areas have seen steady improvements in visibility over the past 15 to 20 years. Standard Visual Range distances have been increasing at both ends of the visibility spectrum, meaning that improvements are generally being made on the best and worst visibility days.

Deposition

Current trends indicate that deposition rates are decreasing and progress is being made to reduce the associated impacts of deposition in and around the planning area. This does not suggest

that the current levels of deposition are acceptable for all areas of concern. A case-by-case determination must be made to determine significance when specific project data are known.

3.17.3. References

Colorado Department of Public Health and Environment, Water Quality Control Division. 2008. 2008 Air Pollution Emissions Inventory. Internet Web site: http://www.colorado.gov/airquality/inv_maps_2008.aspx.

_____. 2012. Queried Sources of Air Pollution. Internet Web site: http://www.colorado.gov/airquality/ss_map_wm.aspx.

Federal Land Managers' Air Quality Related Values Work Group. 2010. Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report-Revised (2010) Natural Resource Report NPS/NRPC/NRR-2010/232.

Interagency Monitoring of Protected Visual Environments (IMPROVE). 2011. IMPROVE and RHR Summary Data. Regional Haze Rule Summary data 1988–2010 (posted December 2011). Internet Web site: http://vista.cira.colostate.edu/improve/data/improve/summary_data.htm.

3.18. Climate Change

3.18.1. Existing Conditions

Conditions of the Planning Area

Climate represents the long-term statistical characterization of daily, seasonal, and annual weather patterns such as temperature, relative humidity, precipitation, cloud cover, solar radiation, and wind speed and direction. Climate is the composition of the general prevailing weather conditions of a particular region throughout the year, averaged over a series of years (typically 30 years). A region's climate is affected by its latitude, terrain, and elevation, as well as its relative location to large water bodies.

Climate in the planning area is varied depending on the orientation of topography, elevation, slope and aspect. Winters are typically cool to cold with temperatures ranging from below zero to above freezing. Precipitation events are occasional and, depending on the elevation, are typically in the form of snow.

Summers are generally warm to hot, again depending on elevation. Precipitation during the summer is usually in the form of short-duration, high-intensity monsoonal thunderstorms. Precipitation ranges from 9 to 25 inches primarily dependent on elevation, with the highest receiving the most.

3.18.2. Trends

There is now strong and growing scientific evidence for human-induced climate change (National Climate Assessment Development Advisory Committee 2012). These changes typically forecast that temperatures will increase with precipitation becoming more variable in nature. This change in climate, primarily over the last 50 years, is due to the increased emissions of greenhouse gases

such as carbon dioxide, methane, nitrous oxide (Intergovernmental Panel on Climate Change 2007). While these gases are produced naturally through physiological processes of plants and animals, decomposition of organic manner, naturally started wildfires, and volcanic and geothermal activity, concentrations of these gases has dramatically increased over the last 150 years from the emissions of industrial processes, transportation technology, urban development, agricultural practices, and other human-induced factors.

Climate is both a driving force and limiting factor for many biological, ecological, and hydrologic processes, as well as resource management activities such as disturbed site reclamation, wildland fire management, rangeland and watershed management, and vegetation and wildlife habitat management. Climate change presents a challenge to land managers because of the magnitude of potential effects of climate change on ecosystem structure, process, and function, along with the uncertainty associated with these effects.

While ecosystems gradually change over time in response to climate change, this accelerated change in climate over the 50 years is likely to impact ecosystems at rates where some resources (species and habitats) are unable to adapt at the same rate. Climate change also may intensify and compound existing non-climate change stressors such as invasive species, pests and diseases, and frequency and intensity of wildfires. Expected changes to ecosystems as a result of climate change include changing of the onset of spring and fall seasons, reduced snowpack, earlier snow melt, altering stream flows, more prolonged and intense seasonal droughts, local extinctions of species (including GRSG), and more intense and frequent extreme weather events.

While not covering the entire planning area (LSFO, KFO, CRVFO, and Routt National Forest), the recently completed Colorado Plateau Rapid Ecoregional Assessment (Bryce et. al. 2012) covers the southern and western portions of the planning area. This assessment projected future climate scenarios using the ECHAM5-driven RegCM3 model. While not covering the entire planning area, one can reasonably assume that the future climate scenarios for temperature and precipitation will be similar for the rest of the planning area.

The downscaled results from the Colorado Plateau Rapid Ecoregional Assessment show that northwest Colorado is expected to undergo a general warming through 2060. Average summer temperatures are expected to increase by as much as 4 degrees Fahrenheit, but even greater increases are expected in the winter months. This increase in winter temperatures may lead to more rain events, thus impacting snow pack and causing earlier snow melt and leading to more prolonged drought in the summer. Further, increasing temperatures may result in a change of vegetation communities. Increase in temperatures in the summer may result in a loss of shrub and woodland canopy due to an overall drying of the soil for a longer period during the growing season and a shift of more drought-resistant vegetation or from shrublands to grasslands. This may ultimately result in a loss of sagebrush cover across the planning area.

Wyoming is also expected to increase in summer temperatures as well with increases as much as 8 degrees Fahrenheit by the end of the century (Karl et al. 2009). As with the Colorado Plateau Rapid Ecoregional Assessment, it is unclear if seasonal precipitation patterns will change. Even if they do not change, the increase in temperatures during the summer will increase the number and frequency of hot days. This would lead to increased water stress in vegetation during the summer.

Climate models are generally less reliable in predicting precipitation than temperature (Bryce et. al. 2012). Under the climate scenarios presented in the Colorado Plateau Rapid Ecoregional Assessment, precipitation is expected to decline throughout much of the year through 2030, with the exception of a couple of months in the fall. From 2030 to 2060, the precipitation trends in

the northern part of the Colorado Plateau indicate a slight increase in precipitation, with this increase primarily occurring in the summer.

3.18.3. References

Bryce, S. A., J. R. Strittholt, B. C. Ward, and D. M. Bachelet. 2012. Colorado Plateau Rapid Ecoregional Assessment Report. Prepared for the US Department of the Interior, Bureau of Land Management, Denver, CO.

Intergovernmental Panel on Climate Change. 2007. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II, and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Core Writing Team: R. K. Pachauri and A. Reisinger (eds.). Intergovernmental Panel on Climate Change, Geneva, Switzerland.

Karl, T. R., J. M. Melillo, and T. C. Peterson (eds). 2009. In: Global Climate Change Impacts in the United States. Cambridge University Press, New York, NY. Pp:123-128.

National Climate Assessment Development Advisory Committee. 2012. Draft National Climate Assessment. Internet Web site: http://ncadac.globalchange.gov/.

National Fish, Wildlife and Plants Climate Adaptation Partnership. 2012. National Fish, Wildlife and Plants Climate Adaptation Strategy. Association of Fish and Wildlife Agencies, Council on Environmental Quality, Great Lakes Indian Fish and Wildlife Commission, National Oceanic and Atmospheric Administration, and US Fish and Wildlife Service. Washington, DC.

3.19. Visual Resources

Visual resources are the visible physical features on a landscape, such as soils, geomorphic features, water, vegetation, and human-made structures, that contribute to the landscape's scenic or visual quality and appeal. A visual impact is created when a perceptible contrast is created that affects the scenic quality of a landscape. The degree of visual impact as perceived by an individual or group depends on a variety of factors or conditions, including personal experience, time of day, and weather or seasonal conditions.

BLM

As required by the FLPMA, the BLM must consider scenic quality as part of its management of public lands. To carry out this mandate, the BLM uses the VRM system. VRM involves the identification and evaluation of scenic values. The BLM's VRM system helps to ensure that actions taken on public lands will benefit the visual qualities associated with the described landscape.

The VRM system includes the development of a visual resource inventory, determination of management levels, and visual resource contrast rating analysis when a surface-disturbing activity is proposed. Visual resource inventory involves identifying an area's visual resources. Based on the inventory and consideration of other RMP objectives, the BLM assigns area-specific management classes (**Table 3.74**, BLM Visual Resource Management Class Descriptions; **Figure 3-12**, Visual Resource Management Classes [**Appendix B**, Figures]).

The BLM uses a contrast rating analysis process to evaluate the design elements of a proposed activity to determine the level of visual impact on the existing landscape as observed from

key observation points. Mitigation requirements can be applied to an activity to lessen visual impacts on the landscape.

USFS

The Routt National Forest Plan (USFS 1998) provides guidance for all resource management activities, including scenic quality, in the Routt National Forest. The plan specifies desired conditions for visual resources. Desired conditions include the provision of scenic quality, maintenance of the overall landscape character, and continued attraction of visitors through the physical setting and scenic beauty of the Routt National Forest.

Historically, the USFS managed visual quality using the Visual Management System. The key component of the Visual Management System is the establishment of Visual Quality Objectives. These Visual Quality Objectives provide visual goals for management activities. Each Visual Quality Objective prescribes a different degree of acceptable alteration of the landscape based on the importance of aesthetics. Visual Quality Objectives consist of five levels: preservation, retention, partial retention, modification, and maximum modification.

Table 3.74. BLM Visual Resource Management Class Descriptions

VRM Class	Class Objective
I	Preserve landscape character. This class provides for natural ecological changes, but does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
II	Retain existing landscape character. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract a casual observer's attention. Any changes must repeat the basic elements of line, form, color, and texture found in the predominant natural features of the characteristic landscape.
III	Partially retain existing landscape character. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate a casual observer's view. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
IV	Provide for management activities that require major modification of the landscape character. The level of change to the characteristic landscape can be high. Management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repetition of the basic landscape elements.
Rehabilitation Areas	Areas in need of rehabilitation should be flagged during the inventory process. The level of rehabilitation is determined through the RMP process by assigning the VRM approved for that particular area.

- Preservation – Allows ecological change only. Management activities are prohibited except for very low visually impacting recreation facilities.
- Retention – Management activities may not be visually evident. Contrasts in form, line, color, and texture must be reduced during or immediately following the management activity.
- Partial Retention – Management activities must remain visually subordinate to the characteristic landscape. Associated visual impacts in form, line, color, and texture must be reduced as soon after project completion as possible or at a minimum within the first year.

- Modification – Management activities may visually dominate the characteristic landscape. However, landform and vegetation alterations must borrow from naturally established form, line, color, or texture so as to blend in with the surrounding landscape character. The objective should be met within 1 year of project completion.
- Maximum Modification – Management activities including vegetation and landform alterations may dominate the characteristic landscape.

However, when viewed as background they must visually appear as natural occurrences within the surrounding landscapes or character type. When viewed as foreground or middle ground, they may not appear to completely borrow from naturally established form, line, color, or texture. Alterations may also be out of scale or contain detail which is incongruent with natural occurrences as seen in foreground or middle ground. Reduction of contrast should be accomplished within 5 years.

With an amendment to the USFS Manual, Chapter 2380 in 2003 (USFS 2003), the USFS began transitioning from the Visual Management System to the Scenery Management System.

3.19.1. Existing Conditions

Conditions of the Planning Area

The visual landscape across the planning area varies greatly but is generally consistent with the broader landscape features found throughout the Rocky Mountains and western Colorado plateau. Landscape characteristics that contribute to the planning area's scenic conditions include mountains, ridges, narrow and broad river valleys, rolling hills, numerous lakes and reservoirs, sand dunes, and diverse vegetation regimes. Over time, volcanic activity, seismic forces, and erosion have produced unique ridges, isolated mountain peaks, rock outcrops, and waterways. Development in the planning area consists of oil and gas development, urban centers, utility infrastructure, dispersed ranches, recreation areas including ski areas, and range improvements such as fencing and water developments. Urban development is largely situated along major roadways. Taken together, these features create a variety of landscape compositions. Overall, public lands in the planning area serve as important scenic backdrops and visual open space.

Conditions on BLM-Administered Lands

BLM-administered land is distributed throughout the planning area, with the greatest acreage located in the LSFO, GJFO, and WRFO. Existing RMPs for each field office establish the VRM classes within which GRSG habitat is located. Recently, several field offices have updated their Visual Resource Inventories and subsequently are preparing VRM management classes based on the new inventories. The VRM classes resulting from the new inventories will establish new baseline conditions from which trends can be determined. However, only in the KFO have the VRM classes been updated to reflect the latest inventory. For all other field offices, the VRM classes represent the most recent inventory.

GRSG habitat is widely distributed throughout the planning area, with the highest concentrations of PPH and PGH in the Wyoming Basin MZ. The largest habitat areas are in Moffat County within the BLM's LSFO, as well as throughout the KFO. Habitat areas in the remaining three field offices are generally smaller and less concentrated.

Colorado River Valley Field Office

GRSG habitats are found in two significant visual resource areas in the CRVFO: the Roan Plateau and Castle Peak-King Mountain areas. The Roan Plateau is home to the Parachute/**Piceance/**Roan population, and the Castle Peak-King Mountain area is home to the Northern Eagle-Southern Routt population. Two separate land use planning efforts were conducted for the two areas (BLM 1984; BLM 2006).

There are 36,200 acres of GRSG habitat, all of which is PGH, located on top of the Roan Plateau and overlapping private surface estate, split estate, and BLM surface estate. The top of the Roan Plateau is characteristic of long ridgelines that slope to the north and are deeply incised by east and west-flowing tributaries of Parachute Creek. This effect creates an undulating horizontal line in the landscape broken by steep vertical lines created by the drainages. The top of the plateau is dominated by a mosaic of aspen woodlands, sagebrush flats, and mixed mountain shrublands, with riparian habitat along the deep stream valleys. The Roan Plateau landscape is visually fragmented by existing development that occurred prior to current VRM objectives (BLM 2006) and includes roads, cabins, grazing improvements, old vegetation treatments, communication towers, limited oil shale development, and (on private land) limited oil and gas development.

The Roan Plateau also lies within an area of high natural gas and oil potential. While no oil and gas development of the federal mineral estate has taken place above the rim, wells have been drilled and developed on private land. The top of the Roan Plateau has valid existing leases and with those leases, valid existing leasing rights. The visual resources within the Roan Plateau are protected through the application of stipulations and mitigation measures. Two stipulations are currently in place for the Interstate 70 viewshed and VRM Class II areas.

The Castle Peak-King Mountain area contains 105,400 acres of GRSG habitat, and is remote and largely undeveloped, although a number of towns are present along the major transportation routes. GRSG habitat is not easily accessible because of private land and topography constraints. The area is characteristic of rural ranching and agricultural land. The topography is varied with visually prominent mountain peaks including King Mountain, Castle Peak, Greenhorn Mountain, and Horse Mountain. Within the mapped GRSG habitat, there is a distinct division of the landscape created by the Colorado River. The vegetation is diverse with the steep north-facing mountain slopes generally forested with conifers intermixed with extensive groves of aspen, and the drier south-facing exposures largely pinyon-juniper woodlands and oakbrush. Grasses, sagebrush, and assorted shrubby species constitute the ground cover along the valley bottoms and riparian communities follow the river corridors.

Grand Junction Field Office

The landscape containing PPH and PGH within the GJFO planning area lies on the mesa/ridge tops above Roan Creek and its tributaries in the northeast portion of the field office, and along the western and southwestern slopes of Battlement Mesa. The Roan Creek portion of this landscape, which contains 5,500 acres of PPH and 8,900 acres of PGH, is characterized by steep-sided mesas or ridges rising 1,500 to 2,000 feet above the primary drainages. The GRSG habitat lies primarily on the tops of these mesas. The Battlement Mesa portion of habitat, which is all PGH, lies on the more gradually sloping lower and middle slopes of Battlement Mesa. Both areas share similar topography and vegetation types that create a landscape with relatively indistinct rolling form, gently undulating lines, subtle hues of greens, greys and tans, and a mottled medium texture. Human-made developments introducing visual contrast to this landscape include scattered roads, fences, stock ponds/tanks, homes and other structures, and energy development infrastructure (such as well-pads, compressor stations, and pipelines.)

The inventoried habitat on top of the mesas and ridges above the Roan Creek drainage is primarily visible only from observation points within and directly adjacent to the habitat areas. The habitat on the slopes of Battlement Mesa is visible from observation points above, below, and within the habitat area.

Kremmling Field Office

In the KFO, two mountain parks dominate the visual setting of the planning area: North Park and Middle Park. North Park is predominately an open landscape composed of flat valleys and rolling hills. Middle Park is a synclinal basin surrounded by mountain ranges. Most of the valley bottoms are privately owned and within the foreground of the viewsheds. GRSG habitat in North Park consists almost exclusively of PPH. GRSG habitat in Middle Park is a mix of PGH on the western side and non-habitat on the eastern side.

Throughout North Park, the views are predominantly of open rolling hills covered with grasses and sagebrush. The vegetation regime is characterized by sagebrush on the southern exposures and pine and aspen forests on the northern exposures. Throughout the center of North Park, water features and ridges contrast with the sagebrush hillsides. Creeks and rivers winding through the hills include riparian vegetation communities and flowing water. Lakes in the northwest portion of North Park give this area additional variety. The ridges that run across North Park are composed of rock outcrops and open sage grasslands. The rock outcrops and mountains break the line of the rolling rounded hills.

Middle Park is more visually diverse than North Park. When traveling through the area, visitors observe a landscape that is constantly changing. The Middle Park landscape is comprised of open rolling sagebrush hills interrupted by isolated mountain peaks with rocky south faces and forested north faces. The Colorado River bisects Middle Park from east to west through Byers Canyon in the east and the steep-walled Gore Canyon in the west. As the river exits Gore Canyon, it winds through hills composed of reddish-orange, rocky soil strata. Pinyon-juniper-covered hills provide a diversity of color and texture along the riverway.

The human features on the east side of Middle Park are mainly the result of tourism. The largest town is Granby; other communities include Hot Sulphur Springs, Grand Lake, Fraser, Tabernash, and Winter Park. The east side provides a ski area, several subdivisions, gateway access to Rocky Mountain National Park, and recreational access to three large lakes. Many homes on this side of the county have been built in the forested areas and serve mainly as recreational homes.

Increasing urbanization and oil and gas development have changed the visual landscape in the KFO in recent years. Urban areas in the North Park area include Walden, Rand, Gould, and Cowdrey. In Middle Park, urban areas include Granby, Hot Sulphur Springs, Fraser, Winter Park, and Kremmling. The area also has several isolated communities, large ranches, ranchettes, and sizeable vacation homes. Oil and gas fields are primarily located east of Walden.

The viewshed in the KFO is also influenced by dead trees killed by the mountain pine beetle. Timber removal is occurring, and removal areas are designed to look like naturally occurring clearings. However, subdivisions in heavily forested areas are becoming more visible as trees are removed.

Little Snake Field Office

PPH or PGH covers a majority of the LSFO, with the exception of steep rugged terrain in the western portion of the field office. The landscape of the LSFO consists of open rolling hills and desert in the lower elevations of the western portion of the field office, while forested mountainous landscapes characterize the higher elevations to the east. The landscape types consist of mountains, ridges, narrow valleys, canyons, mesas, rolling hills, broad valleys, river valleys, basins, reservoirs and badlands. Although much of the LSFO is largely undeveloped, range improvements and oil and gas developments in the past 15 years have altered much of the scenery. Most oil and gas developments have occurred in concentrated areas where the potential for economically recoverable mineral resources is high.

White River Field Office

The WRFO has over 120,000 acres of PPH and 180,000 of PGH scattered throughout the field office planning area. Landscapes in the WRFO display a variety of characteristics depending on location, elevation, vegetation, and cultural modifications. The region consists of high mountain ranges with deeply dissected, steep-side valleys and canyons. These narrow canyons are comprised of irrigated fields flanked by rugged foothills and cliff features. Vegetation in the foothills creates an irregular pattern caused by patches of grasses, low-lying shrubs, or dark evergreen stands.

River corridors such as the White River, Douglas Creek and Cathedral Creek provide high quality scenery. The vegetation along these river corridors provides color variation from the more muted upland hues. Certain landforms such as Cathedral Bluffs present distinct visual characteristics in the WRFO. These features often exhibit strong vertical lines in landscapes typically dominated by horizontal and shallow diagonals.

The WRFO is generally undeveloped and cultural modifications are sparse. The towns of Rangely, Dinosaur, and Meeker along with major roads (SH 139, US 40 SH13 and SH64) contain the highest concentrations of cultural modifications in the area. Rangeland improvements and utility lines are also scattered throughout the WRFO.

Oil and gas development equipment and infrastructure is scattered throughout the WRFO planning area concentrated in five major areas: Rangely, Wilson Creek, Douglas Creek Arch and Piceance Basin.

Conditions on National Forest System Lands

Routt National Forest

The Routt National Forest, located in the northeast portion of Routt County, contains a comparatively smaller concentration of GRSG habitat than is found on BLM-administered lands in the planning area. **Table 3.75**, GRSG Habitat by Geographic Area, Visual Quality Objective, and Habitat Type on the Routt National Forest, summarizes the distribution of PPH and PGH throughout the Routt National Forest's four Visual Quality Objective areas and includes the geographic location name.

Table 3.75. GRSG Habitat by Geographic Area, Visual Quality Objective, and Habitat Type on the Routt National Forest

Geographic Area Name	Visual Quality Objective [1]	GRSG Habitat Type	Acres
Chimney Rock	Modification	PGH	5
Chimney Rock	Partial Retention	PGH	110
Chimney Rock Subtotal			115
Corral Peaks	Modification	PGH	150
Corral Peaks	Modification	PPH	210
Corral Peaks Subtotal			360
Dunckley	Partial Retention	PGH	90
Dunckley	Partial Retention	PPH	30
Dunckley Subtotal			120
Elkhead Mountain	Modification	PGH	140
Elkhead Mountain	Partial Retention	PGH	7,150
Elkhead Mountain	Retention	PGH	60
Elkhead Mountain Subtotal			7,350
Gore	Modification	PGH	5
Gore	Modification	PPH	10
Gore	Partial Retention	PGH	40
Gore	Partial Retention	PPH	410
Gore	Retention	PPH	0
Gore Subtotal			465
Green Ridge	Partial Retention	PGH	90
Green Ridge	Partial Retention	PPH	150
Green Ridge Subtotal			240
Grizzly Creek	Partial Retention	PGH	10
Grizzly Creek	Retention	PGH	40
Grizzly Creek Subtotal			50
Pinkham Mountain	Partial Retention	PPH	590
Pinkham Mountain	Retention	PPH	180
Pinkham Mountain Subtotal			770
Red Dirt	Partial Retention	PGH	70
Red Dirt	Retention	PGH	370
Red Dirt Subtotal			440
Slater Creek	Modification	PGH	1,370
Slater Creek	Partial Retention	PGH	1,210
Slater Creek Subtotal			2,580
Troublesome	Modification	PGH	20
Troublesome	Modification	PPH	0
Troublesome Subtotal			20
Total			**12,510**

Source: Data from GIS by C. Tolbert, 6/15/2012

[1] Visual Quality Objective data was created for the Routt National Forest Plan (USFS 1998) and has not been updated since 1983.

3.19.2. Trends

Trends on BLM-Administered Lands

Visual resources throughout BLM-administered lands are expected to be influenced by a number of competing management areas. Recreation and oil and gas development are likely to be the most

influential. As the state's population grows, more visitors will be attracted to BLM-administered lands for outdoor recreation in natural landscapes. The exercising of valid existing rights for oil and gas leases is also expected to affect scenic quality in the planning area over time. Other management activities expected to influence visual resources include fire management, energy and utility corridor development, road and trail construction, communication site placement, pipeline development, livestock grazing, and water tank siting.

Other possible trends or threats related to visual resources that are largely outside the control of BLM administrative actions include:

- decline in forest health and visual quality as a result of mountain pine beetle infestations
- changes to visual quality as a result of wildfire
- the proliferation of unauthorized routes on BLM-administered lands that can result in erosion, scarring, and deterioration of the scenic landscape

Activities on non-BLM-administered lands may also impact visual resources on BLM-administered land. Mineral extraction, energy development, and urban sprawl on neighboring lands have the greatest potential to alter the overall visual landscape in the planning area.

Trends on National Forest System Lands

Routt National Forest

Trends would be similar to activities occurring on BLM especially in outdoor recreation. Outdoor recreation use would continue to increase on Routt National Forest. Timber activities would occur in areas that have beetle killed trees and would change the visual quality.

3.19.3. References

BLM (United States Department of the Interior, Bureau of Land Management). 1984 (Revised 1988). Glenwood Springs Resource Management Plan. Glenwood Springs Field Office, CO.

_____. 2006. Final Roan RMP Amendment and EIS. Glenwood Springs Field Office, Glenwood Springs, CO.

USFS (United States Department of Agriculture, Forest Service). 1974. Handbook #462 National Forest Landscape Management Volume 2, Chapter 1. Visual Management System. Washington, DC.

_____. 1998. Record of Decision, Final Environmental Impact Statement and Revised Land and Resource Management Plan for the Routt National Forest. Steamboat Springs, CO.

_____. 2003. Amendment to the Forest Service Manual, Chapter 2380. National Headquarters, Washington, DC.

3.20. Lands with Wilderness Characteristics

BLM

The purpose of and need for the national GRSG planning effort is limited to making land use planning decisions specific to the conservation of GRSG habitats. No decisions related to the management of lands with wilderness characteristics will be made as part of this planning effort; therefore, management of lands with wilderness characteristics is considered outside the scope of this plan amendment process. Impacts on lands with wilderness characteristics from the alternatives being analyzed for this planning effort are presented in **Chapter 4**, **Section 4.20**, Lands with Wilderness Characteristics.

As part of the original FLPMA Section 603-mandated inventories, inventories were conducted during past RMP revisions and amendment efforts, and through other various lands with wilderness characteristics inventory updates that have recently taken place. Inventories for wilderness characteristics were conducted for each field office, including some ongoing inventories and reflect the most up-to-date lands with wilderness characteristics baseline information for this planning area. For inventories that were conducted after 2011, findings were documented following guidance in BLM Instruction Memorandum 2011-154, Requirement to Conduct and Maintain Inventory Information for Wilderness Characteristics and to Consider Lands with Wilderness Characteristics in Land Use Plans, which is now encompassed in BLM Manuals 6310 and 6320. Lands with wilderness characteristics inventories will be updated for any site-specific project NEPA analyses that are conducted in the planning area to determine if a project will have impacts to lands with wilderness characteristics identified through previous or updated inventory efforts.

USFS

Wilderness characteristics assessments are not applicable to National Forest System lands.

3.20.1. Existing Conditions

Conditions on BLM-Administered Lands

The BLM's wilderness characteristics assessment is designed to answer the following question: Does the area meet the overall criteria for wilderness character? The assessment reflects current conditions and will be used to update wilderness inventories. The process entails the identification of wilderness inventory units, an inventory of roads and wilderness character, and a determination of whether or not the area meets the overall criteria for wilderness character (naturalness, sufficient size, outstanding opportunities for solitude and primitive and unconfined types of recreation). Units found to possess such character are evaluated during the land use planning process to address future management. The following factors are documented:

- Size: Must be a roadless area with over 5,000 acres of contiguous BLM land or contiguous with designated wilderness or WSAs (or the equivalent. A roadless area of less than 5,000 acres may be considered if it is demonstrated that the area is of sufficient size to make practicable its preservation and use in an unimpaired condition.

- Naturalness: Lands and resources exhibit a high degree of naturalness when affected primarily by the forces of nature and where the imprint of human activity is substantially unnoticeable. An area's naturalness may be influenced by the presence or absence of roads and trails, fences or other developments; the nature and extent of landscape modifications; the presence of native vegetation communities; and the connectivity of habitats. Wildlife populations and habitat are recognized as important aspects of naturalness and would be actively managed.

- Outstanding Opportunities for Solitude or Primitive and Unconfined Types of Recreation: Visitors may have outstanding opportunities for solitude, or primitive and unconfined types of 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 an area is through non-motorized, non-mechanical means, and where no or minimal recreation facilities are encountered.
- Supplemental Values: Does the area contain ecological, geological, or other features of scientific, educational, scenic, or historical value?

Within the planning area, there are inventoried units with wilderness characteristics in four of the five BLM field offices, encompassing approximately 116,800 acres. Of the lands with wilderness characteristics in the planning area, approximately 31,900 acres include GRSG PPH and approximately 84,900 acres include GRSG PGH. Additionally, many acres have not yet been fully inventoried, particularly in the LSFO and WRFO. **Table 3.76,** BLM-Administered Lands with Wilderness Characteristics, provides information on the lands with wilderness characteristics broken down by field office.

Table 3.76. BLM-Administered Lands with Wilderness Characteristics

Field Office	Acres with Wilderness Character	
	PGH	PPH
Colorado River Valley	25,500	3,600
Grand Junction	300	0
Kremmling	0	0
Little Snake [1]	57,600	25,700
White River [2]	1,500	2,600
Total	**84,900**	**31,900**

Source: BLM 2013

[1] The LSFO has not completed a field office-wide inventory of lands with wilderness characteristics. For purposes of analysis, it is assumed that lands not yet inventoried contain wilderness characteristics.

[2] In the WRFO, an additional 22,000 acres of PGH and 14,000 acres of PPH may potentially contain wilderness character. However, a full inventory of these areas has not been completed. Until these areas can be inventoried, they will be managed as though they contain these characteristics.

Conditions on National Forest System Lands

Routt National Forest

Wilderness characteristics assessments are not applicable to National Forest System lands.

3.20.2. Trends

Trends on BLM-Administered Lands

As the BLM's LSFO and WRFO complete their inventories of wilderness characteristics, it is anticipated that more units will be identified to contain wilderness characteristics within the planning area. For purposes of analysis, it is assumed that lands not yet inventoried contain wilderness characteristics. Following completion of the inventories, these offices will determine

whether or not to manage for the protection of areas found to have wilderness characteristics. It is expected that the wilderness characteristics in these areas will be maintained over time.

Three units found to possess wilderness characteristics within the LSFO are currently managed for the protection of those wilderness characteristics. It is expected that the wilderness characteristics in these three areas will be preserved over time.

Within the CRVFO and GJFO, the BLM has completed LWC inventories, but is deferring determinations of protection for LWC until the release of the RMPs for those field offices. The prioritization of management of GRSG habitats is likely to impact LWC within the decision area. It is anticipated that some wilderness characteristics in these areas will be degraded over time, while others will be protected or preserved.

Trends on National Forest System Lands

Routt National Forest

Wilderness characteristics assessments are not applicable to National Forest System lands.

3.20.3. References

BLM (United States Department of the Interior, Bureau of Land Management). 1984. Glenwood Springs RMP. Glenwood Springs, CO.

_____. 2005. Handbook H-1601-1: Land Use Planning Handbook. Rel. 1-1693, March 11, 2005. BLM, Washington, DC.

_____. 2008. Roan Plateau Planning Area RMP Amendment and EIS. Glenwood Springs, CO.

_____. 2011. Little Snake Record of Decision and RMP. Craig, CO.

_____. 2012a. BLM Manual 6310-Conducting Wilderness Characteristics Inventory on BLM Lands. Rel. 6-129. BLM, Washington, DC. March 15, 2012.

_____. 2012b. BLM Manual 6320-Considering Lands with Wilderness Characteristics in the BLM Land Use Planning Process. Rel. 6-130. BLM, Washington, DC. March 15, 2012.

_____. 2012c. Colorado River Valley Field Office Draft RMP. Silt, CO.

3.21. Soundscapes

Soundscapes, defined as the combination of sounds in a given area, are the result of and influenced by two primary factors: sound sources and landscape features that attenuate or amplify sound. Sound can originate from natural sources such as surface water features, animal vocalizations, and weather or from human sources such as aircraft, automobiles, construction equipment, and human speech. Terrain features that may affect noise transmission include mountains, vegetation, and structures such as buildings, fences, and sound walls.

3.21.1. Existing Conditions

Conditions of the Planning Area

GRSG habitat is widely distributed throughout the planning area, with the highest concentrations of PPH and PGH in the Wyoming Basin MZ. This area covers the northern portion of the planning area. The largest habitat areas are located in Moffat, Jackson, and Grand counties. Habitat areas in the remainder of the planning area are generally smaller and less concentrated.

Due to the planning area's distance from large urban centers and rugged topography, the existing soundscape is largely punctuated by natural sounds. Landscapes within the planning area vary, but include mountains, ridges, narrow valleys, canyons, mesas, rolling hills, broad valleys, river valleys, basins, reservoirs, and badlands. These features influence the soundscape by magnifying, attenuating, and influencing the various sounds in the soundscape. **Figure 3-13**, Ambient Background Noise Model for Ridge Point During Summer, **Figure 3-14**, Ambient Background Noise Model for Ridge Point During Winter, **Figure 3-15**, Ambient Background Noise Model for Valley Point During Summer, and **Figure 3-16**, Ambient Background Noise Model for Valley Point During Winter (**Appendix B**, Figures), represent the expected levels of sound dissipation during the winter months and the summer months as tied to vegetation and as tied to topography.

Conditions on BLM-Administered and National Forest System Lands

Soundscapes on both BLM-administered and National Forest System lands within the Colorado sub-region are consistent with the planning area where natural sounds are dominant. Ambient background sources of sound within unpopulated and undeveloped areas include wind, insects, birds, and flowing water in proximity to rivers and streams. Variations in wind speeds and direction can affect the soundscape. Additional factors influencing the GRSG habitat soundscape on BLM-administered and National Forest System lands include aviation sources, recreation (including OHV use), location of transportation routes, proximity to urban areas, and energy development.

Aviation

The Colorado Army National Guard conducts high-altitude army aviation training from its facility at the Eagle County Airport in Gypsum. The Colorado Army National Guard's training exercises typically extend outward in a 25-mile radius (BLM 2007) covering areas of the mapped GRSG habitat in Eagle County. On average, 5 training operations occur per weekday for 46 weeks of the year. Training exercises typically take place during daylight hours, but during the fall and winter months when darkness occurs earlier, training exercises may extend into darkness hours. Training in the area is dispersed and infrequent and the more distant sectors of the training areas tend to receive less use in order to maximize training time. High-altitude army aviation training operates in conformance with seasonal restrictions and specific best management practices for avoiding public areas, wildlife, livestock, and areas with special designations. At close range (less than 100 feet), helicopters produce a sound exposure level of around 100 A-weighted decibels for the instant an overflight occurs. With greater distance these sound exposure level decrease, so that at 1,000 feet the noise level is 80 to 90 A-weighted decibels. At 1 mile, noise levels decrease to 80 A-weighted decibels or less.

There are several airports within or near the planning area, including in the towns of Steamboat Springs, Hayden, Craig, Meeker, Glenwood Springs, Kremmling, Granby, and Walden. The Walden-Jackson County Airport in Walden, McElroy Airport in Kremmling, and Craig-Moffat County Airport in Craig are in or directly adjacent to PPH.

Recreation and Off-Highway Vehicle Use

Colorado State Law regulates noise emissions for OHVs. Under the law, vehicles manufactured before January 1, 1998, must not exceed 99 A-weighted decibels. Vehicles made after January 1, 1998, cannot exceed 96 A-weighted decibels. OHV use is popular throughout the planning area. In the CRVFO, for example, the BLM issues six special recreation permits for guided jeep and all-terrain vehicle tours around the Castle Peak area. Stipulations are included in the permits to limit group sizes, coordinate with other operators to minimize congestion, operate 2 trips or less per day, and avoid early dawn trips.

The Bocco Mountain SRMA, in the CRVFO, overlaps a small portion of the southern mapped boundary of GRSG habitat. This SRMA is also a popular OHV area. The BLM manages the Bocco Mountain SRMA for motorcycle activity on a system of designated single tracks. The Sand Wash area in the LSFO is also a popular location for OHV use.

Shotgun, riffle, and handgun discharges also influence the soundscape. Big game hunting is popular throughout the planning area, particularly in the fall. In addition, there are two developed shooting ranges in the planning area. The Byers Canyon Rifle Range, managed by Colorado State Parks and Wildlife, is along US Highway 40. The privately owned Blue Valley Sportsmen Club Rifle Range is along Colorado Highway 9. Both ranges are adjacent to BLM-administered lands. These shooting ranges see moderate to heavy use, with the highest usage rates occurring during the fall big-game hunting season.

Transportation Routes

Several major roadways traverse the planning area and contribute to the soundscape for areas adjacent to these routes. These roadways are used by private autos and the trucking industry to access other road networks, communities, and BLM-administered and National Forest System lands throughout the planning area. US Highway 40, which runs east to west through Sulphur Springs, Steamboat Springs, and Craig before entering eastern Utah, crosses more GRSG habitat than any other roadway in the planning area. Other roadways that contribute to the soundscape include State Highways 9, 13, 14, 125, and 131. A network of smaller local and private roads also influences the soundscape but to a lesser degree of intensity and frequency.

Several railroad lines cross the planning area. Passing trains provide intense but infrequent contributions to the surrounding soundscapes.

Urban Areas

GRSG habitat in the planning area is mainly on remote, rural land. However, noise radiating from urban areas influences the soundscape for certain GRSG habitat on BLM-administered land adjacent to urban areas. The municipalities with the greatest potential to influence the soundscape of adjacent GRSG habitat are Craig, Walden, Hot Sulphur Springs, and Kremmling. Urban activity originating in Steamboat Springs may contribute to the soundscape in the Routt National Forest.

Energy Development

Noise from energy-related surface activities and mineral extraction modifies the soundscape directly, adjacent to, and, due to the intensity of sound from these activities, well beyond the footprint of the activity. Noise levels associated with construction activities range from 70 A-weighted decibels to over 90 A-weighted decibels within 50 feet of the activity. Noise levels attenuate with distance with a reduction of approximately 6 A-weighted decibels with each doubling of distance (Thurman and Miller 1996). **Table 3.77**, Noise Levels for Oil and Gas

Activities, summarizes noise levels for a number of oil and gas activities. See also **Diagram 3-13**, Typical Noise Levels Near Gas Field Operations.

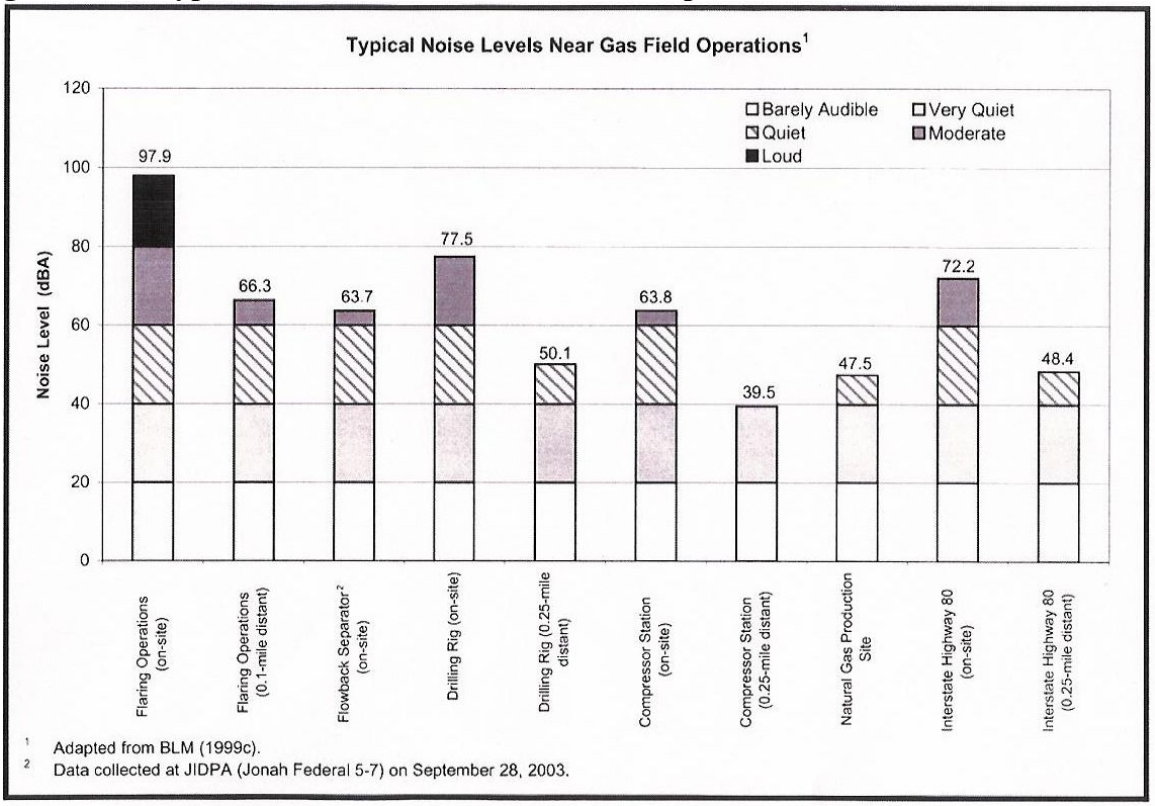
North Park, in the KFO, has the McCallum and Battleship oil fields, which have moderate to high levels of development and associated truck traffic. In recent years, additional oil and gas development has increased within the area but primarily on privately owned lands. The oil and gas rigs and associated vehicle traffic contribute to manmade noise in the soundscape.

In the LSFO, about 226 wells have been constructed on BLM-administered lands in the last 20 years. Most oil and gas developments have occurred in more concentrated areas where the potential for economically recoverable mineral resources is high.

Table 3.77. Noise Levels for Oil and Gas Activities

Typical compressor station	50 A-weighted decibels (375 feet from property boundary)
Pumping units	50 A-weighted decibels (325 feet from well pad)
Fuel and water trucks	68 A-weighted decibels (500 feet from source)
Crane for hoisting rigs	68 A-weighted decibels (500 feet from source)
Concrete pump used during drilling	62 A-weighted decibels (500 feet from source)
Average well construction site	65 A-weighted decibels (500 feet from source)
Source: La Plata County , Colorado	

Diagram 3–13 Typical Noise Levels Near Gas Field Operations



3.21.2. Trends

As the state's population grows, more visitors will be attracted to BLM-administered lands for recreation and solitude in natural landscapes. With the increase in both resident populations and

in tourism, soundscapes are expected to become further influenced by human activities such as recreation, hunting, motor vehicle travel, and energy development.

Oil and gas development in the North Park area continues to slowly increase primarily on privately owned lands. The top of the plateau has valid existing leases and with those leases, valid existing leasing rights. Future oil and gas development on the Roan Plateau could generate noise but would be seasonally limited because of snow accumulations on top of the plateau. Limited convenient access to the top of the plateau would also limit the number of other users that may contribute to the ambient noise on top of the plateau.

Significant modifications to the existing soundscapes in the planning area may be limited since the habitat areas are not easily accessible due to topography constraints. The distribution of private land adjacent to BLM-administered and National Forest System lands also constrains access but may introduce the potential for soundscape changes in the planning area as private parcels are developed.

Soundscapes near GRSG habitat have not changed on the Routt National Forest in the past several decades, with the exception of increased snowmobile activity during the winter. The majority of this activity within GRSG habitat occurs in PGH that is not suitable for winter use by GRSG.

3.21.3. References

BLM (United States Department of the Interior, Bureau of Land Management). 2007. Environmental Assessment #CO-140-2005-143. Increased Aircraft Operations at the Colorado Army National Guard High-Altitude Army Aviation Training Site. BLM, Glenwood Springs Field Office, CO.

La Plata County, Colorado. 2002. La Plata County Impact Report. pp 3-98.

Thuman, A., and R. K. Miller. 1996. Fundamentals of Noise Control Engineering. Prentice-Hall, Englewood Cliffs, New Jersey. 287pp.

3.22. Cultural Resources and Native American Religious Concerns

Cultural resources are the material and physical remains of prehistoric and historic human activity, occupation, or endeavor. “Culture [is] a system of behaviors, values, ideologies, and social arrangements. These features, in addition to tools and expressive elements such as graphic arts, help humans interpret their universe, as well as deal with features of their environments, natural and social. Culture is learned, transmitted in a social context, and modifiable. Synonyms for culture include lifeways, customs, traditions, social practices, and folkways (Parker and King 1998). Natural features of importance in human history, such as mountains and rivers, may also be considered cultural resources. Overall, these resources are fragile and nonrenewable, and embody characteristics and information specific to the period in which a cultural group lived. Intrinsically, each cultural resource is important and provides valuable information about human occupation of an area. The protection of cultural resources is provided for by an extensive framework of laws, regulations, executive orders, and formal agreements. These laws and regulations have evolved over the past century to create a complex but strong policy for managing cultural resources for public benefit on both BLM-administered and National Forest System lands.

Section 106 (16 USC 470-f) and Section 110 (16 USC 470h-2) of the National Historic Preservation Act are the foundation of cultural resource protection and management for all federal agencies. Section 106 specifically requires federal agencies to take into account the effects of their activities on significant cultural properties, and specifies the procedures for meeting the statutory responsibilities. The Act also established the NRHP, which is a national program that coordinates and supports public and private sectors in the identification, evaluation, and protection of historic and archaeological resources. The NRHP provides an official listing of the nation's historic places deemed worthy of preservation.

Section 110 (16 USC 470h-2) provides the legal basis for the historic component of federal agencies' cultural programs. Section 110 prescribes to federal agencies and initiates a preservation program for each agency, which is responsible for both collecting information about cultural resource sites in a particular planning area, as well as identifying sites eligible for nomination to the NRHP. Historic properties are defined as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP. The term includes, for purposes of these regulations, artifacts, records, and remains that are related to and located within such properties. The term "eligible for inclusion in the NRHP" includes properties formally determined as such by the Secretary of the Interior and all other properties that meet NRHP listing criteria (36 CFR 800.2[e])."

Significant cultural properties include Traditional Cultural Properties. According to this code of regulations, a property is significant, and therefore eligible for nomination to the NRHP, if it possesses the following characteristics:

1. The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that

    a. Are associated with events that have made a significant contribution to the broad patterns of our history.

    b. Are associated with the lives of persons significant in our past.

    c. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

    d. Have yielded, or may be likely to yield, information important in prehistory or history.

Although typically only properties 50 years or older may be considered significant, a number of exceptions apply for properties of unusual or exceptional significance (36 CFR 60).

Sites identified as eligible or that require additional data for significance evaluation as potentially eligible for the NRHP, are entitled to resource management considerations. These sites are protected through avoidance, and if avoidance is not possible, a mitigation strategy is developed to mitigate adverse impacts. Sites evaluated as not eligible for the NRHP after complete identification, description, and significance evaluation are eliminated from further resource management considerations. Federal agencies have the responsibility to protect cultural resources on non-federal lands for certain Section 106 undertakings. However, federal agencies have

no responsibility for their long-term protection because cultural resource sites are owned by the landowner.

The BLM has entered into a national programmatic agreement with the Advisory Council on Historic Preservation and the National Conference of State Historic Preservation Officers, and a protocol with the Colorado State Historic Preservation Office on planning for and managing historic properties under the BLM's jurisdiction or control. The protocol outlines how the BLM and State Historic Preservation Office would continue to interact, cooperate, and share information to ensure that the alternate procedures are consistent with the goals of the National Historic Preservation Act. These procedures allow the BLM more flexibility in identifying those cultural resources that meet criteria listed in 36 CFR Part 60.4 for NRHP eligibility and determining effects according to 36 CFR 800.9 without consulting State Historic Preservation Office for each routine undertaking.

The Routt National Forest currently has two forest specific programmatic agreements with the Advisory Council on Historic Preservation and the Colorado State Historic Preservation Office for project specific reporting and managing historic properties under the forest's jurisdiction. These agreements provide protocols for expedited reporting of surveys where there are no cultural resources that meet the criteria for NRHP eligibility as well as standard protection measures to ensure a no adverse effect to those sites meeting the criteria.

3.22.1. Existing Conditions

Conditions of the Planning Area

Documented prehistoric site types on BLM-administered lands in the planning area include open architectural, open and sheltered camps, open lithic, rock art, stone quarries, and a sheltered lithic. Prehistoric sites in this area commonly contain projectile points, scraping and cutting tools, hammerstones, tool manufacture flake debris, manos and metates, and, less commonly, pottery. Prehistoric sites could be associated with one or more of four regional cultural traditions: Paleo-Indian, Archaic, Formative (Fremont), and Proto-historic.

Historic sites are primarily related to early ranching and livestock grazing and are concentrated along the more moist drainage bottoms. Sites include, but are not limited to, arborglyphs, cow camps, trash scatters, mines, roads, trails, railroads, ditches, homesteads, and other historic structures. Artifacts at these sites commonly include tin cans, glass, ceramic, wire, nails, wood, and other metal objects.

Table 3.78, Inventory Acreage, Sites, and Ratio of Known Cultural Resources Sites to Acres, displays the number of inventoried acres and the number of historic properties found, divided up by BLM field office and Routt National Forest.

Table 3.78. Inventory Acreage, Sites, and Ratio of Known Cultural Resources Sites to Acres

Location	Total Class III Inventory	Known Sites	Total Historic Properties	Ratio of Known Sites to Acres (sites: acres)
CRVFO	23,300	243	56	1:96
GJFO	10,600	87	42	1:122
KFO [1]	305,500	5,533	1,086	1:55
LSFO1	65,400	5,679	1,573	1:318

Location	Total Class III Inventory	Known Sites	Total Historic Properties	Ratio of Known Sites to Acres (sites: acres)
WRFO	88,100	645	286	1:137
Routt National Forest	1,400	43	3	1:32
Total	**494,300**	**12,230**	**3,046**	**1:183**

Source: Reed et al. 2008 (for KFO); McDonald and Metcalf 2006 (for LSFO); BLM 2013 (for all other locations).

[1] Numbers for the KFO and LSFO includes acreage and sites outside of GRSG habitat. However, because a large proportion of both field offices falls within the planning area these numbers can be considered representative of the portions of these two field offices that falls within the planning area. Numbers for all other field offices are specific to GRSG habitat within those offices.

As a result of Class III Inventories, the most cultural resource inventory sites and historic properties are within the KFO and LSFO. The ratio of known sites to acres suggests the highest densities of cultural resources occur on the Routt National Forest and KFO.

Conditions on BLM-Administered Lands

The following field office descriptions are intended to provide a general overview of the condition of cultural resources on BLM-administered lands within the decision area. More specific information on the cultural resources for each area can be found in the respective RMPs and several overview reports, including Reed and Metcalf's Northern Colorado River Basin overview (1999), a synthesis of archaeological data compiled for several large pipeline projects (2009); Athearn (1982), Husband (1984), and Church (2007) for an overview of the historic context; and individual Class I Overview Reports for LUP revisions including for the LSFO (McDonald and Metcalf 2006).

Colorado River Valley Field Office

Within the portion of the decision area that falls within the CRVFO, cultural resources are broken out into two separate areas; the Roan Plateau and the North Eagle areas. The Roan Plateau area is located northwest of Rifle, Colorado, north of the Colorado River and on top of the Roan Plateau. The North Eagle area is located north of Eagle, Colorado, and north of the Colorado River within the Upper Colorado River watershed. Differences in cultural resources between the Roan Plateau and the North Eagle areas provide insight to how the areas were utilized in the past.

A total of 23,300 acres have been inventoried for cultural resources at the Class III level the portion of the planning area that falls within the CRVFO. This accounts for approximately 19 percent of the planning area that falls within the CRVFO. A total of 172 prehistoric sites and 177 prehistoric isolated finds have been documented within this area. Of the 172 sites, 37 are eligible and 37 others are potentially eligible for the NRHP. Prehistoric cultural resources consist of open camp sites, open lithic sites, open architectural sites, and various isolated finds. Of the prehistoric sites that are datable, the majority (about 20 sites) date from the Archaic and 15 sites date to the Late Prehistoric. Additionally, the planning area contains one Paleoindian site, one Protohistoric site, and two possible Fremont sites. Unlike the entirety of the CRVFO, the planning area does not contain sites with Wickiup structures. Because Wickiups are mainly located within Pinion-Juniper vegetation and the planning area is predominantly sage brush, these types of sites are not found in this part of the CRVFO.

Historic cultural resources within the planning area consist of irrigation ditches, railroad segments, trails, roads, cabins, and bridges. A total of 58 historic sites have been documented, six of which are eligible and three of which are potentially eligible for the NRHP. Additionally, a total of 20 historic isolated finds have been recorded. Some unique historic sites in the planning area include the Historic Burns School, the Burns rodeo grounds, a cemetery, and 13 separate arborglyph (aspen art) sites. The oldest historic sites date to the 1880s and are segments of stage coach lines or roads.

Grand Junction Field Office

Within the portion of the decision area that falls within the GJFO, cultural resource settings can be split into two distinct units. One unit is located south and east of the Colorado River and wraps around the west end of Battlement Mesa (Sunnyside). The other is located north and west of the Colorado River and characterized as the high elevation ridges above the Roan Creek watershed (Roan Creek). These two environments seem to have been utilized differently during prehistoric times and have distinctly different cultural resources.

Within the portion of the decision area that falls within the GJFO, a total of 10,600 acres have had Class III surveys and a total of 87 cultural resources (sites) and 163 isolated finds have been recorded.

Within the Sunnyside unit, the majority of prehistoric sites are open camps, with open architectural (wickiups), sheltered camps, and rock art sites also recorded. Historic sites in this unit include homesteads, camps, isolated trash scatters, and a wagon road. Recorded Native American sites range from 6,000 years ago to what is interpreted as historic Ute occupation. Excavations in the unit have demonstrated that sites from the archaic time period are not only found on the surface, but in some locations are deeply buried with little to no surface artifacts.

Within the Roan Creek unit, the prehistoric sites are evenly divided between open camps and open lithic (one multicomponent site has an open lithic component at a homestead). Historic sites include cabins, corrals and camps. No excavation data are available and all prehistoric sites have been recorded as “unidentified Native American” which gives no indication of even a general date of occupation. The presence of obsidian at the lithic scatter at the homestead suggests a possible historic Ute association but this is speculative.

Kremmling Field Office

Within the KFO, a total of 305,500 acres have had Class III surveys and a total of 5,533 known sites have been recorded. This includes some acreage and sites that fall outside the planning area for this EIS. However, because the decision area represents the majority of the KFO it can be assumed to be representative of the planning area within the KFO.

The draft EIS for the KFO RMP further describes cultural resource conditions that may affect historic properties on the KFO (BLM 2011, pp. Section 3.2.7) and describes the number of prehistoric and historic properties that are eligible and whether they are multi-component sites, and isolated finds within the decision area, three landscape units defined as: the Middle Park Unit, the North Park Unit and the Larimer Unit. The draft RMP/EIS also describes significant historic properties and actions for protection under the NHPA of 1966, as amended and its implementing laws and regulations within the KFO (BLM 2011, Section 3.2.7). Those portions of Chapter 3 of the draft RMP/EIS that describe the affected environment are incorporated here by reference.

Little Snake Field Office

Within the entirety of the LSFO, 65,400 acres have had Class III surveys and a total of 5,679 sites have been recorded. This includes some acreage and sites that fall outside the decision area for this EIS. However, because the decision area represents a large portion of the LSFO it can be assumed to be representative of the portion of the decision area within the LSFO.

The prehistoric and historic cultural context for the LSFO has been described in several recent regional contexts. The prehistoric context is described in Reed and Metcalf's Northern Colorado River Basin overview (1999), a synthesis of archaeological data compiled for several large pipeline projects (2009). The historic context is described in overviews compiled by Frederic J. Athearn (1982) and Michael B. Husband (1984). A historical archaeology context has also been prepared for the state of Colorado by Church and others (2007). An overview of significant cultural resources (affected environment) on BLM-LSFO administered lands has been compiled by McDonald and Metcalf (2006) for the Little Snake RMP and Final EIS (3-81). Those portions of Chapter 3 of the LSFO RMP/EIS that describe the affected environment are incorporated here by reference.

White River Field Office

Within the portion of the decision area that falls within the WRFO, a total of 88,000 acres (14 percent of the total acreage of the decision area within the WRFO) have had Class III surveys and a total of 645 sites have been recorded. Of these 645 sites, 458 are prehistoric, 169 are historic, and 17 are multicomponent. Of the sites, one is listed on the NRHP (the Battle of Milk Creek/Thornburgh battlefield), 68 are eligible, 218 are potentially eligible, and 358 are not eligible sites. The majority of the previously recorded sites in the WRFO planning area have been identified as prehistoric in age and cultural affiliation.

Prehistoric sites could be associated with one (or more) of four regional cultural traditions: Paleo-Indian, Archaic, Formative (Fremont), and Proto-historic. Documented prehistoric site types in the portion of the decision area that falls within the WRFO include open architectural, open and sheltered camps, open lithic, rock art, stone quarries, and a sheltered lithic. Prehistoric sites in this area commonly contain projectile points, scraping and cutting tools, hammerstones, tool manufacture flake debris, manos and metates, and less commonly pottery.

The historic sites in the portion of the decision area that falls within the WRFO are primarily related to early ranching and livestock grazing and are concentrated along the more moist drainage bottoms. Sites include, but are not limited to, aspen art, a barn, a battlefield, bridges, brush fences, a cairn, cabins, camps, coal mines, corrals, cow camps, ditches, a historic marker, homesteads, horse traps, ranches, roads, rock art, school houses, a townsite, trails, and trash scatters. Artifacts at these sites commonly include tin cans, glass, ceramic, wire, nails, wood and other metal objects.

Conditions on National Forest System Lands

Routt National Forest

Of the 17,500 acres on the Routt National Forest in the decision area, 1,400 acres (8 percent) have been inventoried for cultural resources. Of the acres inventoried, 43 cultural resources have been located, or approximately one cultural resource located for every 30 acres of habitat inventoried.

Of the located cultural resources, the majority (26 of the 43, or 60 percent) are prehistoric sites. The most common type of site located in the habitat on the Routt National Forest is a lithic

scatter. Historic sites in the habitat area include isolated USGS survey markers, historic aspen art, roads, and cabins.

Of the 43 sites located, only 3 have been evaluated as being eligible to the NRHP. This translates to one eligible site for every 452 acres surveyed. The Hahns Peak/Bears Ears Ranger District has one of the eligible sites, a historic cabin site. The Parks Ranger District has the other two sites, both of which are prehistoric sites.

3.22.2. Trends

Trends on BLM-Administered Lands

Known conditions of cultural resources within the decision area indicate that the majority of sites are in good or fair condition; few sites are in deteriorating or poor condition. Natural erosion, such as wind and water erosion, project development, increases in site visitation, and increases in recreation and development activities can all contribute to declining site conditions. Actions that specifically highlight stabilization or avoidance measures for cultural resources would contribute to maintaining current site conditions.

Declining site conditions can result from project development activities, permitted activities, or neglect. Causes of declining site conditions in the decision area include recreation activities, vegetation treatments, fire (both natural and unplanned), locatable mineral development, coal development, road and utility rights of ways and leases (such as pipelines, roads, and transmission lines), livestock grazing, and wild horses and burros. These activities generally fragment the landscape, break up site continuity, and can damage and destroy sites, contributing to their decline.

The cultural resource program within the Colorado GRSG decision area continues to be driven primarily by project-related cultural resource inventory, as well as proactive Section 110 inventories. As a result new discoveries are on-going, and newly discovered cultural resources are being documented and added to the cultural resource database regularly. Significant cultural resources are selected for protection or mitigation prior to project implementation.

Trends on National Forest System Lands

Routt National Forest

Trends that are likely to affect cultural resources include oil and gas development, recreation, vegetation treatments, lands and realty actions, and livestock grazing. For the Routt National Forest, these trends are primarily qualitative in nature. As projects are proposed, additional acres are surveyed for cultural resources. If a significant resource is located, mitigation is typically designed to avoid any negative consequences of the proposed actions. In general, increased numbers of proposed projects increase the ability of the USFS to identify and evaluate cultural resources, and thereby protect those that are considered significant. The increasing use of the Forest by recreation users has the potential to increase effects on significant resources through exposure of the sites by vehicular and foot traffic, as well as potential effects through unauthorized collection of artifacts.

3.22.3. References

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3.23. Paleontological Resources

Paleontology is the study of fossils and related remains. A fossil is defined as any trace of a past life form. The term “paleontological resources” includes any fossilized remains, traces, or imprints of organisms that are preserved in or on the earth’s crust, are of scientific interest, and provide information about the history of life on earth. Paleontological resources constitute a fragile and nonrenewable scientific record of the history of life on earth.

Occurrences of paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds) that contain them. The probability for finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. Therefore, geologic mapping can be used for assessing the occurrence potential of paleontological resources.

BLM

BLM policy is to manage paleontological resources for scientific, educational, and recreational values and to protect or mitigate these resources from adverse impacts. To accomplish this goal, paleontological resources must be professionally identified and evaluated, and paleontological data should be considered as early as possible in the decision-making process. Paleontological resources are managed according to the BLM Manual Section 8270, Paleontological Resource Management, BLM Handbook H-8270-1, General Procedural Guidance for Paleontological Resource Management, and applicable BLM instructional memoranda and bulletins. Additional preservation measures have been enacted under the Omnibus Public Lands Act of 2009. The BLM is currently developing regulations to implement the requirements of this law.

BLM guidance (BLM Instruction Memorandum 2008-009, Potential Fossil Yield Classification System for Paleontological Resources on Public Lands) defines a classification system to provide a more uniform tool to assess potential occurrences of paleontological resources and evaluate potential impacts. The Potential Fossil Yield Classification system is intended to be applied in broad approach for planning efforts and as an intermediate step in evaluating specific projects. This is part of a larger effort to update BLM Handbook H-8270-1, General Procedural Guidance for Paleontological Resource Management.

Using the Potential Fossil Yield Classification system, geologic units are classified based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts. A higher class number indicates a higher potential. This classification is applied to the geologic formation, member, or other distinguishable unit, preferably at the most detailed mappable level. It is not intended to be applied to specific paleontological localities or small areas within units. Although significant localities may occasionally be found in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher class; instead, the relative abundance of significant localities is intended to be the major determinant for the class assignment. Five classes were developed: Class 1 has very low potential for containing fossils, and Class 5 has very high potential.

The Potential Fossil Yield Classification system class assignments are (BLM 2008h):

- Class 1-Very Low. Geologic units that are not likely to contain recognizable fossil remains.
- Class 2-Low. Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils.
- Class 3-Moderate or Unknown. Fossiliferous or scientifically geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential.
- Class 4-High. Geologic units containing a high occurrence of significant fossils. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. Surface-disturbing activities may adversely affect paleontological resources in many cases.

- Class 5-Very High. Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils, and that are at risk of human-caused adverse impacts or natural degradation.

USFS

In 2009, Congress passed the Paleontological Resources Preservation Act as part of the Omnibus Public Land Management Act (Public Law 111-11). The Act mandated that the "Secretary [of Agriculture] shall manage and protect paleontological resources on federal land using scientific principles and expertise. The Secretary shall develop appropriate plans for inventory, monitoring, and the scientific and educational use of paleontological resources, in accordance with applicable agency laws, regulations, and policies. These plans shall emphasize interagency coordination and collaborative efforts where possible with non-federal partners, the scientific community, and the general public."

The USFS Rocky Mountain Region has developed a classification system of geologic units according to their probability of containing scientifically significant fossil resources referred to as the Fossil Yield Potential Classification. The Fossil Yield Potential Classification is designed to provide USFS management with a way to prioritize protection of paleontological resources. Under this system, geologic formations are classified on a scale from 1 to 5 (with 5 as the highest paleontological sensitivity) to reflect the likelihood of containing scientifically significant vertebrate fossils of terrestrial (i.e., nonmarine) origin. A less arbitrary and subjective classification system is currently being developed by USFS paleontological resource specialists.

3.23.1. Existing Conditions

Conditions of the Planning Area

The planning area, which includes Dinosaur National Monument and other high fossil yielding geological formations, contains extensive paleontological resources. While comprehensive paleontological inventories have not been completed for the planning area, however, many studies have been conducted.

Conditions on BLM-Administered Lands

While a comprehensive paleontological inventory has not been conducted on BLM lands within the decision area, various government, academic, and private industry personnel have studied paleontological resources.

Within the KFO, 23 of the 59 named surface formations are known to contain fossils. Over 1,000 paleontological localities have been documented, representing a diverse array of plants, invertebrates, and vertebrates (BLM 2011, Section 3.2.8). Within the portion of the decision area that falls within the KFO, the Kremmling Cretaceous Ammonite ACEC is managed for scientific and educational purposes related to paleontological resources.

Within the LSFO, at least 40 groups and institutions from the 1850s to the present have collected fossils (Armstrong and Wolney 1989). During that period, over 1,000 paleontological localities have been documented, representing a diverse array of plants, invertebrates, and vertebrates. There are currently active paleontological use permits within the LSFO.

Roughly 20 percent of the GJFO has either Morrison or Wasatch formation on the surface, both of which have produced many scientifically significant fossils. Since 1987, numerous paleontological fossil sites have been discovered and continue to be surveyed and recorded. Nearly all of the decision area within the GJFO is classified as Potential Fossil Yield Class 5, meaning these areas have a high probability of containing significant fossils.

Over 1,000 paleontological localities have been documented in the CRVFO area, and the fossils recovered represent a diverse array of plants, invertebrates, and vertebrates. There are active paleontological use permits issued on decision area lands in the CRVFO. Efforts to fully inventory fossil resources within the CRVFO have been limited in scope. The 78 named surface formations identified within the CRVFO area are described in the draft EIS for the CRVFO RMP (DES 11-33, BLM 2011, Section 3.2.9). This document also outlines the 20 fossil bearing formations classified as high potential yield based on the BLM's Potential Fossil Yield Classification system. Most fossil bearing formations present within the identified PPH and PGH in the CRVFO are not exposed in bedrock outcrops (which represent the majority of discovery sights) due to tertiary aged colluvium and alluvium deposits as well as a high degree of vegetative cover.

Efforts to fully inventory fossil resources within the WRFO planning area have been limited in scope. Government, academic, and private industry personnel have studied paleontological resources in various contexts, but principally in relation to surface-disturbing development activities. To date, there are approximately 355 documented paleontological localities within the WRFO and many more that were located prior to current recording standards. The GRSG habitat in the WRFO is primarily in Potential Fossil Yield Class 5 formations, so there is a very high probability of it containing significant fossils. There are 68 documented paleontological localities that have been recorded in the GRSG habitat.

Conditions on National Forest System Lands

Routt National Forest

The extent of paleontological deposits in the Routt National Forest is unknown at this time. A complete inventory of the possible fossil-laden deposits has not been completed. Two potential paleontological resource areas on the National Forest have been identified. In the late 1970s, a single mammoth femur was removed from the mud at the base of the Yamcolo Reservoir Dam during construction. Little is known about the circumstances of the recovery. However, the excellent preservation of the specimen and the geomorphology of the area suggest the presence of Pleistocene deposits which may contain more faunal material. The other area is California Park, which contains unique features such as sulphur springs, fossils, and buffalo skulls. The California Park area is the only areas of known fossils in conjunction with PGH.

The Fossil Yield Potential Classification maps for the Routt National Forest show most of the forest as a 1or 2, with the two mentioned areas as 3's. At this time there are not any known areas with a classification rating of 4 or 5 on the National Forest.

3.23.2. Trends

Trends on BLM-Administered Lands

Interest in fossils and paleontology has been greatly stimulated in recent years, bringing new vocational and professional visitors to the known fossil locations, and increased exploration to discover new fossil localities. This has in turn increased agency concern for potential impacts on

the resource from vandalism and theft. The current trend of paleontological resource use permits and scientific activity is likely to continue or to increase slightly in the future. Clearances and monitoring of surface-disturbing activities, land tenure adjustments, and scientific research are anticipated to be the primary means of identifying paleontological localities.

The current management direction and forecast for paleontological resources is to implement the Potential Fossil Yield Classification throughout the decision area and to identify and record new findings. Another goal is to seek opportunities to identify areas with significant paleontological resources for special management. Preservation measures for paleontological resources enacted under the Omnibus Public Lands Act of 2009 would be implemented.

Surface-disturbing activities and oil and gas development are two of the main drivers of the paleontology program. Developments of oil and gas and other minerals such as coal and nahcolite, as well as the realty actions associated with them, road and pipeline construction for example, fragment the landscape, and cause outright destruction of sites, as well as indirect impacts such as theft. The positive effect of energy and mineral development is the increased knowledge of the resource that is gained by surveys, construction monitoring, and excavations.

Additionally, despite the harm oil and gas can potentially cause paleontological resources, all paleontological resources are managed to protect their important scientific values and will continue in the future as the BLM continues to enact preservation measures enacted under the Omnibus Public Lands Act of 2009 and other legislation.

Trends on National Forest System Lands

Routt National Forest

The USFS recognizes multiple-use values for paleontological resources that include a legacy for present and future generations; scientific significance, education and interpretation; recognition of aesthetic qualities; and public participation. The Paleontological Resources Preservation Act set specific regulations for permitting, collection, and curation of paleontological resources from federal lands. Furthermore, it is the policy of the USFS to complete a paleontological resources inventory for all National Forest System lands potentially impacted by agency and non-agency project proposals. For sites located during these inventories, it is policy to complete a paleontological resource site form.

3.23.3. References

BLM (US Bureau of Land Management). 2008. Instruction Memorandum No. 2008-009, Potential Fossil Yield Classification System for Paleontological Resources on Public Lands. BLM, Washington Office, Washington, DC.

3.24. Social and Economic Conditions (Including Environmental Justice)

This section includes the individual resources of social conditions, economic conditions, and environmental justice. Due to the nature of social, economic, and environmental justice conditions, the social and economic analysis is based on a somewhat different area for analysis than is used for other resources. Specifically, the Socioeconomic Study Area is made up of counties within the Northwest Colorado sub-region that contain some GRSG habitat, plus counties

that may not contain habitat but are intimately linked to the economic or social conditions and also serve as important service areas. This latter category includes what are sometimes called "service area" counties, or counties from which businesses operate that regularly provide critical economic services, such as recreational outfitting or support services for oil and gas drilling and production, within the counties that contain habitat (METI Corp/Economic Insights of Colorado 2012). Including service area counties is important because a change in economic activity in a county containing habitat may result in changes in economic activity within service area counties as well. At the same time, not every possible service area county is included in the Socioeconomic Study Area, because to do so would risk dwarfing the impacts within the counties that would be most affected. For example, businesses within the City and County of Denver do provide some services within the Northwest Colorado sub-region, but including Denver in the Socioeconomic Study Area would risk overwhelming the observable conditions in less populated counties within the sub-region.

The Socioeconomic Study Area contains eight counties in Colorado: Eagle, Garfield, Grand, Jackson, Mesa, Moffat, Rio Blanco, and Routt. Each of these counties contains PPH or PGH. Larimer and Summit counties also have GRSG habitat in the Northwest Colorado sub-region but were excluded from the Socioeconomic Study Area because they have considerably less habitat than other counties (less than 10,000 acres), are not considered important service areas for the remaining counties, and, in the case of Larimer County, would have considerably altered the data presented for the Socioeconomic Study Area because of the size of the county's population and economy. Mesa County also has less than 10,000 acres of GRSG habitat but was kept in the Socioeconomic Study Area because the city of Grand Junction is a primary service area county for oil and gas support services. **Table 3.79**, BLM and USFS Management Units and Counties within the Socioeconomic Study Area, shows the counties contained partially or wholly within the Routt National Forest and each BLM field office composing the Socioeconomic Study Area.

Table 3.79. BLM and USFS Management Units and Counties within the Socioeconomic Study Area

Agency	Management Unit	Counties
BLM	CRVFO	Eagle, Garfield, Mesa, Pitkin, Rio Blanco, Routt
BLM	GJFO	Garfield, Mesa
BLM	KFO	Eagle, Grand, Jackson, Larimer, Summit
BLM	LSFO	Moffat, Rio Blanco, Routt
BLM	WRFO	Garfield, Moffat, Rio Blanco
USFS	Routt National Forest	Garfield, Grand, Jackson, Moffat, Rio Blanco, Routt

BLM and USFS considered Larimer and Summit Counties in Colorado, with some GRSG habitat, as part of a "secondary" Socioeconomic Study Area. In addition, Uintah County, in Utah, and Sweetwater and Carbon counties, in Wyoming, were also included as part of the secondary Socioeconomic Study Area. Uintah County was included because companies in Vernal provide important oil and gas related services within some of the areas of northwestern Colorado in the primary analysis area (Lau 2012). Sweetwater and Carbon counties were included because Rock Springs (Sweetwater County) and Rawlins (Carbon County) also seem to serve as an important service areas (Comstock 2013). Because any effects on the Secondary Socioeconomic Study Area would be indirect and sometimes focused on specific sectors (e.g., oil and gas in Uintah County), this section contains limited data on conditions within these counties, and focus on what is necessary to provide appropriate context for the impact analysis provided in **Chapter 4**, Environmental Consequences.

Table 3.80, Commuter Patterns in the Socioeconomic Study Area, 2010, shows the share of workers employed in a given county of the Primary and Secondary Socioeconomic Study Areas and that reside in the same county. It also shows other counties that provide labor to the selected primary or secondary study area. The table shows that no labor market in the Socioeconomic Study Area relies on a county outside the Socioeconomic Study Area for a considerable share of the workers employed.

Table 3.80. Commuter Patterns in the Socioeconomic Study Area, 2010

Geographic Area of Employment	Live in Same Area of Employment	Other Counties Where Considerable Share of Workers Live
Primary Socioeconomic Study Area		
Eagle County, CO	64.4%	Garfield (5.3%), Summit (4.6%), Lake (2.7%), Denver (2.4%), Jefferson (2.0%)
Garfield County, CO	60.8%	Mesa (9.0%), Eagle (5.0%), Pitkin (2.4%)
Grand County, CO	73.9%	Jefferson (3.8%), Larimer (3.2%), Denver (2.4%).
Jackson County, CO	74.7%	Larimer (3.4%), Jefferson (2.7%), Albany (2.5%)
Mesa County, CO	74.6%	Jefferson (2.5%), Montrose (2.2%), Delta (2.0%)
Moffat County, CO	68.6%	Routt (7.8%), Mesa (2.6%)
Rio Blanco County, CO	61.8%	Moffat (12.4%), Mesa (8.2%), Garfield (3.9%), Uintah, UT (2.6%)
Routt County, CO	70.7%	Moffat (8.6%)
Secondary Socioeconomic Study Area		
Larimer County, CO	68.1%	Weld (10.9%), Boulder (3.1%), Jefferson (3.0%)
Summit County, CO	55.2%	Eagle (7.3%), Jefferson (4.3%), Park (3.2%), Denver (2.9%), Arapahoe (2.3%), Boulder (2.2%), Douglas (2.0%)
Uintah County, UT	73.3%	Duchesne, UT (7.7%), Salt Lake, UT (5.1%), Utah, UT (3.2%)
Sweetwater County, WY	73.0%	Uinta, WY (5.4%), Natrona, WY (3.9%), Carbon, WY (2.4%)
Carbon County, WY	73.5%	Natrona, WY (3.9%), Laramie, WY (3.9%), Sweetwater, WY (3.5%), Fremont, WY (2.6%), Albany, WY (2.0%)
Source: US Census Bureau 2012b		

Because of the nature of the Socioeconomic Study Area, the socioeconomic resources section has a slightly different format than the other resource analyses in the EIS. Rather than proceeding by Field Office and National Forest, the section provides information for the entire Socioeconomic Study Area except where the relevant information or data are tabulated for the specific geographic area of field office or National Forest. In addition, the analysis presents information about existing conditions and trends within the same section, because that is the common practice for analysis of social and economic conditions.

3.24.1. Existing Conditions

Social Conditions

Social conditions concern human communities, including towns, cities, and rural areas, and the customs, culture, and history of the area as it relates to human settlement, as well as current social values.

Population and Demographics

Table 3.81, Population Growth, 1990–2010, shows current and historic populations in the Socioeconomic Study Area.

Table 3.81. Population Growth, 1990–2010

Geographic Area (Colorado)	1990	2000	2003	2005	2007	2010	Percent Change (1990–2010)
Eagle County	21,928	41,659	44,995	47,205	49,803	52,197	138.0
Garfield County	29,974	43,791	47,622	49,579	53,534	56,389	88.1
Grand County	7,966	12,442	13,324	13,627	14,306	14,843	86.3
Jackson County	1,605	1,577	1,512	1,449	1,407	1,394	-13.1
Mesa County	93,145	116,255	124,994	130,194	139,434	146,723	57.5
Moffat County	11,357	13,184	13,106	12,956	13,348	13,795	21.5
Rio Blanco County	6,051	5,986	5,923	5,945	6,373	6,666	10.2
Routt County	14,088	19,690	20,893	21,398	22,491	23,509	66.9
Socioeconomic Study Area	186,114	254,584	272,369	282,353	300,696	315,516	69.5
Colorado	3,294,473	4,301,261	4,528,732	4,631,888	4,803,868	5,029,196	52.7
US	248,790,925	281,421,906	290,107,933	295,516,599	301,231,207	308,745,538	24.1
Sources: US Census Bureau 1990, 2000, 2010a, 2010d							

Since 1990, the population in Colorado has increased by 52.7 percent, over twice the percent change of the US. A higher percentage of growth occurred in Colorado between 1990 and 2000 than between 2000 and 2010. Of the percentage increase in Colorado's population since 1990, natural increase (births minus deaths) accounts for approximately 41 percent of the growth and an increase in net migration accounts for approximately 59 percent (Colorado State Demography Office 2012).

Within the Socioeconomic Study Area, Mesa County has maintained the largest population of any county over the last 20 years. Currently, Mesa County's population of nearly 147,000 is over twice the size of the Study Area's second largest county.

With a population of 58,566 people (US Census Bureau 2010a), Grand Junction is the most populous city in Mesa County and the 15th most populous city in Colorado. Other large communities include Fruita in Mesa County with a population of 12,646 (the 37th most populous city in Colorado); Steamboat Springs in Routt County with a population of 12,088 (39th most populous); Glenwood Springs in Garfield County with a population of 9,614 (46th most populous); Craig in Moffat County with a population of 9,464 (47th most populous); and Rifle in Garfield County with a population of 9,172 (48th most populous) (US Census Bureau 2010a, 2010b).

Table 3.82, Demographic Characteristics, Share in Total Population (percent), 2010, shows age and gender characteristics of the population in each county of the Socioeconomic Study Area.

Table 3.82. Demographic Characteristics, Share in Total Population (percent), 2010

Geographic Area (Colorado)	Women	20–64 Years of Age	Under 20 Years of Age	65 Years of Age or Older
Eagle County	46.7	68.0	26.4	5.6
Garfield County	48.4	62.2	29.4	8.4
Grand County	46.6	67.5	22.3	10.2
Jackson County	47.2	60.8	20.8	18.4
Larimer County	50.4	62.7	25.4	11.9
Mesa County	50.3	58.5	26.6	14.9
Moffat County	48.9	60.0	29.5	10.5
Rio Blanco County	48.5	60.0	27.6	12.4
Routt County	46.8	68.8	23.1	8.1
Summit County	45.1	73.3	19.0	7.7
Colorado	49.9	62.0	27.1	10.9
US	50.8	60.1	26.9	13.0
Source: US Census Bureau 2010b				

In terms of demographic characteristics, Colorado generally follows the same trends as the country as a whole: approximately 50 percent of the population is women, and approximately 60 percent of the population is between the ages of 20 and 64. The Socioeconomic Study Area, however, has a slightly lower percentage of women than the nation and a higher percentage of working age individuals. Of the counties within the Socioeconomic Study Area, Routt, Eagle, and Grand Counties have the highest percentages of working-age individuals, all at least 7 percentage points higher than the national average. Jackson County has the highest percentage (18.4 percent) of individuals over the age of 65, with more than 5 percentage points higher than the national average (13 percent).

Interest Groups and Communities of Place

There is a range of interest groups in the Socioeconomic Study Area, and the positions advanced by these groups include some overlapping interests and some divergent interests. These groups sometimes define and/or measure "sustainable use" or "resource conservation" differently, and different definitions and measures of sustainability sometimes result in different conclusions about how land and resources should be managed. There are also groups that represent coalitions of interest groups. A list of interest groups that have requested to receive a copy of the draft EIS are provided in **Chapter 6**, Consultation and Coordination. Interest groups within the Socioeconomic Study Area include the following: federal agencies, state agencies, county agencies, local agencies, congressional representatives, academic institutions, civic organizations, local chambers of commerce, environmental groups, outdoors groups, farm associations, Native American groups, and various business groups. Specific types of business interest groups include the following: real estate; tourism; recreation; mineral development; textile manufacturers; grain, fruit and vegetable farmers; and ranch operators.

The Socioeconomic Study Area includes various communities of people who are bound together because of where they reside, work, visit, or otherwise spend a continuous portion of their time. The various communities in the Socioeconomic Study Area share a strong link to the land and natural resources.

For example, recreation opportunities and scenic beauty are among the most commonly cited reasons that people live in or visit the communities in the Colorado River valley. The quality of life and small town character are also reasons residents live in these communities (BLM 2007a). Popular recreation activities includes skiing, fishing, hiking, hunting, OHV use, pleasure driving and mountain biking. These activities contribute greatly to the quality of life and lifestyles in the Socioeconomic Study Area.

Recently, many rural communities in the western US have witnessed "migration turnaround," a reversal of the rural-to-urban migration that characterized much of the US prior to the 1970s. Many rural areas are experiencing a significant increase in population after decades of stability or decline. In scenic areas, particularly those with recreational opportunities, ranches are being sold and used for recreation purposes or subdivided for homesites. Other rural areas, however, continue to lose population. This is due, in part, to the out-migration of young people. In addition to these trends, some rural areas have experienced the population and employment "boom and bust" cycles that are sometimes associated with certain kinds of industries, such as mineral development (BLM,2010b; BLM 2011a). Most recently, several communities in the study area experienced relatively rapid growth in the early- to mid-2000s in large part driven by natural gas development. The recent economic downturn in conjunction with falling natural gas prices slowed economic activity down substantially. This recent "boom and bust" cycle especially impacted housing as some developments were left partially completed or deteriorated.

Mining and agriculture have historically defined the character and lifestyle of Moffat County. The power plant and coal mine near the City of Craig have provided employment opportunities for ranchers and their family members. The Moffat County government has expressed the importance of protecting the customs and culture of Moffat County, which includes agricultural production, timber, industries and manufacturing, and mineral production (USFS 1998). There has been a population pattern of boom and bust due to energy production. The population was 6,525 in 1970, doubled between 1970 and 1980 to 13,133, and decreased by 13 percent to 11,357 in 1990. More recently, the population has remained relatively stable, increasing by only 611 persons from 13,184 in 2000 to 13,795 in 2010. While just 1.2 percent of Moffat County is contained within the Routt National Forest, ranchers, loggers, hunters, outfitters and guides, and

other businesses and individuals use the Forest and contribute significantly to the character of eastern Moffat County. Dinosaur National Park, which is primarily located in Moffat County, represents a national and regional attraction.

Routt County's social context has changed considerably in recent years. This is due largely to a transition from dependence on agriculture and mining to dependence on recreation and tourism, especially downhill skiing. This transition has been accompanied by sustained, and at times relatively rapid, population growth. Much of the growth has been concentrated in the Steamboat Springs area (USFS 1998). Steamboat Springs is a major winter ski resort destination (Colorado Tourism Office 2012).

Historically, Mesa County's economy revolved around agriculture and energy extraction, including extraction of natural gas and uranium (BLM 2010a). Recently, its economy has become more diverse. Key industries include retail trade; healthcare and social assistance; accommodation and food services; and government. Tourism-related industries, in particular, have grown in importance as communities begin marketing the County's extensive public lands as tourism destinations (public lands comprise 76 percent of Mesa County's acreage) (BLM 2010a; Mesa County 2000). For example, the Gateway Canyons resort in Gateway, a community in Mesa County, has marketed surrounding public lands as tourism destinations. The resort's efforts have contributed to Gateway's shift from a primarily mineral extraction- and ranching-based economy to a diversified economy that includes tourism (BLM 2010a).

In addition to its evolving economy, Mesa County's population has grown over 50 percent since 1990 (BLM 2010a). The two most populous cities in the Socioeconomic Study Area, Grand Junction and Fruita, lie in Mesa County (US Census Bureau 2010a). Both cities have grown quickly: Grand Junction's population has increased by 71 percent increase and Fruita's population by 163 percent in the past three decades (BLM 2010a). The Grand Junction economy was historically based on mining and agriculture, but the economy has diversified considerably in the last 25 years. The area's manufacturing base ranges from electronics to semiconductor equipment, advanced composites to bicycle parts, as well as traditional and base manufacturing. Additionally, oil and gas extraction, mining and construction have re-emerged as strong industry sectors in recent years. The area's growing gross metropolitan production was rated 15th in the nation in average annual growth from 1995 - 2005 (Grand Junction Economic Partnership 2012). Grand Junction also offers outdoor recreation opportunities including hunting, fishing, and biking (Grand Junction Economic Partnership 2012). It serves as the healthcare, educational, economic, and political hub of the County and Western Colorado (BLM 2010a). Fruita, once focused on farming and ranching, has expanded its economy to include energy extraction and tourism. The City considers itself a "mountain biking and outdoor sports destination" (City of Fruita 2008).

Grand County has historically had a farming and ranching culture. However, consistent population and economic growth since the 1970s has introduced opportunities for diversification, as well as challenges to preservation of the County's rural character. In the western portion of the county, agriculture still predominates; in the eastern portion, outdoor recreation (e.g., skiing, hiking, biking, and snowmobiling) and tourism focused on Grand County's natural amenities have become important contributors to the economy (Grand County 2011b). Tourist destinations in the county include the Winter Park ski area, Fraser Valley, Silver Creek ski and resort area, Town of Grand Lake resort community, and Rocky Mountain National Park, among others (Grand County 2011b). Grand County consists primarily (75 percent) of public lands (Grand County 2011b).

Social characteristics in Jackson County differ from those of many of the other counties within the Socioeconomic Study Area. Jackson County is one of the few counties in Colorado that has experienced a recent reduction in population. Its population is rural, with most economic activity coming from agriculture, forestry, fishing, hunting, and mining (BLM 2011b). The Town of Walden is the county seat and has a population of 608 people (US Census Bureau 2010b). The North-Central Colorado Community Assessment Report (BLM 2007a) identified the reasons people live in Jackson County, the most important issues to Jackson County residents, and their desired benefits from public land management. Jackson County residents expressed the wish to preserve the rural character and lifestyle but still want to pursue some development. They enjoy a rugged lifestyle and they respect the land and its resources, as it provides the base for their lifestyle. Jackson County residents have a flexibility and survivability inherent in their lifestyle that is necessitated by the lack of diversity in economic opportunities (BLM 2007a). During the scoping process, commenters highlighted the importance of Jackson County's agricultural industry and heritage as well as the importance of energy development on BLM-administered land to the social values and economy of the county (BLM and USFS 2012). Recreation opportunities available in Jackson County include hunting, fishing, OHV use, GRSG tours, and campgrounds and cabin facilities (Crowder 2012).

Rio Blanco County is primarily rural and is the second smallest county by population in the Study Area after Jackson County. The majority of the land in the county is public, including land administered by BLM and USFS, as well as land managed by the State of Colorado. Public land therefore plays a central role in the social and economic characteristics of Rio Blanco County. The residents of the county place a high value on quality of life, independence, open space, and outdoor recreational opportunities – values reliant, to a large extent, on public land (BLM 1994). Many residents also place a high value on resource extraction industries and their importance to the economic well-being of the county. The primary economic activities in the county include agriculture, mineral development (coal, nahcolite, natural gas, oil, oil shale), and recreation (Rio Blanco County 2012). Much of this activity, excluding agriculture, occurs on public land. The communities of Meeker (county seat) and Rangely are located within the county. Both towns advertise the scenic qualities and recreational opportunities in the surrounding area and both are important staging areas for nearby oil and gas and other mineral-related activity. Meeker offers abundant outdoor recreational opportunities in part because it is the home to some of the nation's largest elk herds (Meeker Colorado 2012).

Respondents to the 2008 Garfield County Community Survey identified cost of living, affordable housing, preservation of rural character, water availability, and preservation of open space as the most important issues facing Garfield County (Garfield County 2008). Garfield County has experienced rapid population growth in recent years resulting from increases in energy development, tourism and recreation. From 1990 to 2010, the population of Garfield County increased 88.1 percent and the resulting pressures on the housing market, including the availability of affordable housing for workers, has become an issue for many communities in the county. In the face of increasing population and development, many long-time residents have expressed the importance of preserving rural characteristics and values. The presence of public land plays an important role in the county – approximately 60 percent of land in the county is publicly owned (Garfield County 2012). Many of the primary economic activities in the county including energy development, recreation, and livestock grazing occur on public lands and residents have expressed the importance of protecting these industries and the economic lifeline they provide to local communities. The county seat, Glenwood Springs, is the largest community in the county with a population of 9,614 (US Census Bureau 2010b). The communities of Rifle and Parachute are staging areas for oil and gas activity in the Piceance Basin.

Eagle County is located in the central mountains of Colorado whose terrain and geology has sculpted the social and economic characteristics of the county. Eagle County is home to downhill skiing resorts Vail and Beaver Creek. Many of the mountain communities were founded in the mid- to late-1800s to support local mining industry. As the industry declined in the region, many of the towns declined along with it, with some disappearing altogether. Over the last several decades, tourism and recreation, and especially ski tourism, has become the dominant industry in many mountain communities. In Eagle County, oil and gas activity has also been an important economic contributor (BLM 2011a). Population growth in Eagle County has more than doubled since 1990, driven primarily by resort development. With the increase in population have come problems with local services including housing, day care, and health care along with strains on infrastructure and other county and community services (BLM 2011a). Affordability has become a major issue in many communities as the cost of housing and other goods and services has increased alongside the rise in resort and second-home development (BBC Research and Consulting 2008). Eagle County has a 39 percent housing vacancy rate due in large part to the high presence of secondary homes in its resort communities (Colorado State Demography Office 2010; BLM 2011a, 2011b).

A common theme expressed by many residents of the Socioeconomic Study Area – including in previous planning processes – is the concern for the preservation of rural characteristics and values; however, there is also a perceived conflict in values and beliefs between long-time residents and newer residents (BLM 2011a, 2011b). For instance, some individuals perceive that people who commute to jobs distant from their residential communities have less of a social connection with the places where they live, and that they participate less in local affairs (BLM 2011a). In addition, various trends threaten the economic viability of livestock grazing and ranching, and the number and size of ranches is decreasing in parts of the Socioeconomic Study Area, especially in Garfield, Grand, and Routt Counties (BLM 2011a, 2011b). Development of land for purposes other than ranching, including residential development, has raised social concerns about preserving open space and traditional Western values and culture (BLM 2011a, 2011b). Cattle ranching has played a large role in distinguishing this culture and in providing open areas (BLM 2007b; Grand County, 2000).

Residents expressed some similar themes during public scoping and the June 2012 Economic Strategies Workshop for this planning document (BLM and USFS 2012; BLM 2013a). In addition to the themes expressed above, some individuals were concerned that certain recreation and tourism activities important to communities across the Socioeconomic Study Area, including OHV use, hunting, and lek-viewing, would be adversely impacted by additional GRSG protections. Conversely, residents who expressed support for additional conservation measures noted indirect benefits to recreation, tourism, and scenic values through the preservation of habitat for big game and other wildlife.

As before, many residents expressed concerns that constraints on energy development, mining, and ranching might create economic hardship within their communities. Additionally, some argued that constraints on livestock grazing would exacerbate existing trends of conversion of ranch lands to agricultural and residential uses, perhaps with the unintended consequence of decreasing available GRSG habitat.

County Land Use Plans

BLM-administered and National Forest System surface land in the Socioeconomic Study Area is intermingled with State and private lands. County governments have land use planning

responsibility for the State and private lands located in unincorporated areas within their jurisdictions. County-level LUPs were identified for all eight counties in the Socioeconomic Study Area. Of these, five (Eagle, Garfield, Jackson, Moffat, and Rio Blanco) include explicit economic development components.

Economic Conditions

Economic analysis is concerned with the production, distribution, and consumption of goods and services. This section provides a summary of economic information, including trends and current conditions in the Socioeconomic Study Area. This section also identifies and describes major economic sectors in the Socioeconomic Study Area that can be affected by BLM and USFS management actions. The economic sectors most likely affected by BLM and USFS management actions would be those sectors that rely or could rely on public lands.

Economic Sectors, Employment and Personal Income

The distribution of employment and income by industry sector within the Socioeconomic Study Area is summarized in **Table 3.83**, Employment by Industry Sector within the Socioeconomic Study Area, and **Table 3.84**, Labor Income by Industry Sector and Non-Labor Income within the Socioeconomic Study Area (2010 dollars). See **Appendix M**, Socioeconomics Data and Methodology, for equivalent data by county.

Employment results for the Socioeconomic Study Area as a whole are driven in large part by Mesa County. The industry sector in the Socioeconomic Study Area employing the greatest number of individuals is the services related sector, which comprised 68.3 percent of total employment in 2010. This reflects a growth rate of 16.5 percent from 2001, compared to an overall employment growth rate of 13.2 percent. Within the services related sector, retail trade (10.3 percent) and accommodations and food services (10.1 percent) accounted for the largest share of employment in 2010, followed by construction at 9.1 percent. The industries that demonstrated the largest growth between 2001 and 2010 were mining, with an increase of 204.6 percent; management of companies and enterprises (increase of 99.5 percent); and finance and insurance (increase of 47.1 percent). Compared to the services related sector, the non-services related sector and the government sector represented much lower levels of employment, 18.2 percent and 12.1 percent, respectively.

Table 3.83. Employment by Industry Sector within the Socioeconomic Study Area

Socioeconomic Study Area	Absolute			Percentage of Total		Percent Change 2001–2012
	2001	2010	Change 2001–2010	2001	2010	
Total Employment (number of jobs)	**181,183**	**205,113**	**23,930**	**100.0%**	**100.0%**	**13.2%**
Non-services related	**38,190**	**37,300**	**-890**	**21.1%**	**18.2%**	**-2.3%**
Farm	4,941	4,905	-36	2.7%	2.4%	-0.7%
Forestry, fishing, and related activities	883	1,127	244	0.5%	0.5%	27.6%
Mining (including fossil fuels)	2,736	8,333	5,597	1.5%	4.1%	204.6%
Construction	24,105	18,627	-5,478	13.3%	9.1%	-22.7%
Manufacturing	5,525	4,308	-1,217	3.0%	2.1%	-22.0%
Services related	**120,332**	**140,181**	**19,849**	**66.4%**	**68.3%**	**16.5%**
Utilities	586	572	-14	0.3%	0.3%	-2.4%
Wholesale trade	3,713	4,348	635	2.0%	2.1%	17.1%

Socioeconomic Study Area	Absolute			Percentage of Total		Percent Change 2001–2012
	2001	2010	Change 2001–2010	2001	2010	
Retail trade	21,074	21,220	146	11.6%	10.3%	0.7%
Transportation and warehousing	4,426	5,494	1,068	2.4%	2.7%	24.1%
Information	2,466	2,224	-242	1.4%	1.1%	-9.8%
Finance and insurance	5,989	8,812	2,823	3.3%	4.3%	47.1%
Real estate and rental and leasing	11,485	15,835	4,350	6.3%	7.7%	37.9%
Professional and technical services	8,843	10,804	1,961	4.9%	5.3%	22.2%
Management of companies and enterprises	521	1,039	518	0.3%	0.5%	99.5%
Administrative and waste services	8,699	10,152	1,453	4.8%	4.9%	16.7%
Educational services	1,464	1,976	512	0.8%	1.0%	35.0%
Health care and social assistance	13,643	16,803	3,160	7.5%	8.2%	23.2%
Arts, entertainment, and recreation	8,567	9,504	937	4.7%	4.6%	10.9%
Accommodation and food services	19,224	20,795	1,571	10.6%	10.1%	8.2%
Other services, except public administration	9,632	10,603	971	5.3%	5.2%	10.1%
Government	**20,415**	**24,748**	**4,333**	**11.3%**	**12.1%**	**21.2%**
Federal	2,820	3,598	778	1.6%	1.8%	27.6%
State	3,174	3,412	238	1.8%	1.7%	7.5%
Local	14,417	17,734	3,317	8.0%	8.6%	23.0%
Source: US Department of Commerce 2012a						

Table 3.84. Labor Income by Industry Sector and Non-Labor Income within the Socioeconomic Study Area (2010 dollars)

Socioeconomic Study Area	Absolute (Millions)			Percentage of Total [1]		Percent Change 2001–2010
	2001	2010	Change 2001–2010	2001	2010	
Total Labor Earnings [2]	**$7,124.3**	**$8,431.8**	**$1,307.6**	**100.0%**	**100.0%**	**18.4%**
Non-services related	**$1,786.6**	**$1,827.1**	**$40.6**	**25.1%**	**21.7%**	**2.3%**
Farm	$35.4	$33.4	-$2.1	0.5%	0.4%	-5.8%
Forestry, fishing, and related activities	$20.8	$17.3	-$3.5	0.3%	0.2%	-16.9%
Mining (including oil and gas)	$213.1	$644.9	$431.8	3.0%	7.6%	202.6%
Construction	$1,251.3	$953.4	-$297.9	17.6%	11.3%	-23.8%
Manufacturing	$265.9	$178.2	-$87.7	3.7%	2.1%	-33.0%
Services related	**$4,279.5**	**$5,181.0**	**$901.5**	**60.1%**	**61.4%**	**21.1%**
Utilities	$80.1	$81.7	$1.7	1.1%	1.0%	2.1%
Wholesale trade	$179.4	$244.9	$65.6	2.5%	2.9%	36.5%
Retail trade	$681.9	$684.5	$2.6	9.6%	8.1%	0.4%
Transportation and warehousing	$221.3	$306.6	$85.3	3.1%	3.6%	38.6%
Information	$109.2	$100.9	-$8.3	1.5%	1.2%	-7.6%
Finance and insurance	$241.2	$279.7	$38.5	3.4%	3.3%	16.0%

Socioeconomic Study Area	Absolute (Millions)			Percentage of Total [1]		Percent Change 2001–2010
	2001	2010	Change 2001–2010	2001	2010	
Real estate and rental and leasing	$403.5	$471.1	$67.6	5.7%	5.6%	16.7%
Professional and technical services	$354.8	$451.9	$97.1	5.0%	5.4%	27.4%
Management of companies and enterprises	$42.2	$47.2	$5.1	0.6%	0.6%	12.0%
Administrative and waste services	$212.5	$311.0	$98.6	3.0%	3.7%	46.4%
Educational services	$51.1	$67.5	$16.4	0.7%	0.8%	32.1%
Health care and social assistance	$651.6	$897.7	$246.1	9.1%	10.6%	37.8%
Arts, entertainment, and recreation	$244.3	$283.7	$39.4	3.4%	3.4%	16.1%
Accommodation and food services	$467.8	$560.9	$93.1	6.6%	6.7%	19.9%
Other services, except public administration	$338.7	$391.5	$52.8	4.8%	4.6%	15.6%
Government	**$985.3**	**$1,377.4**	**$392.1**	**13.8%**	**16.3%**	**39.8%**
Federal	$188.2	$286.1	$97.9	2.6%	3.4%	52.0%
State	$161.7	$185.7	$23.9	2.3%	2.2%	14.8%
Local	$635.4	$905.6	$270.2	8.9%	10.7%	42.5%
Non-labor Income [3]	**$2,986.6**	**$4,400.6**	**$1,414.0**	**30.9%**	**36.2%**	**47.3%**
Dividends, interest, and rent	$2,046.8	$2,719.7	$672.9	21.1%	22.4%	32.9%
Personal current transfer receipts [4]	$939.8	$1,680.9	$741.1	9.7%	13.8%	78.9%
Contributions to government social insurance [5]	**$686.8**	**$873.2**	**$186.4**	**7.1%**	**7.2%**	**27.1%**
Total Personal Income [6]	**$9,677.7**	**$12,154.6**	**$2,476.9**	**100.0%**	**100.0%**	**25.6%**

Source: US Department of Commerce 2012a. Values reported in 2001 dollars were converted to 2010 dollars using the Consumer Price Index (US Bureau of Labor Statistics 2012a).

[1] Industry earnings are reported as a share of total labor earnings. Dividends, interest, and rent; personal current transfer receipts; and contributions to government social insurance are reported as a share of personal income.

[2] Total labor earnings are reported by place of work.

[3] Non-labor income includes dividends, interest, and rent and personal current transfer receipts.

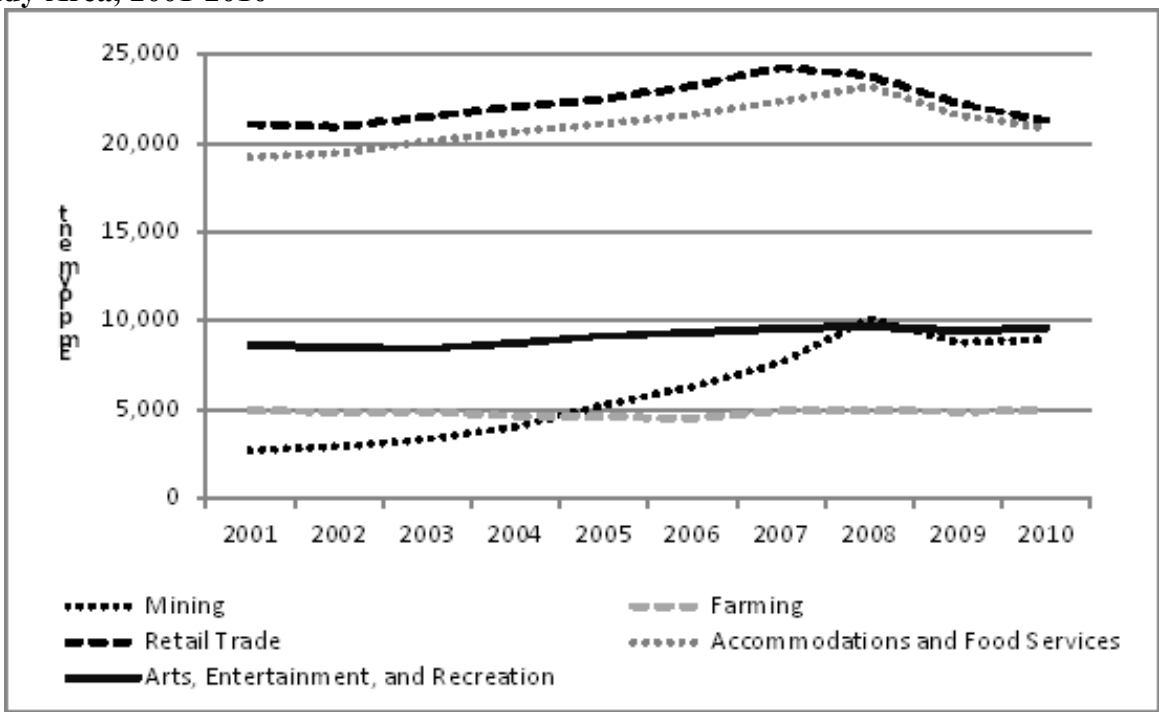
[4] "Personal current transfer receipts" are benefits received by persons for which no current services are performed. They are payments by government and business to individuals and institutions, such as retirement and disability insurance benefits.

[5] "Contributions for government social insurance" consists of payments by employers, employees, the self-employed, and other individuals who participate in the following government programs: Old-age, Survivors, and Disability Insurance; Medicare; unemployment insurance; railroad retirement; pension benefit guarantee; veterans' life insurance; publicly-administered workers' compensation; military medical insurance; and temporary disability insurance (US Department of Commerce 2012b).

[6] Total personal income is reported by place of residence.

Diagram 3-14, Employment Trends by Select Industry Sector within the Socioeconomic Study Area, 2001-2010, presents the employment trends for several industries from 2001 to 2010. Notably, retail trade and accommodation and food services both employed approximately 20,000 to 25,000 individuals in each year of the 10-year period. This is more than double the employment in the mining industry and approximately four times the employment in the farming industry. (Note: Values in **Diagram 3-14** may not match exactly those in **Table 3.83**, Employment by Industry Sector within the Socioeconomic Study Area, due to revisions to data between data releases.) See **Appendix M**, Socioeconomics Data and Methodology, for equivalent data by county.

Diagram 3–14 Employment Trends by Select Industry Sector within the Socioeconomic Study Area, 2001-2010



Source: US Department of Commerce 2012a

Note: Farming value sums data for "Farm and Agriculture and forestry support activities."

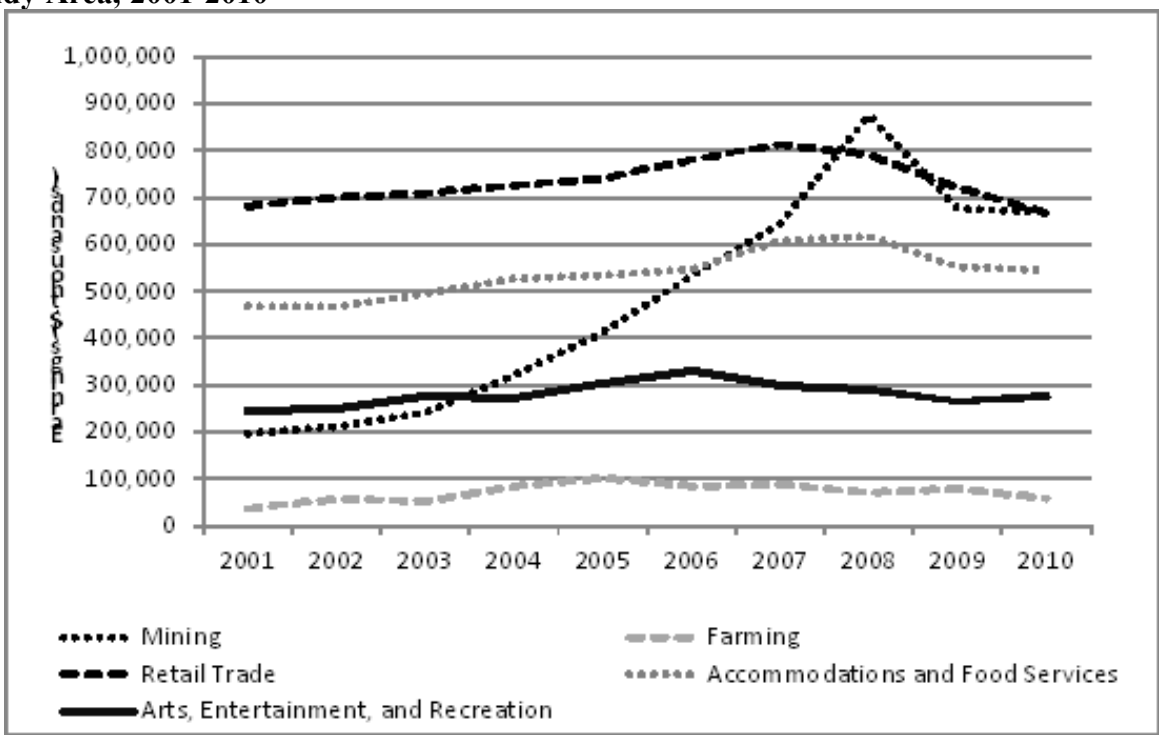
Focusing on industry sectors that directly use public lands, mining contributes a substantial portion of employment in several counties, especially Rio Blanco but also Moffat, Garfield, Jackson and Mesa. Mining also contributes substantially in Sweetwater and Carbon counties, Wyoming and Uintah County, Utah, which constitute part of a secondary study area for socioeconomics as noted in the introduction. Farming, including livestock grazing, also contributes a sizable share of employment in several counties, particularly Jackson County (11.8 percent) as well as Rio Blanco, Moffat, Routt, and others. (Ranching contributes a sizable share of employment in Jackson County. The US Department of Commerce captures ranching employment in its data for the "farming" industry.) The accommodation and food services industry (which depends partly on outdoor recreation on public lands) contributes substantially to employment in all counties, but is particularly large in Eagle and Grand Counties. The accommodation and food services industry also contributes substantially in Summit County, which makes up part of a secondary study area

for socioeconomics as noted in the introduction. See **Appendix M**, Socioeconomics Data and Methodology, for equivalent data by county.

With respect to personal earnings, the services related sector accounted for the largest share (61.4 percent) of labor income in the Socioeconomic Study Area in 2010, followed by the non-services related sector (21.7 percent) and the government sector (16.3 percent). In 2010, the individual industries that generated the largest shares of personal earnings included the construction industry (11.3 percent), the healthcare and social services industry (10.6 percent), and the retail trade industry (8.1 percent). Several industries showed a trend of relative growth since 2001, with the mining industry displaying the highest growth rate (202.6 percent). During the same time period, the manufacturing and construction industries experienced the largest declines (33.0 percent and 23.8 percent, respectively).

Diagram 3-15, Labor Earnings Trends by Select Industry Sector within the Socioeconomic Study Area, 2001-2010, presents the labor earnings trends for several industries from 2001 to 2010. In 2010, the mining industry generated over three times its earnings in 2001. Retail trade has consistently generated a high level of earnings, compared to the other four industries displayed. In the 10-year period, farming generated the least, at fewer than $100 million almost every year. (Note: Values in **Diagram 3-15** may not match exactly those in **3-96**, Labor Income by Industry Sector and Non-Labor Income within the Socioeconomic Study Area (2010 dollars), due to revisions to data between data releases.) See **Appendix M**, Socioeconomics Data and Methodology, for county-level detail.

Diagram 3–15 Labor Earnings Trends by Select Industry Sector within the Socioeconomic Study Area, 2001-2010



Sources: US Department of Commerce 2012a. Values reported in 2001 dollars were converted to 2010 dollars using the Consumer Price Index (US Bureau of Labor Statistics 2012a).

Note: Farming value sums data for "Farm and Agriculture and forestry support activities."

Appendix M, Socioeconomics Data and Methodology, provides county-level labor earnings figures. The county-by-county patterns (focusing on sectors that directly use public lands) are similar to those for employment. Mining contributes the most to earnings in Rio Blanco County at 31.8 percent, followed by Moffat County at 19.6 percent. Mining is also a significant contributor to earnings in Uintah County, Utah, which represents part of a secondary study area as noted in the introduction. The earnings data indicate that farming, including livestock grazing, is an important industry in the Socioeconomic Study Area, particularly in Jackson County, where it accounts for 25.1 percent of earnings. (Ranching contributes substantially to earnings in Jackson County. The US Department of Commerce captures ranching employment in its data for the "farming" industry.) Within the remaining counties a much lower share of earnings is from farming, with the greatest share at 2.8 percent in Moffat County. Earnings from the accommodation and food services sector also vary by county; they are highest in Eagle and Grand. Retail trade, another recreation-related industry, contributes consistently across all counties (between 7.0 and 9.4 percent of earnings).

In addition to industry shares of labor earnings, another metric – residence adjustment – provides information about the economic conditions in the Socioeconomic Study Area. Residence adjustment represents the net inflow of the earnings of inter-area commuters. A positive number indicates that, on balance, area residents commute outside to find jobs; a negative number indicates that, on balance, people from outside the area commute in to find jobs. Moffat County's residence adjustment represented 11.4 percent of its total personal income, the highest share of all counties in the Socioeconomic Study Area. Grand County had the second highest share (7.8 percent). Residence adjustment accounted for the lowest share of total personal income in Rio Blanco County (-9.1 percent), followed by Routt County (-3.7 percent). See **Appendix M**, Socioeconomics Data and Methodology, for detailed county data.

Table 3.85, Annual Unemployment, 2007–2011, presents the unemployment rates for each county in the Socioeconomic Study Area, as well as the rates for the eight counties aggregated and the State of Colorado. The data show that the Socioeconomic Study Area as a whole experienced a lower rate of unemployment than the State in 2007 and 2008. In 2011, the most recent year reported, the Socioeconomic Study Area recorded an unemployment rate of 8.9 percent, compared to the state rate of 8.3 percent. At the county level, in 2011, the unemployment rate ranged from a low of 3.9 percent in Jackson County to a high of 9.6 percent in Mesa County.

Table 3.85. Annual Unemployment, 2007–2011

Geographic Area (Colorado)	2007	2008	2009	2010	2011
Eagle County	2.9%	3.5%	7.8%	9.5%	8.6%
Garfield County	2.5%	3.1%	7.8%	10.1%	8.8%
Grand County	2.6%	3.7%	7.4%	9.1%	8.2%
Jackson County	2.5%	3.2%	4.6%	6.7%	3.9%
Mesa County	3.2%	3.9%	9.3%	10.7%	9.6%
Moffat County	3.1%	3.8%	6.9%	9.5%	8.5%
Rio Blanco County	2.1%	2.6%	5.4%	6.5%	5.5%
Routt County	2.6%	3.4%	7.3%	9.5%	8.2%
Socioeconomic Study Area	3.1%	3.8%	7.6%	8.7%	7.8%
Colorado	3.8%	4.8%	8.1%	8.9%	8.3%
Source: US Bureau of Labor Statistics 2012b					

Recreation

Approximately 33,701 jobs (27.0 percent of all private sector jobs) in the Socioeconomic Study Area are related to travel and tourism (Headwaters Economics 2012). This estimate is based on data from the US Census Bureau County Business Patterns and selects industrial sectors that, at least in part, provide goods and services to visitors to the local economy and to the local population (Typical sector classifications do not map easily into tourism. For example, "accommodation and food services" includes meals out by local residents, not just tourists; "retail trade" captures purchases of souvenirs but also a wide range of other purchases).

It includes both full- and part-time jobs. Most of these jobs are concentrated in the "accommodation and food services" and "retail trade" sectors. Travel and tourism-related jobs in the Socioeconomic Study Area grew 14.3 percent between 1998 and 2010. This growth was below the growth of non-travel and tourism-related jobs in the Socioeconomic Study Area (20.6 percent) and the share of travel and tourism-related jobs in the total employment in the Study Area fell from 28.1 percent to 27 percent during that period. Still, the share of travel and tourism-related jobs in the Socioeconomic Study Area is approximately 11.9 percent points higher than the national average. Jobs in these sectors are more likely to be seasonal and/or part-time and the average annual earnings per job tend to be lower than jobs in non-travel and tourism-related sectors. The average annual wage per job in this sector was $21,849 (2010 dollars) in the Socioeconomic Study Area in 2011, compared to $43,339 (2010 dollars) for private sector jobs not related to travel and tourism (Headwaters Economics 2012) (All dollar values were converted to 2010 dollars using the US Bureau of Labor Statistics Consumer Price Index Inflation Calculator (US Bureau of Labor Statistics 2012a).

Although much of the recreation use on BLM-administered and National Forest System lands is dispersed, and far from counting devices such as trail registers, fee stations, or vehicle traffic counters, approximations of the number of visitors to BLM-administered lands can be obtained from the BLM Recreation Management Information System database, in which BLM recreation specialists provide estimated total visits and visitor days to various sites within the boundaries of their field office (In Recreation Management Information System, a *visit* is defined as the entry of any person onto lands or related waters administered by the BLM for any time period. A same day reentry, negligible transit, and entry to another recreation site or detached portion of the management area on the same day are considered a single visit. Recreation Management Information System defines a *visitor day* as equivalent to 12 visitor hours).

The USFS tabulates visitor data through its National Visitor Use Monitoring program. **Table 3.86**, Estimated Number of Annual Visits by Field Office and National Forest, summarizes the most recent visitation data available for BLM field offices and the Routt National Forest.

Visitor expenditures can be approximated by using the Recreation Management Information System data in conjunction with data from USFS, which has constructed recreation visitor spending profiles based on years of survey data gathered through the National Visitor Use Monitoring program. Although the data are collected from National Forest visitors, the analysis that follows is based on the National Visitor Use Monitoring program profiles because the BLM has no analogous database. The profiles break down recreation spending by type of activity, day use versus overnight use, local versus nonlocal visitors, and non-primary visits. **Table 3.87**, Visitor Spending from Recreation on BLM-Administered and National Forest System Lands in the Socioeconomic Study Area, summarizes individual and party visits and expenditures by trip type and estimated direct expenditure.

Table 3.86. Estimated Number of Annual Visits by Field Office and National Forest

BLM Field Office or National Forest	Total Individual Visits [1]	Local Individual Visits [2]	Nonlocal Individual Visits [2]	Non Primary [3]Individual Visits [2]
BLM CRVFO	826,267	446,184	272,668	107,415
BLM GJFO	839,252	453,196	276,953	109,103
BLM KFO	640,606	345,927	211,400	83,279
BLM LSFO	118,398	63,935	39,071	15,392
BLM WRFO	252,605	136,407	83,360	32,839
USFS Routt National Forest	1,631,680	881,107	538,454	212,118
Total	**4,308,808**	**2,326,756**	**1,421,906**	**560,146**

[1] Data for BLM field offices is for fiscal year 2011 (BLM 2012c); data for the Routt National Forest is for fiscal year 2007 (USFS 2012). Fiscal year 2011 is the year ending September 30, 2011.

[2] Based on national averages for all National Forests. White and Gooding (2012). Party spending per visit is converted from 2009 to 2010 dollars using the Consumer Price Index (US Bureau of Labor Statistics 2012a).

[3] Non-primary means incidental visits where the primary purpose of the trip was other than visiting the National Forest being surveyed.

Table 3.87. Visitor Spending from Recreation on BLM-Administered and National Forest System Lands in Socioeconomic Study Area

Trip Type	Percent of Visits [1]	Estimated Number of Individual Visits	Average Party Size [1]	Estimated Number of Party Visits	Party Spending Per Visit (2010) [1]	Estimated Direct Expenditure ($ millions)
Nonlocal Day Trips	10	430,881	2.5	172,352	$63.68	$11.0
Nonlocal Overnight on Public Lands	9	387,793	2.6	149,151	$237.27	$35.4
Nonlocal Overnight off Public Lands	14	603,233	2.6	232,013	$522.63	$121.3
Local Day Trips	49	2,111,316	2.1	1,005,389	$33.56	$33.7
Local Overnight on Public Lands	4	172,352	2.6	66,289	$165.14	$10.9
Local Overnight off Public Lands	1	43,088	2.4	17,953	$216.48	$3.9
Non-Primary Visits	13	560,145	2.5	224,058	$376.62	$84.4
Total	100	4,308,808	N/A	1,867,205	N/A	$300.6

[1] National average for all National Forests. White and Gooding (2012). Party spending per visit is converted from 2009 to 2010 dollars using the Consumer Price Index (US Bureau of Labor Statistics 2012a).

As **Table 3.87** shows, the estimated total visitor spending on BLM and USFS lands in the Socioeconomic Study Area was about $301 million in fiscal year 2011. It is important to note that this includes expenditures from local residents and visitors whose use of public lands was incidental to some other primary purpose.

Grazing

Farming employed approximately 4,905 people in the Socioeconomic Study Area in 2010, accounting for 2.4 percent of total employment. The share has been falling consistently over the last 40 years. The average annual wage for a farm job in the Study Area was $26,993 (2010 dollars) in 2011. This was lower than the average annual wage for a non-farm job, which was $37,469 (Headwaters Economics 2012) (All dollar values were converted to 2010 dollars using the US Bureau of Labor Statistics Consumer Price Index Inflation Calculator (US Bureau of Labor Statistics 2012a). As of 2007, the Socioeconomic Study Area contained 4,289 farms, with an average farm size of 742 acres. Farms covered approximately 22.9 percent of the land area in the Study Area. **Table 3.88**, Number of Farms and Land in Farms, 2007, presents the breakdown of number of farms and land area by county.

Table 3.88. Number of Farms and Land in Farms, 2007

Geographic Area (Colorado)	Number of Farms	Land in Farms (Acres)	Average Farm Size (Acres)	Approximate Percent of Land Area in Farms
Eagle County	152	124,000	816	11.5
Garfield County	623	335,300	538	17.8
Grand County	229	208,500	910	17.6
Jackson County	120	387,100	3,226	37.5
Mesa County	1,767	372,500	211	17.5
Moffat County	503	836,600	1,663	27.6
Rio Blanco County	285	386,600	1,356	18.8
Routt County	610	533,000	874	35.3
Socioeconomic Study Area	4,289	3,183,600	742	22.9
Source: US Department of Commerce 2012a				

Table 3.89, Number of Farms by Type, 2007, presents the distribution of farms by primary product type and county. These data demonstrate the prevalence of farms engaging primary in activities related to beef cattle, and to some extent sheep and goats, across the Study Area in 2007 (Headwaters Economics 2012).

Table 3.89. Number of Farms by Type, 2007

Geographic Area (Colorado)	Crops [1]	Beef Cattle	Cattle Feedlots	Dairy Cattle & Milk	Hog & Pig	Poultry & Egg	Sheep & Goat	Animal Aquaculture & Other
Eagle County	41	56	1	0	0	0	5	49
Garfield County	235	155	4	4	10	13	17	185
Grand County	68	85	3	1	5	3	1	63
Jackson County	27	54	1	0	0	1	1	36
Mesa County	836	413	29	9	22	43	47	368
Moffat County	195	148	1	1	14	17	25	102
Rio Blanco County	92	91	1	1	12	1	15	72
Routt County	289	166	8	0	11	9	13	114
Study Area	1,783	1,168	48	16	74	87	124	989

Source: Headwaters Economics 2012. [1] The "Crops" category includes farms primarily engaged in oil seed and grain, vegetables and melon, fruit and nut, greenhouse/nursery, and other crops.

Table 3.90, Farm Earnings Detail, 2010 (2010 dollars), presents the proportion of personal income originating from farm earnings and the farm cash receipts from livestock received throughout the Socioeconomic Study Area and Colorado as a whole. Mesa has the largest amount of farm cash receipts in absolute terms. Farm earnings are a highest share of total earnings in Jackson County. Just over 70 percent of farm cash receipts in that county are from livestock.

Table 3.90. Farm Earnings Detail, 2010 (2010 dollars)

Geographic Area (Colorado)	Farm Earnings as Share of All Earnings	Earnings from Agriculture and Forestry Support Activities as Share of All Earnings [1]	Farm Cash Receipts ($millions)	Share of Farm Cash Receipts from Livestock	Share of Farm Cash Receipts from Crops
Eagle County	0.1%	(D)	$5.3	68.1%	31.9%
Garfield County	-0.1%	0.1%	$24.4	65.9%	34.1%
Grand County	1.2%	(D)	$10.5	78.6%	21.4%
Jackson County	25.1%	(D)	$24.7	72.2%	27.8%
Mesa County	0.1%	0.2%	$62.8	43.1%	56.9%
Moffat County	2.8%	0.5%	$31.5	81.1%	18.9%
Rio Blanco County	0.8%	(D)	$17.1	83.1%	16.9%
Routt County	0.5%	(D)	$38.2	79.2%	20.8%
Socioeconomic Study Area	0.3%	0.1%	$355.2	63.4%	36.6%
Colorado	0.6%	0.1%	$6,375.7	64.4%	35.6%

Source: US Department of Commerce 2012a

[1] This division is the finest resolution of data provided by the US Department of Commerce's Bureau of Economic Analysis that includes agricultural services.

[2] (D) indicates that the value is not released to the public by the US Department of Commerce's Bureau of Economic Analysis to avoid disclosure of confidential information.

Table 3.90, Farm Earnings Detail, 2010 (2010 dollars), shows that – as noted earlier in this section – the relative contribution of farm earnings varies substantially across the counties in the Socioeconomic Study Area, and the share of farm earnings is greatest in Jackson and Moffat Counties (25.1 percent and 2.8 percent, respectively). Compared with the state as a whole, the share of farm cash receipts originating from livestock and crops in the Socioeconomic Study Area are roughly equal.

Table 3.91, Active and Billed Animal Unit Months, 2011, provides information on active and billed AUMs on BLM and USFS land, for each of the BLM field offices and the Routt National Forest. An AUM is the amount of forage needed to feed 1 cow, 1 horse, or 5 sheep for 1 year. Cattle are the dominant species grazed in all areas, although sheep consume about one-third of the forage in the LSFO. The estimated expenditure data in **Table 3.91** are calculated from data from the US Department of Agriculture Economic Research Service, which publishes annual budgets for cow-calf operations for different production regions across the country (US Department of Agriculture Economic Research Service 2012). The BLM calculated a 10-year inflation-adjusted average expenditure per cow-calf operation from the US Department of Agriculture Economic Research Service budgets, then converted that information to a per-AUM figure based on average forage requirements for a cow including other livestock (e.g., bulls and replacement heifers) that are needed to support the production from the cow (Workman 1986). Based on these calculations,

BLM estimates that the 10-year average expenditure in the Socioeconomic Study Area is $50.24 per AUM (2010 dollars), which is reflected in **Table 3.103**.

Table 3.91. Active and Billed Animal Unit Months, 2011

Region	Active (2011)	%Billed (2011)	Billed (2011)	Cattle (%)	Sheep (%)	Other (%)	Allotments	Acres per AUM	Expenditures (millions)
CRVFO	44,446	63	28,118	88	12	0	191	12.4	$2.2
GJFO	64,190	57	36,751	100	0	0	188	16.3	$3.2
KFO	34,630	86	29,679	99	0	1	246	9.7	$1.7
LSFO	139,772	67	93,248	61	36	3	312	9.5	$7.0
WRFO	120,401	63	75,319	82	18	0	155	12.1	$6.0
Routt National Forest	73,213 [1]	n/a	63,797	n/a	n/a	n/a	104	n/a	$3.7
Total	476,652	-	326,912	-	-	-	1,196	-	$23.8

Source: BLM 2012b; USFS 2013; Workman 1986; US Department of Agriculture Economic Research Service 2012.

Expenditures are calculated based on active AUMs and 10-year average expenditures, as described in the text.

[1] Active AUMs for Routt National Forest as of March 6, 2013.

The data in **Table 3.91**, Active and Billed Animal Unit Months, 2011, help to demonstrate the importance of livestock grazing throughout the Socioeconomic Study Area. It is important to remember, as well, that the data are only for forage values on BLM-administered land; forage on other public lands, and private lands, contribute additional values to the Socioeconomic Study Area. The economic analysis of the alternatives, presented in **Chapter 4**, Environmental Consequences, addresses additional indirect contributions of livestock grazing (as well as other resource uses) to the regional economy, comparing the alternatives to one another.

Minerals

Approximately 4,416 jobs (3.5 percent of all private sector jobs) in the Socioeconomic Study Area are from mining industry sectors (Headwaters Economics 2012). This is up from 1.7 percent of private sector jobs in 1998. The relative contribution differs across the Study Area counties and is substantial for some counties. The share of mining jobs in the Socioeconomic Study Area was higher than the national average of 0.5 percent. This estimate is based on data from the US Census Bureau County Business Patterns and a selection of industrial sectors that includes "oil and gas extraction," "coal mining," "metal ore mining," and "nonmetallic minerals mining" industry sectors. It includes both full- and part-time jobs. Average annual earnings per mining jobs are higher than non-mining jobs: The average annual wage per job in the mining sector was $74,219 (2010 dollars) in the Study Area in 2011, compared to $35,470 (2010 dollars) for private sector jobs not related to mining (Headwaters Economics 2012).

Several of the counties in the Socioeconomic Study Area have a significant percentage of mining jobs according to the data in the County Business Patterns: Rio Blanco (481 mining jobs, 26 percent of private employment) and Moffat (541 mining jobs, 14 percent of private employment) (Headwaters Economics 2012). Mining contributes more jobs numerically, but fewer proportionately, in Garfield (1,060 jobs, 6 percent of private employment) and Mesa county (1,755 jobs, 4 percent of private employment). **Table 3.92**, Coal, Gas, and Oil: Sales Volume and Sales Value from BLM-Administered Resources, fiscal year 2011, provides sales volume and sales value for coal, gas and oil resources managed by the BLM, and underscores the importance of mining in these five counties – especially Garfield and Rio Blanco.

Table 3.92. Coal, Gas, and Oil: Sales Volume and Sales Value from BLM-Administered Resources, Fiscal Year 2011

Geographic Area (Colorado)	Sales Volume			Sales Value (millions)		
	Coal (tons)	Gas (mcf)	Oil and Condensate (bbl)	Coal	Gas	Oil and Condensate
Eagle County	0	0	0	$0	$0	$0
Garfield County	15,894	166,822,688	4,699,051	$0.7	$700.3	$249.9
Grand County	0	0	0	$0	$0	$0
Jackson County	0	0	76,875	$0	$0	$6.3
Mesa County	0	18,200,250	234,102	$0	$76.7	$7.9
Moffat County	3,145,954	16,136,910	312,561	$95.5	$68.7	$24.7
Rio Blanco County	3,725,700	88,457,430	4,235,755	$134.4	$384.4	$343.6
Routt County	696,048	0	19,210	$31.6	$0	$1.5
Socioeconomic Study Area	7,583,596	289,617,278	9,577,554	$262.2	$1,230.1	$634.1

Source: Office of Natural Resources Revenue 2012

mcf = thousand cubic feet; bbl = oil barrel

Other mineral production in the Socioeconomic Study Area includes gypsum (Eagle County), sodium, limestone, and construction sand and gravel (USGS 2011; BLM 2013b). **Table 3.93**, Other Mineral Production, 2010 (Tons), shows production of other minerals in the study area in 2010.

Table 3.93. Other Mineral Production, 2010 (Tons)

Geographic Area	Leasable	Locatable		Salable
	Sodium	Limestone	Gypsum	Sand and Gravel
LSFO	N/A	5,000	N/A	10,000
GJFO	N/A	N/A	N/A	23,405
WRFO	130,000	N/A	N/A	20,000
KFO	N/A	N/A	N/A	20,000
CRVFO	N/A	50,000	350,000	N/A
Socioeconomic Study Area	130,000	55,000	350,000	73,405
Source: BLM 2013b				

Other Values

Public lands provide a range of goods and services that benefit society in a variety of ways. Some of these goods and services, such as timber and minerals, are bought and sold in markets, and hence have a readily observed economic value (as documented in the sections above); others have a less clear connection to market activity, even though society derives benefits from them. In some cases, goods and services have both a market and a non-market component value to society. This section provides an overview of several "non-market" values described through a qualitative and quantitative economic valuation analysis.

The non-market values associated with public lands can be classified as values that derive from direct or indirect use (e.g., recreation) and those that do not derive from use, such as existence values held by the general public from self-sustaining populations of GRSG. This section and **Appendix M**, Socioeconomics Data and Methodology, describe the use and non-use economic values associated with recreation, populations of GRSG, and land that is currently used for livestock grazing and ranch operations. The sections that follow discuss each of these values in turn. **Appendix M**, Socioeconomics Data and Methodology, provides more discussion of the concepts and measurement of use and non-use non-market values. It is important to note that these non-market values are not directly comparable to previous sections that describe output (sales or expenditures) and jobs associated with various resource uses on BLM-administered and National Forest System lands (see **Appendix M**, Socioeconomics Data and Methodology, for more information).

Values Associated with Recreation

Actions that promote the conservation of GRSG habitat may result in changes in recreation activity, by changing opportunities or access for different recreational activities. Opportunities for some activities such as wildlife viewing may increase as the amount of habitat may increase for species that depend on public lands including GRSG. The **Chapter 4**, Environmental Consequences, addresses this issue for each of the management alternatives. This section documents baseline non-market values visitor receive associated with recreation activities. This is measured by what economists call consumer surplus, which refers to the additional value that visitors receive over and above the price they pay. **Appendix M**, Socioeconomics Data and Methodology, provides an explanation of consumer surplus. Fees to use public lands for

recreation are typically very low or non-existent, so the value people place on public land recreation opportunities is not fully measured simply by the entrance fees people pay.

Economists estimate the consumer surplus from recreation by measuring how the variation in visitors' travel costs corresponds to the number of visits taken. This "travel cost method" has been developed extensively in academic literature and is used by federal agencies in economic analyses; the method is explained more fully in **Appendix M**, Socioeconomics Data and Methodology. Conducting original travel cost method studies can be time-consuming and expensive; for this project BLM and USFS relied on estimates of consumer surplus from prior recreation studies in the same geographic region, using an established scientific method called "benefit transfer." Based on the studies reviewed and cited in **Appendix M**, Socioeconomics Data and Methodology, visitors to natural areas, such as lands managed by BLM and USFS, gain values (in excess of their direct trip cost) ranging from approximately $31 per day for camping, to about $175 per day for mountain biking.

To calculate the aggregate "consumer surplus" value of recreation in the study area, BLM multiplied this per-day value of recreation by the estimated number of visitor days associated with each activity type. Visitation estimates by activity are derived based on the BLM Recreation Management Information System database and the USFS National Visitor Use Monitoring program for the study area.

Accounting for the value per day and the number of days, the total non-market value of recreation on BLM and USFS lands in the study area was estimated to be about $180 million per year (see **Appendix M**, Socioeconomics Data and Methodology, for details). Based on the quantity of recreational trips and the economic value of each type of activity, the largest annual non-market values are associated with hunting, camping, fishing, hiking, sightseeing, and pleasure driving. These categories omit downhill skiing, because there is little or no overlap between GRSG habitat and lands used for downhill skiing. **Chapter 4**, Environmental Consequences, discusses if and how recreational visits and total non-market value for recreation may change under the alternatives being considered.

Values Associated with Populations of Greater Sage-Grouse

The existence and perseverance of the ESA and similar acts reflects the values held by the American public associated with preventing species from going extinct. Economists have long recognized that rare, threatened and endangered species have economic values beyond those associated with active "use" through viewing. This is supported by legal decisions and technical analysis (see **Appendix M**, Socioeconomics Data and Methodology, for details), as well as a number of conceptual and empirical publications that refine concepts and develop methods to measure these non-use or existence values.

The dominant method uses surveys to construct or simulate a market or referendum for protection of areas of habitat, or changes in populations of species. The survey asks the respondent to indicate whether they would pay for an increment of protection, and if so how much they would pay. Economists have developed increasingly sophisticated survey methods for non-use value over the last two decades to improve the accuracy of this method. **Appendix M**, Socioeconomics Data and Methodology, offers an in-depth discussion of this method of value estimation.

Original surveys to estimate non-use values are complex and time-consuming; rather than perform a new survey, BLM and USFS reviewed existing literature to determine if there were existing non-use value studies for GRSG. No existing studies on valuation specific to the GRSG were

found. However, there are several studies published in peer-reviewed scientific journals for bird species that BLM judged to have similar characteristics with GRSG, including being a candidate for listing as threatened or endangered and being a hunted species. These studies find average stated willingness to pay of between $15 and $58 per household per year in order to restore a self-sustaining population or prevent regional extinction (see **Appendix M**, Socioeconomics Data and Methodology, for details). These values represent a mix of use and non-use values, but the non-use components of value are likely to be the majority share, since the studies primarily address species that are not hunted. Since GRSG protection is a public good available to all households throughout the intermountain west, if similar per-household values apply to the species the aggregate regional existence value could be substantial.

Values Associated with Grazing Land

Public land managed for livestock grazing provides both market values (e.g., forage for livestock) and non-market values, including open space and western ranch scenery, which provide value to some residents and outside visitors, and may also provide some value to the non-using public (e.g., the cultural icon of the American cowboy). Many people who ranch for a living or who otherwise choose to live on ranches value the ranching lifestyle in excess of the income generated by the ranching operations. This could be seen as a non-market value associated with livestock grazing. On the other hand, some residents and visitors perceive non-market opportunity costs associated with livestock grazing. Although some scholars and policy makers have discussed non-market values associated with livestock grazing, the process for incorporating these values into analyses of net public benefits remains uncertain, and BLM and USFS did not attempt to quantify these values for the present study.

Furthermore, some of the lifestyle value of ranching is likely to be captured in markets, such as through the property values of ranches adjacent to public lands with historic leases or permits for grazing on public land. Economists typically use a method called the hedonic price method to estimate values associated with particular amenities; this method may be used to explain the factors that influence the observed sale prices of ranch land. **Appendix M**, Socioeconomics Data and Methodology, provides more information about this method, as well as additional information to address potential non-market values associated with grazing.

Fiscal

Table 3.94, Revenues Received in the Socioeconomic Study Area by County, Government Funds, 2010 (Thousands), shows the main sources of revenues for counties in the Socioeconomic Study Area. For most counties, approximately half of their revenues are generated by taxes, with another 20 percent to 40 percent attributable to intergovernmental transfers. The main exception is Jackson County, which receives over half of its revenues from intergovernmental transfers. The table shows Payments in Lieu of Taxes, which are federal government payments based on the presence of federal lands within each county. The non-taxable status of BLM-administered lands is important to local governments, which must provide services to county residents and provide public safety and law enforcement services on BLM-administered lands. Federal revenue-sharing programs provide resources to local governments in lieu of property taxes because state and local governments cannot tax federally owned lands the way they would if the land were privately owned.

Table 3.94. Revenues Received in the Socioeconomic Study Area by County, Government Funds, 2010 (Thousands)

Geographic Area (Colorado)	Tax Revenues [1]	Payments in Lieu of Taxes [2]	Other Transfers [3]	Other Revenues [4]	Total
Eagle County	$46,201	$2,010	$14,730	$14,990	$77,931
Garfield County	$77,696	$392	$56,775	$11,283	$146,146
Grand County	$18,175	$852	$8,345	$6,482	$33,863
Jackson County	$1,004	$169	$2,042	$497	$3,712
Mesa County	$58,521	$512	$49,122	$10,658	$118,813
Moffat County	$14,647	$551	$11,280	$5,779	$32,257
Rio Blanco County	$16,504	$494	$8,842	$8,906	$34,746
Routt County	$21,197	$1,463	$8,216	$4,750	$35,626
Socioeconomic Study Area	$253,945	$6,443	$159,361	$63,345	$483,094

Sources: US Department of the Interior 2012; Eagle County 2011; Garfield County 2011; Grand County 2011a; Mesa County 2011; Moffat County 2011; Rio Blanco County 2011; Routt County 2011.

[1] Minor differences with **Table 3.95**, Tax Revenues Received in the Socioeconomic Study Area by County, 2010 (Thousands), reflect difference between government-wide revenues and fund revenues.

[2] Includes Payments in Lieu of Taxes received from BLM, USFS, US Bureau of Reclamation, National Park Service, and USFWS.

[3] Inter-governmental transfers excluding Payments in Lieu of Taxes

[4] "Other revenues" includes charges for services, licenses and permits, investment earnings and other unidentified revenues.

Intergovernmental transfers include a proportion of the mineral royalties and other revenues (such as lease/rent payments and bonus payments from lease sales) collected by the federal government from minerals leased by the federal government (including oil and gas and coal) in Colorado. Fifty percent of the royalties and payments collected by federal government related to mineral leases in Colorado are returned to the state (net of administrative charges). Colorado then distributes 50 percent of these funds (up to a limit) to the counties of origin and 50 percent to the state school fund, the Department of Local Affairs and the Water Conservations Board. Funds above the limit are distributed, in varying proportions, to the state school fund, counties, school districts, towns and the Department of Local Affairs (Garfield County, undated). Intergovernmental transfers also include transfers from Colorado state revenues to counties including revenues generated from the State Severance Tax on mineral extraction.

Table 3.95, Tax Revenues Received in the Socioeconomic Study Area by County, 2010 (Thousands), shows tax revenues for the Socioeconomic Study Area, by county, for 2010. Property taxes are the main source of tax revenues for counties. Counties typically collect taxes on real property (e.g., oil and gas improvements and structures) located on public lands. Expenditures by visitors to BLM-administered and National Forest System lands also generate tax revenues through state, county, and municipality sales and use taxes.

Table 3.95. Tax Revenues Received in the Socioeconomic Study Area by County, 2010 (Thousands)

Geographic Area (Colorado)	Sales Tax	Property Tax	Other Tax [2]	Total Tax Revenues
Eagle County	$15,575	$29,770	$1,060	$46,405
Garfield County	$4,077	$71,028	$6,144	$81,248
Grand County [1]	$2,954	$14,670	$551	$18,175
Jackson County [1]	$240	$610	$154	$1,004
Mesa County	$24,275	$28,072	$5,985	$58,332
Moffat County	$2,752	$10,631	$706	$14,089
Rio Blanco County [1]	$4,203	$10,432	$1,869	$16,504
Routt County	$4,486	$16,711	$0	$21,197
Socioeconomic Study Area	$58,453	$181,786	$16,441	$255,954

Sources: Eagle County 2011; Garfield County 2011; Grand County 2011a; Mesa County 2011; Moffat County 2011; Rio Blanco County 2011; Routt County2011.

[1] Government Funds

[2] "Other taxes" may include use tax, specific ownership tax, insurance premium tax, and/or other unidentified form of tax.

BLM and FS Expenditures and Employment

BLM field offices and USFS units provide a direct contribution to the economy of the local and surrounding area. BLM and USFS operations and management make direct contributions to area economic activity by employing people who reside within the area and by spending dollars on project related goods and services. Contracts for facilities maintenance, shuttling vehicles, and projects contribute directly to the area economy and social stability as well. **Table 3.96**, BLM and USFS Employment and Related Expenditures in the Socioeconomic Study Area, provides available information on the number of employees at each field office and the Routt National Forest. It also presents the contributions to the local economy, in terms of labor income, resulting from BLM and USFS operations and management expenditures. BLM and USFS contribute directly to area economic activity by employing people who reside in the area and by spending dollars on project-related goods and services. BLM and USFS expenditures also result in indirect contributions when BLM and USFS purchases supplies and services from other industries in order to produce their product.

Table 3.96. BLM and USFS Employment and Related Expenditures in the Socioeconomic Study Area

Agency	Management Unit	Number of Field Office Staff (Full-Time Equivalent Employees)	Labor Expenditures (millions of dollars)
BLM	CRVFO	43.8	$3.3
BLM	GJFO	49.2	$3.7
BLM	KFO	22.9	$1.7
BLM	LSFO	27.3	$2.2
BLM	Northwest District Office	15.4	$1.3
BLM	WRFO	41.7	$3.2

Agency	Management Unit	Number of Field Office Staff (Full-Time Equivalent Employees)	Labor Expenditures (millions of dollars)
USFS	Routt National Forest	221 [1]	$12.1[2]

Source: BLM 2012c; USFS 1998.

[1] Represents the number of full time employees supported by USFS in the Routt National Forest, not the number of field office staff.

[2] The Routt National Forest EIS reported USFS expenditures of $8.7 million in 1996 dollars. This value was converted to 2010 dollars using the Consumer Price Index (US Bureau of Labor Statistics 2012a).

Environmental Justice

Executive Order 12898 requires federal agencies to "identify and address the disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." The BLM Land Use Planning Handbook (BLM 2005) reiterates BLM's commitment to environmental justice – both in providing meaningful opportunities for low-income, minority, and tribal populations to participate in decision-making, and to identify and minimize any disproportionately high or adverse impacts on these populations. Similarly, the US Department of Agriculture's Departmental Regulation on Environmental Justice (US Department of Agriculture 1997) provides direction to agencies for integrating environmental justice considerations into US Department of Agriculture programs and activities, including those of USFS. Specifically, the Departmental Regulation on Environmental Justice calls for the identification, prevention, and/or mitigation of disproportionately high and adverse human health or environmental effects of US Department of Agriculture programs and activities on minority and low-income populations and provision for the opportunity for minority and low-income populations to participate in planning, analysis, and decision making that affects their health or environment.

According to the CEQ's Environmental Justice Guidance Under the National Environmental Policy Act (CEQ 1997), "minority populations should be identified where either: (a) the minority population of the affected region exceeds 50 percent or (b) the minority population percentage of the affected region is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis." The same document states that "In identifying low-income populations, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect."

Additionally, the CEQ guidance (CEQ 1997) advises that "In order to determine whether a proposed action is likely to have disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, or Indian tribes, agencies should identify a geographic scale, obtain demographic information on the potential impact area, and determine if there is a disproportionately high and adverse effect to these populations. Agencies may use demographic data available from the Bureau of the Census to identify the composition of the potentially affected population. Geographic distribution by race, ethnicity, and income, as well as a delineation of tribal lands and resources, should be examined."

Minority Populations

Table 3.97, Population Race and Ethnicity, 2010, summarizes the percentage of the population made up of ethnic minority groups in each county of the Socioeconomic Study Area and in Colorado and the US as a whole.

With the exception of Eagle and Garfield Counties, which have a slightly greater minority population percentage than Colorado as a whole, the remaining counties within the Socioeconomic Study Area have a much lower minority population by percentage than Colorado or the US as a whole. The dominant minority group in Eagle and Garfield Counties is the Hispanic or Latino population, which makes up approximately 30 percent of each county's population. Other ethnic minorities each accounts for 2 percent or less of the population in each county within the Socioeconomic Study Area.

Table 3.97. Population, Race and Ethnicity, 2010

Geographic Unit Analyzed	Total Population	Percent of Total Population								
		White	Black or African American	Alaska Native or American Indian	Asian	Native Hawaiian & Other Pacific Islander	Other Race	Two or more Races	Hispanic or Latino [1]	Total Minorities [2]
Eagle County, CO	52,197	83.2	0.7	0.7	1.0	0.0	12.3	2.1	30.1	32.7
Garfield County, CO	56,389	82.2	0.7	1.1	0.7	0.1	12.6	2.6	28.3	31.0
Grand County, CO	14,843	93.5	0.4	0.5	0.8	0.1	3.1	1.6	7.5	10.2
Jackson County, CO	1,394	92.5	0.0	1.2	0.1	0.0	5.0	1.1	10.8	12.6
Mesa County, CO	146,723	89.4	0.6	1.1	0.8	0.1	5.4	2.7	13.3	16.7
Moffat County, CO	13,795	90.0	0.3	0.9	0.6	0.1	5.9	2.2	14.4	17.3
Rio Blanco County, CO	6,666	91.9	0.8	0.9	0.3	0.2	3.7	2.3	10.0	13.6
Routt County, CO	23,509	94.8	0.4	0.5	0.6	0.1	2.1	1.6	6.8	9.3
Socio-economic Study Area	660,288	89.2	0.7	0.8	1.3	0.1	5.4	2.4	14.2	18.1
Colorado	5,029,196	81.3	4.0	1.1	2.8	0.1	7.2	3.4	20.7	29.9
US	308,745,538	72.4	12.6	0.9	4.8	0.2	6.2	2.9	16.3	36.0

Source: US Census Bureau 2010b.

[1] Individuals who identify themselves as Hispanic or Latino might be of any race; the sum of the other percentages under the "Percent of Total Population" columns plus the "Hispanic or Latino" column therefore does not equal 100 percent, and the sum of the percentages for each racial and ethnic category does not equal the percentage of "total minorities".

[2] The total minority population, for the purposes of this analysis, is the total population for the geographic unit analyzed minus the non-Latino/Hispanic white population.

Low Income Populations

Table 3.98, Low-Income Populations, 2006-2010 Average, summarizes the percentage of the population below poverty levels in each county of the Socioeconomic Study Area and in Colorado and the US as a whole. Following the Office of Management and Budget's Directive 14, the Census Bureau uses a set of money income thresholds that vary by family size and composition to detect what part of the population is considered to be in poverty (US Census Bureau 2012b).

Table 3.98. Low-Income Populations, 2006-2010 Average

Geographic Area	Percent Population Below Poverty Line
Eagle County, CO	9.4
Garfield County, CO	9.2
Grand County, CO	6.6
Jackson County, CO	13.9
Mesa County, CO	12.4
Moffat County, CO	13.0
Rio Blanco County, CO	5.3
Routt County, CO	6.9
Socioeconomic Study Area	11.6
Colorado	12.2
US	13.8
Source: US Census Bureau 2010c	

Of the eight counties in the Socioeconomic Study Area, two counties have higher percentages of residents below the poverty level than the overall Colorado percentage (12.2 percent): Mesa (12.4 percent) and Moffat (13.0 percent). One county, Jackson County, has a higher percentage (13.9 percent) of residents below the poverty level than the national percentage (13.8 percent).

To ascertain whether there are disproportionate effects of the alternatives on low-income populations, data on effects by each alternative are reported in **Chapter 4**, Environmental Consequences.

Tribal Populations

There are two federally recognized Indian tribes in the State of Colorado: the Southern Ute Tribe and the Ute Mountain Ute Tribe (US Department of Interior, Bureau of Indian Affairs 2011). While neither is located within the Socioeconomic Study Area, feedback received during public scoping and the June 2012 Economic Strategies Workshop for this planning document emphasized the significance of the GRSG in Native American culture and the need for continued consultation and engagement of area tribes throughout the planning process (BLM and USFS 2012; BLM 2013a).

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Chapter 4. Environmental Consequences

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4.1. Introduction

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

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

- A method of analysis section that identifies indicators and assumptions
- An analysis of impacts for each of the four alternatives (in some sections, the analysis has been broken down by alternative; in other sections, if the impacts are expected to be similar, the analyses have been combined)
- A summary comparison of the alternatives

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

Some BLM and USFS management actions may affect only certain resources and alternatives. This impact analysis identifies impacts that may benefit, enhance, or improve a resource as a result 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 BLM and USFS manage public lands for multiple uses, in accordance with the FLPMA and the NFMA. Land use decisions are made to protect the resources, while allowing for different uses of those resources, such as livestock grazing and oil and gas development. These decisions can result in trade-offs, which are disclosed in this chapter. 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 USFS planning team's knowledge of resources and the project area
- Reviews of existing literature
- Information provided by experts in the BLM and USFS, 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. 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 of analysis 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 be in compliance with all valid existing rights, federal regulations, bureau policies, and other requirements.
- Implementation-level actions necessary to execute the LUP-level decisions in this LUPA would be subject to further environmental review, including that under NEPA, as appropriate.
- Direct and indirect impacts of implementing the LUPA would primarily occur on the public lands administered by the BLM and the USFS 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 or USFS may be required to reevaluate decisions made as part of this planning process and to adjust management accordingly.
- The BLM and USFS 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 and federal mineral estate. There are approximately 1.7 million acres of BLM-administered and Routt National Forest lands and approximately 1.2 million acres of federal mineral estate in the decision area.
- Data from GIS have been used in developing acreage calculations and to generate the figures in **Appendix B**, Figures. Calculations depend on the quality and availability of data. Acreage figures and other numbers are approximate projections for comparison and analytic purposes only. Readers should not infer that they reflect exact measurements or precise calculations. In the absence of quantitative data, best professional judgment was used. Impacts were sometimes described using ranges of potential impacts or qualitatively, when appropriate.

4.2.1. General Methodology for Analyzing Impacts

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

Type of impact-Impacts are characterized using the indicators described at the beginning of each resource impact section. The presentation of impacts for key planning issues is intended to provide the BLM/USFS 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 northwest Colorado; and regional impacts would extend beyond the planning area boundaries.

Duration-This describes the duration of an effect, either short term or long term. Unless otherwise noted, short term is defined as anticipated to begin and end within the first 5 years after the action is implemented; long term is defined as lasting beyond 5 years to the end of or beyond the life of this LUPA.

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

Direct and indirect impacts-Direct impacts are caused by an action or implementation of an alternative and occur at the same time and place; indirect impacts result from implementing an action or alternative but usually occur later in time or are removed in distance and are reasonably certain to occur.

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

Irreversible and irretrievable commitment of resources is discussed in **Section 4.25**, Irreversible and Irretrievable Commitment of Resources. Irreversible commitments of resources result from actions in which resources are considered permanently changed; irretrievable commitments of resources result from actions in which resources are considered permanently lost.

4.2.2. Incomplete or Unavailable Information

The CEQ established implementing regulations for NEPA, requiring that a federal agency identify relevant information that may be incomplete or unavailable for evaluating reasonably foreseeable significant adverse impacts in an EIS (40 CFR, Part 1502.22). If the information is essential to a reasoned choice among alternatives, it must be included or addressed in an EIS, unless the cost of obtaining such information is exorbitant. Knowledge and information is, and would 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 USFS have made a considerable effort to acquire and convert resource data into digital format for use in the LUP, both from the BLM and USFS themselves 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 planning area-wide inventory of wildlife and special status species occurrence and condition
- GIS data used for disturbance calculations on private lands
- Site-specific surveys of cultural and paleontological resources

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

4.3. Fish and Wildlife

4.3.1. General Description

This section discusses impacts on fish and wildlife from proposed management actions. Habitat types are described in **Section 3.5**, Vegetation (Forest, Rangelands, Riparian and Wetlands, and Noxious Weeds); existing conditions concerning fish and wildlife and descriptions of habitat requirements for various species are described in **Section 3.2**, Fish and Wildlife. Impacts on GRSG are found in **Section 4.4.2**, Greater Sage-Grouse.

4.3.2. Terrestrial Wildlife

Methodology and Assumptions

General Impacts on Terrestrial Wildlife

Indicators of impacts on terrestrial wildlife and the measurements used to describe the impacts (where available or appropriate) are described below:

- Direct Habitat Loss

Acres of habitat lost. Direct habitat loss results when habitat is destroyed or converted to a form that is unsuitable for the impacted species. Direct habitat loss can be a short-term or long-term impact.

- Habitat Fragmentation

Habitat fragmentation occurs when contiguous habitat is broken into smaller blocks by surface-disturbing activities. Habitat fragmentation could lead to the following:

- Likelihood of reduced habitat quality and interference with movement patterns, leading to a decreased ability to breed or overwinter successfully to a degree that would lead, in turn, to substantial population declines
- Likelihood that individual habitat blocks would be reduced
- Likelihood of increased percentage of "edge" habitat (juxtaposition or placing side by side of contrasting environments on an ecosystem or a place were 2 different vegetation types come together) on smaller blocks, when compared to larger blocks
- Disruption to Species

Direct mortality of species, including predation, collisions with structures (fences, towers, vehicles), and disease; interference with movement patterns due to fragmented landscapes; short- or long-term displacement and physiological or behavioral influences (avoidance of otherwise functional habitats).

- Habitat Degradation

Weed infestation and understory and overstory reductions indicators (reductions in herbaceous ground cover, lack of residual cover, change in understory plant composition):

- Miles/acres disturbed. (It is assumed that habitat next to roads that are impacted by dust and dust suppression activities would have some lower level of understory next to the impacted habitat.)
- Habitat Restoration/Improvement

The likelihood of improving or enhancing habitat quality (e.g., increased species diversity, increased habitat connectivity, and decreased weeds).

- Habitat Protection

Acres protected through stipulations, withdrawals, closures, and special designations (e.g., ACECs). Also, the likelihood of reduced or prohibited surface disturbance.

Assumptions

The following list presents basic assumptions about terrestrial wildlife that apply to the impacts assessment for Alternatives A through D in this LUPA/EIS:

- The BLM and the USFS are primarily responsible for managing habitat, whereas state agencies such as CPW primarily manage terrestrial and aquatic wildlife species.
- Sufficient habitat exists to maintain current CPW data analysis unit objectives.
- Disruptive activities would displace wildlife, although some wildlife would adapt. In general, direct impacts result from activities authorized by the BLM/USFS and generally occur at the same time and place as the management activity or action causing the impact.

- Disturbance of any component of a species' habitat would be detrimental, with the degree of detriment depending on the importance of the habitat component to the maintenance of the population.
- Impacts on populations would not be considered significant if they exceed the current carrying capacity and would not reduce those populations below the carrying capacity.
- The exact locations of future surface-disturbing activities cannot be predicted at the LUPA/EIS level.
- The BLM/USFS will use best available information, management and conservation plans, and other research and related directives to guide wildlife habitat management on BLM-administered or National Forest System lands.
- NSOs, TL, CSUs, COAs, and siting conditions would be applied to important wildlife habitats (big game ranges, migratory bird nesting habitat, raptor nest sites and nesting habitat) to mitigate impacts from surface-disturbing activities.
- Raptor nest surveys are required before project implementation in those areas potentially influenced by development or other activities.
- If management actions (grazing, energy development, ROWs) are excluded from PPH and PGH, development would occur in non-sagebrush habitats (e.g., pinyon/juniper, mountain shrub, and spruce/fir), with potential adverse impacts on species that inhabit these ranges.
- Under all of the alternatives, proposed actions would comply with BLM Colorado Public Land Health Standard #3 (BLM 1997). Healthy, productive, and diverse plant communities support terrestrial wildlife communities that are productive, resilient, diverse, and vigorous and that are able to reproduce and sustain natural fluctuations and ecological processes; therefore, implementing management actions that contribute to maintaining the condition and quality of wildlife habitat would ensure that BLM Colorado Public Land Health Standard #3 (BLM 1997) would be met throughout the life of the LUPA.
- Federal oil and gas regulations prevent the BLM/USFS from being able to apply new or additional lease stipulations to existing leases. However, federal regulations do allow the BLM/USFS to apply other protection measures, in conjunction with planning and implementing oil and gas projects. These include applying stipulations consistent with the most recent LUP as terms and conditions for discretionary approvals (e.g., ROW actions) and applying COAs to augment protections related to lease activities.

Direct and Indirect Impacts on Terrestrial Wildlife

Impacts from Travel Management on Terrestrial Wildlife

Direct Habitat Loss, Habitat Fragmentation, and Disruption to Species

Impacts from designating roads and trails for recreation are not expected, but these designations would influence the amount and type of casual use impacts and could influence road construction impacts in an area. Casual use and road and trail building impacts are described under Recreation Management.

In general, the more acres of routes that are designated in the area, the greater the likelihood of habitat fragmentation and disturbance to species and habitats as high concentrations of human use typically occur on or next to motorized routes. Areas designated as open have no restrictions on cross-country travel and therefore have the highest potential for increased route density and associated disturbance. Managing on-site recreation and motorized activity, limiting travel to designated routes, and closing travel routes could prevent or reduce impacts. For example, seasonal closure of routes would prevent impacts on species during sensitive or critical times of the year, such as during winter or birthing. Impacts are more likely to occur in easily accessible areas where visitation would be highest.

Alternative A-Under this alternative the fewest acres would have seasonal restrictions on casual use; some of the areas within GRSG habitat would remain open to cross-country travel. This alternative has the highest potential for impacts on terrestrial wildlife due to the lack of restrictions on activities that cause these impacts.

Alternative B-Under this alternative no areas within PPH would be designated as open; instead, the field offices and ranger districts would determine where closures and seasonal restrictions are necessary within PPH to limit impacts on GRSG. This alternative would provide greater protection than Alternative A by reducing the likelihood of impacts from recreation on terrestrial wildlife species using the area. This would be the case particularly if the critical areas and seasons of use for these species were to coincide with the closures and seasonal limitations imposed for GRSG.

Alternative C-Same as Alternative B.

Alternative D-This alternative would implement the most restrictions by including the potential for seasonal limitations as necessary in ADH. It also would prohibit seasonal camping and other nonmotorized recreation within 4 miles of a lek. In this case, associated benefits for other terrestrial wildlife species could be expanded to ADH and all habitat within 4 miles of a lek.

Habitat Degradation

Habitat degradation impacts from designation of roads and trails for recreation are not expected, but these designations would influence the amount and type of casual use impacts and could influence road construction impacts in an area. Casual use and road and trail building impacts are described under Recreation Management.

Alternative A-Under this alternative some of the areas within GRSG habitat would remain open to cross-country travel. This alternative has the highest potential to see impacts on terrestrial wildlife through habitat degradation.

Under all the action alternatives, all areas within PPH would be limited to designated routes; no PPH would be open to cross-country travel. The action alternatives are similar and provide the most protection for terrestrial wildlife when compared to Alternative A.

Habitat Restoration/Improvement

Designating an area as closed is expected to result in the eventual revegetation of roads after a closure.

Alternative A-Under this alternative, the fewest acres would be closed to cross-country travel. This alternative includes the fewest acres of habitat restoration as a result of natural revegetation.

Alternatives B, C, and D-Under these alternatives, no areas within PPH would be designated as open, and the field offices and ranger districts would determine where closures are necessary within PPH to limit impacts on GRSG. These alternatives are expected to provide the potential for more habitat restoration than Alternative A.

Impacts from Recreation Management on Terrestrial Wildlife

Direct Habitat Loss, Habitat Fragmentation, and Disruption to Species

Areas Open for Casual Use. Impacts from recreational use would include impacts from casual use such as nonmotorized recreation or dispersed camping. Such activities are not subject to site-specific environmental review and vegetation impacts would not be apparent until after damage has occurred. Examples of direct impacts on terrestrial wildlife from casual use include habitat loss, fragmentation, and direct mortality from collisions with vehicles. Some species may adapt to disturbances over time and could recolonize disturbed habitats. Impacts are more likely to occur in easily accessible areas where visitation would be high, and in areas open to intensive motorized use, as cross-country travel facilitates weed spread as well as increasing habitat fragmentation. In general, the more acres of routes in the area, the greater the likelihood of habitat fragmentation and disturbance to species and habitats as high concentrations of human use typically occur on or immediately adjacent to motorized routes.

Indirect impacts on terrestrial wildlife through habitat would include avoidance or displacement (Knight and Cole 1995 in Joslin and Youmans 1999) and subsequent changes in species movement patterns, and impacts on survival or reproduction (Gutzwiller et al. 1998). Both short-term, loud noise (such as from vehicles or construction) and long-term, low-level noise (such as from industrial uses such as oil and gas development) have been documented to cause physiological effects, including increased heart rate, increased energy expenditure, altered metabolism, and a change in hormone balance (Radle 2007). 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. 2009). Impacts would be both short and long term, depending on the type and source of noise. Human disturbance near raptor nests can result in the abandonment of the nest, high nestling mortality from overheating, chilling, or dehydration when young are left unattended if adults are flushed from the nest, premature fledging, and reduced access to resources (Gutzwiller et al. 1998). Some species may adapt to disturbances over time and could recolonize disturbed habitats. On-site management of recreation and motorized activity and designation or closure of travel routes could prevent or reduce impacts. For example, seasonal closure of routes would prevent impacts on species during sensitive or critical times of the year, such as during winter or birthing. Impacts are more likely to occur in easily accessible areas, where visitation would be high and concentrated.

Alternative A-Under this alternative the fewest acres would have seasonal restrictions on casual use; some of the areas within GRSG habitat would remain open to cross-country travel. This alternative has the highest potential to see impacts on terrestrial wildlife due to the lack of restrictions on activities that cause these effects.

Alternatives B and C-Under these alternatives no areas within PPH would be managed as open to cross-country travel; the field offices and ranger districts would determine where closures and seasonal restrictions are necessary within priority habitat to limit impacts on GRSG. These alternatives would be more restrictive than Alternative A but less restrictive than Alternative D. It would reduce the likelihood of impacts from recreation to terrestrial wildlife species utilizing

the area particularly if the critical areas and seasons of use for these species coincide with the closures and seasonal limitations imposed for GRSG.

Alternative D-This alternative would include the potential for seasonal limitations as necessary in ADH, and would seasonally prohibit camping and other nonmotorized recreation within 4 miles of a lek. In this case associated benefits for other terrestrial wildlife species would potentially be expanded to ADH and all habitat within 4 miles of a lek. This alternative provides the greatest protection for terrestrial wildlife associated with GRSG habitat.

Construction of Roads and Trails. Impacts from construction, realignment and upgrading of roads and trails as a result of recreational activities would include habitat loss, fragmentation, or degradation, direct mortality from construction activities, sedimentation of waterways, increased turbidity, and decreased water quality. In general, the more miles of routes that are constructed in the decision, the greater the likelihood of habitat fragmentation and disturbance to species and habitats. Impacts from construction would be intensified during the construction phase and after construction would be the same as those discussed under C*asual Use*. Realignment of routes could be beneficial to wildlife species utilizing the area if the existing route is impacting habitat critical for these species and rerouting of the route would reduce impacts, for example if an existing route is impacting a spring utilized by wildlife and rerouting the route would reduce impacts on the spring. Generally, limiting construction, realignment and upgrading of roads is expected to be beneficial to terrestrial wildlife species utilizing the habitat.

Indirect impacts from construction would be similar to those discussed under C*asual Use* but would be expected to be intensified during the construction phase and after construction would be the same as those discussed under C*asual Use*.

Alternative A-Under this alternative, restrictions on construction of roads and trails would be implemented on a case-by-case basis throughout the decision area. This alternative has the highest potential to see impacts on terrestrial wildlife utilizing GRSG habitat due to the lack of restrictions on activities that cause these effects.

Alternative B-Under this alternative construction and realignment of roads and trails would be highly limited in PPH, as would upgrades to existing roads and trails. This alternative also limits new construction in PPH to access valid existing rights so that any new construction that would cause the area to exceed 3 percent disturbance would require mitigation to offset the disturbance. This alternative provides more protection than Alternatives A and D but less than Alternative C.

Alternative C-This alternative is similar to Alternative B but expands the restrictions on construction, realignment and upgrading to ADH. In addition, this alternative would expand the 3 percent disturbance cap to the entire area within 4 miles of a lek. Generally this alternative would be the most restrictive for new construction, realignment and upgrading of roads and trails. This alternative provides the most protection to terrestrial wildlife associated with GRSG.

Alternative D-Alternative D applies restrictions to priority habitat that are more flexible than those outlined in the NTT report. Other than Alternative A this alternative is the least restrictive for new construction, realignment and upgrading of roads and trails.

Disruption to Species. Disruption to species from permitted uses would include SRPs and USFS SUAs. These are for activities typically for larger organized recreation, such as competitive and noncompetitive events, and commercial outfitting services. Allowing competitive events is expected to result in impacts similar to those described under casual use; however, because these

events typically involve a much larger concentration of people than casual use, the impacts are expected to be magnified, and displacement of terrestrial wildlife as a result of noise disturbance is expected to be intensified. Impacts from commercial outfitting services are the same as those described under casual use as these activities typically do not involve large concentrations of people at any one time.

Alternative A-Under Alternative A, the BLM and USFS would continue issuing SRPs and SUAs on a case-by-case basis and would continue to provide opportunities for competitive and noncompetitive events and commercial outfitting services.

Alternatives B and C-SRPs and SUAs would only be authorized where impacts on PPH would be neutral or beneficial, it is expected that other terrestrial wildlife species within PPH or sagebrush habitats would also benefit from these restrictions.

Alternative D-This alternative limits impacts on disruption of the species as well as PPH, thus it would also benefit terrestrial wildlife species whose critical use periods coincide with these seasonal restrictions.

Habitat Degradation

Casual Use. Impacts from recreational use would include impacts from casual use such as nonmotorized recreation or dispersed camping. Such activities are not subject to site-specific environmental review and vegetation impacts would not be apparent until after damage has occurred. Examples of terrestrial wildlife habitat degradation as a result of casual use include increased soils and vegetation disturbance leading to an increase in the likelihood of weed invasion and spread in recreation areas. Impacts from casual use are more likely to occur in easily accessible areas where visitation would be high, and in areas open to intensive motorized use, as cross country travel facilitates weed spread as well as increasing habitat fragmentation.

Alternative A-Under this alternative some of the areas within GRSG habitat would remain open to cross-country travel. This alternative has the highest potential to see impacts on terrestrial wildlife through habitat degradation.

Alternatives B, C, and D-Under the action alternatives, all areas within PPH would be limited to designated routes; no PPH would be open to cross-country travel. The action alternatives provide the greatest protection for terrestrial wildlife habitat.

Construction of Roads and Trails. In general, the more miles of routes that are constructed in the decision area, the greater the likelihood of habitat degradation associated with these routes. Direct impacts from construction would be intensified during the construction phase and after construction would be the same as those discussed under casual use. Realignment of routes could be beneficial to wildlife species utilizing the area if the existing route is impacting habitat critical for these species and rerouting would reduce impacts (e.g., if an existing route is impacting a spring utilized by wildlife and rerouting would reduce impacts on the spring). In general, limiting construction, realignment, and upgrading of roads is expected to be beneficial to terrestrial wildlife species.

Alternative A-Under this alternative restrictions on construction of roads and trails would be implemented on a case-by-case basis throughout the decision area. This alternative has the highest potential to see impacts on terrestrial wildlife utilizing GRSG habitat due to the lack of restrictions on activities that cause these effects.

Alternative B-Construction and realignment of roads and trails would be highly limited in PPH, as would upgrades to existing roads and trails. This alternative would also limit new construction in PPH to access valid existing rights so that any new construction that would cause the area to exceed 3 percent disturbance would require mitigation to offset the disturbance. This alternative provides more habitat protection than Alternatives A and D but not as much as Alternative C.

Alternative C-This alternative is similar to Alternative B but expands the restrictions on construction, realignment and upgrading to ADH. In addition, this alternative would expand the 3 percent disturbance cap to the entire area within 4 miles of a lek. Generally this alternative would be the most restrictive for new construction, realignment and upgrading of roads and trails, and therefore is expected to provide the greatest benefit to terrestrial wildlife.

Alternative D-This alternative applies restrictions to priority habitat that are more flexible than those outlined in the NTT report. Other than Alternative A, this alternative is the least restrictive for new construction, realignment and upgrading of roads and trails.

Habitat Restoration/Improvement

Reclamation of Roads and Trails. Reclamation of roads and trails is expected to have beneficial impacts on terrestrial wildlife species through reduction of the direct and indirect impacts discussed under casual use above.

None of the proposed alternatives require restoration except as a possible mitigation for the disturbance cap (as described above under construction of roads and trails).

Alternative A-Alternative A provides the least direction on habitat restoration for GRSG thus it is expected to result in the least habitat restoration for this habitat type.

Alternatives B and D-Alternatives B and D require consideration of use of transplanted sagebrush in priority habitat. Alternatives B and D would have fewer beneficial impacts than Alternative C, but would have more beneficial impacts than Alternative A.

Alternative C-Alternative C requires use of transplanted sagebrush in ADH. As a result it is expected that Alternative C could result in the most rapid habitat recovery for GRSG because transplanted sagebrush may provide GRSG-required habitat features faster.

Impacts from Lands and Realty Management on Terrestrial Wildlife

Direct Habitat Loss, Habitat Fragmentation, and Habitat Degradation

In areas where ROWs are permitted, there would be more impacts on terrestrial wildlife species and wildlife habitats than in areas where ROWs are excluded or avoided.

Construction and operation of ROW facilities (such as transmission lines, roads, and pipelines) may result in habitat loss, fragmentation, and degradation. Surface disturbance during construction removes vegetation, reducing important hiding cover and forage for wildlife species. ROWs, such as roads and industrial facilities, may lead to permanent loss of wildlife habitat. Other ROWs, such as pipelines or buried power lines, may lead to a more short-term loss of habitat if the area were reclaimed after construction. In addition to vegetation removal, long-term occupancy of structures (e.g., wind turbines and transmission lines) and facilities leads to direct habitat loss.

ROWs may also lead to habitat fragmentation and degradation. ROW projects can reduce patch size and increase edge habitats. These impacts would be more severe to species that

require large blocks of intact habitat, but species that require edge habitat could benefit from this disturbance. Surface disturbance can also lead to new weed infestations and spread weeds where infestations already occur. Noxious and invasive weeds are often of lower value to wildlife species and degrade wildlife habitat by reducing optimal cover or food. Fragmentation and habitat degradation may lead to a lower carrying capacity and reduce wildlife populations.

Excluding, limiting, or collocating ROWs in GRSG habitats would benefit wildlife species that occupy sagebrush habitats. In addition, disturbance caps, NSOs, and TLs can protect wildlife species from disturbances. However, if disturbances are moved from GRSG habitat into other habitat types, such as pinyon/juniper woodlands, species that occupy these habitats may experience greater impacts from ROW projects.

Disruption to Species

Both the construction and operation phases of ROW projects can lead to disruption impacts. Noise and an increase in human presence during construction may displace wildlife into lower quality habitat and may disrupt breeding, nesting, wintering, and migration. Although construction impacts are generally short term, many impacts would continue during routine maintenance and operation of the ROWs. Some wildlife species may avoid habitat in the vicinity of infrastructure, resulting in indirect habitat loss. In addition, noise and an increase in traffic during ROW operation and maintenance would disturb and likely displace wildlife. Predation and harassment of prey species can increase when tall structures (power lines and towers) provide additional perch locations for raptors and corvids (Avian Power Line Interaction Committee 2006) or when ROW roads increase mammalian predator densities.

Construction and operation of ROW facilities may also lead to direct mortality of wildlife. This impact would be more pronounced for burrowing animals or wildlife with limited mobility. Direct mortality may occur when such species as bats or birds collide with turbines, power lines, and meteorological towers or their supporting infrastructure, such as guy wires (Erickson et al. 2005). In addition, increased traffic on roads from ROW maintenance and operations can lead to direct mortality through vehicle/wildlife collisions.

Excluding, limiting, or collocating ROWs in GRSG habitats would benefit wildlife species that occupy sagebrush habitats. In addition, disturbance caps, NSOs, and TLs can protect wildlife species from disruptions. However, if disturbances are moved into other habitat types, such as pinyon/juniper woodlands, species that occupy these habitats may experience greater impacts from ROW projects.

Habitat Protection

Managing important GRSG habitat as exclusion or avoidance areas would eliminate or reduce the impacts discussed above. Protections afforded to GRSG under the various alternatives are expected to benefit those wildlife species whose ranges are coincident with PPH or PGH.

Withdrawals. Withdrawing PPH from mineral entry and other authorized activities would be beneficial to wildlife habitats. Prohibiting surface-disturbing and -disrupting activities would benefit terrestrial wildlife by precluding activities that would have direct and indirect impacts on terrestrial wildlife.

Land Tenure. In general, proponents of land acquisition or disposal actions would consider land tenure adjustment criteria with the goal that the exchange, acquisition, or disposal would increase

public benefits, including wildlife resources. Any acquisition of land that includes high-value GRSG habitat can result in beneficial impacts on wildlife whose ranges are coincident with GRSG. Any disposal of BLM-administered or National Forest System land with high-value habitat is typically avoided; such disposals could increase the risk of habitat loss through development because there would not be any BLM/USFS-required mitigation. Lands no longer administered by the BLM/USFS could also experience increased human presence that can increase disturbance to wildlife in the area. Consolidating land ownership through land tenure adjustments increases the manageability of lands and results in more contiguous blocks of habitat; this would beneficially impact wildlife.

Summary of Impacts by Alternative

Alternative A would have the most areas available for ROWs and would have the most potential to impact wildlife species and their habitat. The impacts described above would be the greatest under this alternative.

Alternative B would have fewer areas available for ROWs through restrictions to protect GRSG habitat. Under this alternative, PPH would be managed as an exclusion area, and PGH would be managed as an avoidance area for new ROW projects (see **Figures 2-4** through **2-7**, **Appendix B**). In addition, Alternative B would encourage consolidation of GRSG habitat, facilitating habitat conservation. These conservation measures would be more protective than conservation measures under Alternatives A and D but would be less protective than Alternative C; therefore, potential impacts on wildlife whose ranges overlap with PGH and PPH would be less than Alternatives A and D but would be greater than Alternative C.

Alternative C would have the most protective measures for GRSG. Under this alternative, ADH would be managed as an exclusion area for new ROW projects. In addition, Alternative C would encourage consolidation of GRSG habitats, facilitating habitat conservation and management. This alternative is expected to have the fewest impacts on wildlife species whose ranges overlap with PGH and PPH.

Under Alternative D, PPH would be managed as an avoidance area. ROW projects would be allowed in PPH if the project would not adversely affect GRSG populations. This alternative would be more protective than Alternative A but less protective than Alternatives B and C.

Impacts from Wind Energy Development on Terrestrial Wildlife

Direct Habitat Loss, Habitat Fragmentation, Habitat Degradation

In areas where wind energy facilities are permitted, there would be more impacts on wildlife species than in areas where wind energy facilities are excluded.

Wind energy facilities would be authorized through land use authorizations (ROWs). Impacts on wildlife habitats from construction and operation of wind energy facilities are similar to the impact for ROWs. These impacts include direct habitat loss, fragmentation, and degradation (see Impacts from Land and Realty Management on Terrestrial Wildlife).

Disruption to Species

In areas where wind energy facilities are permitted, there would be more impacts on wildlife species than in areas where wind energy facilities are excluded.

Impacts on wildlife habitats from construction and operation of wind energy facilities are similar to the impact for ROWs. These impacts include direct habitat loss, fragmentation, and degradation. Impacts on species could also include mortality, stress, and avoidance of turbines. (See Impacts from Land and Realty Management on Terrestrial Wildlife.)

Summary of Impacts by Alternative

Alternative A does not exclude wind energy developments specifically from GRSG habitat. In addition, this alternative would have the most areas available for ROWs and would have more potential to impact wildlife than Alternatives B, C, and D.

Although Alternative B does not exclude wind energy developments specifically from GRSG habitat, this alternative would have fewer areas available for ROWs. Conservation measures would be more protective under Alternative B than under Alternatives A and D but would be less protective than Alternative C; therefore, potential impacts on wildlife whose ranges overlap with PGH and PPH would be less than Alternatives A and D but would be greater than Alternative C.

Alternative C would have the most protective measures for GRSG by precluding wind developments from ADH; therefore, it would have the fewest impacts on wildlife species whose ranges overlap with PGH and PPH.

Although Alternative D does not address wind energy specifically, Alternative D would be more protective in respect to all ROWs than Alternative A, but it would be less protective than Alternatives B and C.

Impacts from Solar Energy Development on Terrestrial Wildlife

Direct Habitat Loss, Habitat Fragmentation, and Habitat Degradation

In areas where solar energy facilities are permitted, there would be more impacts on wildlife species than in areas where solar energy facilities are excluded. All solar energy projects 20 megawatts and greater are excluded in all LUPs within the planning area, as described in the Solar Energy Development Programmatic EIS Record of Decision (BLM 2012). There is limited potential for industrial solar development in the planning area.

Impacts on wildlife habitats from construction and operation of solar energy facilities are similar to the impact for ROWs. These impacts include direct habitat loss, fragmentation, and degradation (see Impacts from Land and Realty Management on Terrestrial Wildlife).

Disruption to Species

In areas where solar energy facilities are permitted, there would be more impacts on wildlife species than in areas where solar energy facilities are excluded.

Impacts on wildlife habitats from construction and operation of solar energy facilities are similar to the impact for ROWs. These impacts include direct habitat loss, fragmentation, and degradation (see Impacts from Land and Realty Management on Terrestrial Wildlife).

Summary of Impacts by Alternative

Alternative A does not exclude solar facilities specifically from GRSG habitat. In addition, this alternative would have the most areas available for ROWs and would have more potential to impact wildlife than Alternatives B, C, and D.

Although Alternative B does not exclude solar facilities specifically from GRSG habitat, it would preclude siting a solar facility in PPH. Conservation measures would be more protective under Alternative B than Alternatives A and D but would be less protective than Alternative C; therefore, impacts on wildlife whose ranges overlap with PGH and PPH would be less than Alternatives A and D but would be greater than Alternative C.

Alternative C would have the most protective measures for GRSG by precluding solar facilities from ADH and therefore would have the fewest impacts on wildlife species whose ranges overlap with PGH and PPH.

Although Alternative D does not address solar facilities specifically, it would be more protective in respect to all ROWs than Alternative A but would be less protective than Alternatives B and C.

Impacts from Range Management on Terrestrial Wildlife

Direct Habitat Loss, Habitat Fragmentation, and Disruption to Species

In areas that are available for livestock grazing, there could be more impacts on terrestrial wildlife from vegetation management than in areas where livestock grazing is excluded.

The noise from heavy equipment used for treatments and fence construction could temporarily disperse bird species from breeding and nesting habitat and wildlife from occupied habitat. Prescribed burning could also disturb nesting bird species from smoke inadvertently drifting into occupied habitat (see also Impacts from Wildfire suppression, Fuels Management, and Fire Rehabilitation). These activities have the potential to remove or alter terrestrial wildlife habitat and could result in disrupted foraging and nesting behavior. Disturbances from heavy equipment and prescribed burning are expected to be localized and short term. Most wildlife species would move into adjacent untreated areas; however, direct mortality during the vegetation treatments is possible. Direct mortality can also result from fence collisions and entanglement. TLs (such as those for big game birthing areas, raptor nesting, and big game winter habitat), as well as site-specific COAs (such as TLs for migratory bird nesting), could mitigate the short-term impacts resulting from the treatments.

Habitat treatments would be beneficial for species that depend on younger seral stages. However, there would also be adverse direct and indirect impacts on species that depend on large blocks of older seral stage habitats until vegetation communities reestablish themselves. Adverse impacts on these species are direct habitat loss, habitat modification, habitat fragmentation, and reduced habitat effectiveness. Timing of rangeland habitat projects could adversely impact nesting birds and young broods by direct mortality; however, most projects occur in the fall, after the nesting season.

A concern of resetting vegetation seral stage through vegetation treatments is the invasion of undesirable plant species. Noxious and invasive weeds are often of lower value to wildlife and degrade wildlife habitat by reducing optimal cover or food. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds. Cheatgrass invasion is also a threat to some treatment areas. Invasive nonnative plants with little or no forage value for big game species are increasing in some areas. The greatest impacts have occurred on big game winter range areas with low precipitation rates. Not only can invasive species outcompete most native plants when moisture is limited, they can also change site-specific fire ecology and result in the loss of critical shrub communities. Cheatgrass would provide some

short-term forage benefits to big game species while in the early stages of growth; however, cheatgrass lacks the ability to provide high quality forage during most of the year.

Noxious and invasive weed management includes herbicide use, biological controls, and mechanical treatments in weed-infested areas. Short-term habitat and forage loss for some wildlife could result from treatments. Adverse direct impacts could result from accidental chemical drift caused by herbicide use in nearby areas. For example, accidental chemical drift could poison individual bird species or result in mortality of prey. All weed treatments would result in long-term beneficial impacts on terrestrial wildlife species and to their habitats, as native vegetation is, or would be, restored.

Implementation-level grazing decisions would comply with BLM Colorado Public Land Health Standard #3 (BLM 1997). Where the standards are being met, rangeland management is expected to result in minimal impacts on terrestrial wildlife. Healthy, productive, and diverse plant communities support terrestrial wildlife communities that are productive, resilient, diverse, and vigorous and those that are able to reproduce and sustain natural fluctuations and ecological processes; therefore, implementing management actions that contribute to maintaining the condition and quality of wildlife habitat would ensure that BLM Colorado Public Land Health Standard #3 (BLM 1997) would be met throughout the life of the LUPA.

Alternative A would allow livestock grazing and has the most potential for vegetation disturbance and range improvements with the fewest restrictions; therefore, Alternative A would have the greatest impact on terrestrial wildlife.

The potential for vegetation disturbance and range improvements is expected to be the same under Alternative B as under Alternative A; however, more restrictions would be in place to protect GRSG habitat, so it would have fewer impacts on terrestrial wildlife.

While the removal of livestock under Alternative C would be expected to lead to substantial improvements in herbaceous understories which would likely benefit terrestrial wildlife species in general; in all practicality, the only way to keep livestock out of these areas would be through the construction of fences. An estimated 5,000 miles of fence would need to be constructed under this alternative (see , Table 4.6, “Livestock Grazing Management-Alternative C” (p. 705), in **Section 4.13**, Range Management). Increased fence densities may have an impact to terrestrial wildlife species, particularly big game species. Potential impacts would depend on fence design and location (coincident with GRSG habitats).Conversely, if livestock were removed from public lands, there would be no need to maintain existing fences, particularly in areas with large, continuous tracts of publicly-owned land.

Alternative D would have the same areas available for livestock grazing as Alternatives A and B. Impacts on terrestrial wildlife are expected to be the same under Alternative D as they would be under Alternative B.

Habitat Degradation

In areas that are available for livestock grazing, there could be more impacts on terrestrial wildlife than in areas where livestock grazing is excluded.

The impacts resulting from livestock grazing on wildlife habitat include competition for forage and water and habitat use. Grazing, invariably, reduces the height and ground cover of plants, at least temporarily. This would reduce the cover wildlife species need for protection,

escape, feeding (including the availability of prey populations), roosting, breeding, and nesting. Inappropriate grazing, or overgrazing, could change habitat effectiveness and the connectivity of wildlife habitats by changing the structure, composition, or diversity of vegetation. The placement of salt and mineral supplements could lead to cattle concentration in terrestrial wildlife species habitats. This could displace species, cause nests to be trampled, and reduce habitat quality. Impacts could be both short term and long term and could range from minor to major, depending on the grazing intensity, duration, season of use, and local climate.

Managing the timing and intensity of livestock grazing is critical to maintaining habitat conditions preferable to wildlife. For example, cattle grazing during the early season could improve the quality of winter forage for elk; however, cattle must be removed early enough in the fall to allow plants to regrow.

Implementation-level grazing decisions would comply with BLM Colorado Public Land Health Standards (BLM1997a). If livestock grazing is the cause for lands not meeting BLM Colorado Public Land Health Standards, changes would be made in order to address the kind, numbers, and class of livestock, as well as the season, duration, distribution, frequency, and intensity of grazing.

Alternative A would allow livestock grazing, with no restrictions in place to protect GRSG habitat specifically and therefore would have the greatest impact on terrestrial wildlife.

Alternative B would have the same areas available for livestock grazing as Alternative A; however, more restrictions would be in place to protect GRSG habitat, so it would have fewer impacts on terrestrial wildlife.

Alternative C would have no areas available for livestock grazing within ADH and therefore would have the fewest impacts on terrestrial wildlife.

Alternative D is similar to Alternative B but would be slightly more restrictive. This is because GRSG habitat objectives within grazing allotments would be applied to ADH and not just PPH. This alternative would have fewer impacts than Alternative A and would have greater impacts than Alternative C.

Habitat Restoration/Improvement

In areas that are available for livestock grazing, there is more opportunity to improve habitat quality for terrestrial wildlife using grazing and vegetation management as tools than in areas where livestock grazing is excluded.

In the long term, wildlife would benefit from most vegetation treatments and grazing. This would be due to decreases in noxious and invasive weeds, increases in vegetation productivity, and increases in plant diversity and age classes. This would, in turn, provide additional forage, cover, and prey base. Mimicking natural periodic disturbance is often necessary to stimulate plant productivity and to increase diversity and nutritional value.

Removal of residual cover could hasten spring green-up of the herbaceous understory, thereby providing quality forage for wildlife coming out of stressful winter conditions. Improving vegetation in upland areas would provide more forage to big game species and other herbivorous species that occur in these areas. This would result in direct beneficial impacts. Livestock grazing can also enhance forage and brood-rearing conditions for wildlife species.

Well-designed water developments (e.g., reservoirs) and the associated riparian vegetation create nesting, feeding, and brood-rearing habitat for waterfowl and other migratory birds. The development of water sources in dry regions would allow wildlife use to expand into habitats that previously were used only seasonally. Range improvements for livestock would disperse the impact of livestock on the land, which, in turn, would prevent disturbance, weed spread, and soil compaction in any one area.

Vegetation treatments in upland areas often divert livestock and wildlife use from riparian and wetland areas, thereby increasing the vigor and structural diversity of these plant communities. In addition, benefits resulting from habitat restoration (such as road reclamation, weed spraying, fertilization, and seeding) include increased habitat connectivity, improved pollinator habitat for plants, weed control, soil stability, and a more natural fire regime.

Alternative A would allow livestock grazing, with the most potential for vegetation management and the fewest restrictions; therefore, Alternative A would allow the most flexibility to use these tools to benefit terrestrial wildlife.

The potential for livestock grazing and vegetation management is expected to be more restrictive under Alternative B than under Alternative A. Vegetation treatments would only be allowed if they conserve, enhance, or restore GRSG habitat in PPH. Thus, there would be less flexibility to use grazing and vegetation management tools to benefit terrestrial wildlife.

Alternative C would not allow livestock grazing in ADH for GRSG, and only treatments that would benefit GRSG would be allowed; therefore, Alternative C would allow the least flexibility to use grazing and vegetation management tools to benefit terrestrial wildlife.

Alternative D would have the same areas available for livestock grazing as Alternatives A and B. The potential to use grazing and vegetation management tools to benefit terrestrial wildlife is expected to be less restrictive under Alternative D, compared to Alternatives B and C, and more restrictive than Alternative A.

Impacts from Wild Horse Management on Terrestrial Wildlife

Disruption to Species

Wild horse gathers would create short-term localized disturbance to wildlife from human activity. Vehicle traffic, helicopter use, wranglers on horseback, and the movements of the wild horses during gathers would contribute to wildlife stress and displacement. Management of wild horses may result in range improvement projects, such as fences and water developments. Disturbance from construction and maintenance of range projects are similar to impacts described in the livestock grazing section (see *Impacts from Range Management on Terrestrial Wildlife*).

Habitat Degradation

Grazing by wild horses would be similar to permitted livestock grazing (see above) and may result in competition for forage, water, and available habitat. Season-long grazing by wild horses may impact habitat quality by changing structure, composition, or diversity of vegetation. Since horse diets consist primarily of grass and horses can clip vegetation close to the ground, year-round grazing by wild horses can remove important cover for nest and concealment. Decreased cover and diversity of grasses and shrubs as well as decreased mammal burrow density have been documented at water sources used by wild horses (Beever and Brussard 2000; Ganskopp and Vavra 1986). Small mammals are a prey base for many species, so less prey can negatively affect

raptors and carnivores that may inhabit the area. Grazing by wild horses can also facilitate new weed infestations or spread weeds where infestations already occur.

Wild horses also contribute to riparian-wetland habitat degradation, which reduces the quality or suitability of these habitats for wildlife species. Wild horses that tend to dominate water sources can force wildlife to find alternative water sources. This can displace wildlife into lower-quality habitat or force wildlife to travel farther to find water. Under all alternatives, the BLM has the ability to adjust the appropriate management level of wild horses if resources are being damaged. However, only Alternatives B, C, and D provide management guidelines specific to GRSG habitat.

Summary of Impacts by Alternative

Alternative A would place the fewest restrictions on wild horse management and therefore would have the most potential for impacts on terrestrial wildlife.

Alternative B would place some restrictions on the management of wild horses. Under this alternative, gathers would be prioritized in ADH, and GRSG habitat objectives and management considerations would be incorporated into HMA plans. These management strategies would benefit wildlife species whose ranges overlap PPH or PGH. Overall, impacts on terrestrial wildlife are less than Alternative A and D but similar to Alternative C.

Alternative C would have the same impacts on terrestrial wildlife species as Alternative B.

Alternative D would be similar to Alternatives B and C but would consider all resource values in conjunction with GRSG when managing wild horses. For terrestrial wildlife, impacts from this alternative are similar to Alternatives B and C but more protective than Alternative A.

Impacts from Fluid Minerals Management on Terrestrial Wildlife

Impacts on fish and wildlife species would be most pronounced in certain Colorado MZs. These are the zones that currently are strongly influenced by energy development or are expected to experience increases in energy development in the near future. However, all lands with existing lease rights have the potential to be influenced by development activities. See **Table 3.34**, Acres of Oil and Gas Potential on Planning Area GRSG Habitat, in **Section 3.7**.

Table 4.1. Acres of Federal Mineral Estate in Mule Deer Habitat

Field Office	Leased		Unleased	
	Severe Winter Range	Summer Range	Severe Winter Range	Summer Range
	PPH	ADH	PPH	ADH
CRVFO	0	80	16,600	26,600
GJFO	0	3,000	0	1,400
KFO	14,100	14,100	45,600	55,900
LSFO	115,400	187,900	232,800	473,400
WRFO	17,500	98,900	3,000	59,800
Roan Plateau	0	0	0	0
Routt National Forest	10	10	500	500
Source: BLM 2013a				

Direct Habitat Loss and Modification

Shrubland and woodland clearing and facility occupation would result in long-term modification or loss of woody vegetation as a source of wildlife forage or cover. This condition would persist from about 20 years in mountain big sagebrush sites to 150 to 200 years in pinyon/juniper woodlands. Interim (pad) and final (pipeline) reclamation applied to surface disturbances would not generally regain useful shrubland character for one to two decades; however, it could serve as a source of herbaceous forage and cover in the short term. In every seasonal range, the presence of early seral (interim/final reclaimed) sites that provide greater horizontal and vertical ground cover or more diverse structural or flowering forms may serve important functional roles to all animal groups. This includes overwinter cover for nonhibernating small mammals, substrate for invertebrate prey of migratory birds and GRSG, and supplemental sources of nutritious herbaceous forage for big game. In the long term, reclamation practices are expected, in varying degrees, to establish herbaceous communities that complement successional advance to former shrubland or woodland character.

The potential to influence big game both positively and negatively would vary by alternative. Big game would benefit (to varying degrees) by conservation measures designed to reduce or eliminate sagebrush loss or alteration. This would be the case where important seasonal ranges are coincident with PPH or ADH, such as severe winter range (which supports up 90 percent of a herd's population during the most severe winters), summer range, or calving/production areas. Similarly, reclamation practices designed to promote reestablishment of perennial grass and forb species would benefit big game species in the short term. Excluding or limiting disturbance in sagebrush habitat may increase the removal or modification of other community types that big game rely on (such as pinyon/juniper and mountain shrub) or lead to the occupation of important big game seasonal ranges (such as severe winter ranges and elk production). This could have negative impacts.

The most prevalent habitat-related risk from fluid minerals development in and potentially outside the planning area would extend primarily to woodland nesting raptors (that is, accipiters and owls). This would be the case where the clearing of pinyon/juniper woodlands can alter nest stand conformation or the character of the surrounding habitat for centuries. Because redevelopment of canopy structure suitable for raptor nesting is prolonged (e.., 150 years or more), reductions in the suitable habitat base can accumulate rapidly at the landscape level. Avoidance of sagebrush habitats associated with each alternative could shift development into other community types, including pinyon/juniper, resulting in long-term habitat loss for many raptor species.

Development would most likely occur in three major vegetation complexes: pinyon/juniper, upland big sagebrush, and mountain shrub. The level of habitat loss in each respective community would vary by alternative. Excluding or limiting development in big sagebrush habitats (associated with PPH and ADH) would benefit those nongame bird and small mammal species that are closely associated with sagebrush communities. Additionally, the reestablishment of perennial herbaceous forms capable of providing more effective ground cover from reclamation requirements of the various alternatives would benefit ground or low shrub nesting birds and most small mammals in the short term. Relocation of development into communities that are incapable of supporting GRSG (pinyon/juniper, aspen/spruce/fir, and mountain shrub) could negatively influence those nongame species that rely more on these communities for cover (including nesting) and forage.

Indirect Habitat Loss and Avoidance (Disruption to Species)

The avoidance of otherwise functional habitats due to human activity adds substantially to overall loss of habitat. Impacts on terrestrial wildlife from the construction and operation of well pads and ancillary facilities (including maintenance activities) are similar to those discussed above under *Impacts from Lands and Realty Management on Terrestrial Wildlife*. Impacts would vary depending on species.

Research has shown that big game have the tendency to avoid human disturbance, most commonly access roads and trails (Rost and Bailey 1979; Preisler et al. 2006). Increased traffic volumes could also increase the frequency of vehicle strikes, resulting in injury or direct mortality.

Raptors as a group and eagles in particular are birds afforded protection under the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act. Raptors traditionally receive pronounced management attention due to their relatively low abundance (high trophic level) and reproductive potential. Raptors are considered to be among those birds most susceptible to reproductive failure caused by human activities. As indicated above under Direct Habitat Loss, conservation measures designed to avoid or reduce disturbance in sagebrush habitats may result in more concentrated development in other vegetative types, including woodland communities; however, a combination of COAs (nest surveys), NSO, and TL stipulations designed to prevent disruption of ongoing nest efforts would be applied regardless of alternative. An example of this disruption is development-induced absences of the adult birds sufficient to jeopardize egg or nestling survival from malnourishment, exposure, or predation. Clearing shrubland and woodland canopies would increase foraging habitat available primarily for buteo hawks, falcons, and eagles.

Although the response is species specific, migratory birds tend to avoid siting nests near disturbance. Inglefinger and Anderson (2004) found the nesting density of sagebrush-associated birds was reduced by 40 to 60 percent within 330 feet of roads accessing natural gas fields in Wyoming, with as few as 10 vehicle trips per day. Recent work from Wyoming gas fields (Gilbert and Chalfoun 2011) documents 10 to 20 percent declines in the abundance of certain sagebrush obligates (i.e., sage sparrow and Brewer's sparrow) in developed natural gas fields. Conservation measures under each alternative and designed to reduce or eliminated impacts on GRSG and sagebrush habitat in each Colorado MZ would undoubtedly reduce the indirect influences of fluid minerals development on bird species closely associated with sagebrush communities: Brewer's sparrow, sage thrasher, and vesper sparrow. Activity in woodland and deciduous shrubland communities may intensify as a result of these conservation measures, leading to avoidance-based declines in habitat capacity. COAs, NSO, and TL stipulations may moderate the influence of development on breeding bird activity. Intervening topography and taller shrubland forms (e.g., serviceberry and oakbrush) and woodland vegetation also could moderate development influence.

Habitat Fragmentation and Habitat Degradation

Fluid minerals development (well pads, roads, and associated structures) would physically fragment habitat across the landscape. This would reduce intact expanses of habitat and would increase edge habitats within the habitat matrix**.** In terms of functional connectivity, development patterns (scale and distribution) could influence animal movement patterns and may, depending on species mobility and behavioral responses, create absolute barriers. Surface-disturbing activities can alter plant community composition and decrease species diversity and may lead to the proliferation of noxious weeds and invasive plant species. All of these can reduce the habitat quality for resident wildlife species. Conservation measures outlined in each alternative would reduce the potential for fragmentation and degradation across sagebrush landscapes within each Colorado MZ. The potential for development to be relocated into non-sagebrush habitats, either

within or next to Colorado MZs, could alter the conformation or character of woodland and shrubland types. This could reduce habitat quality and carrying capacity.

Habitat Restoration/Improvement and Habitat Protection

Protections afforded to GRSG under the various alternatives would benefit those wildlife species whose ranges are coincident with PPH or ADH. Conservation measures associated with each alternative would reduce or eliminate impacts associated with oil and gas development (see below). These measures include excluding development, limiting surface disturbance (disturbance cap), and applying TL and NSO stipulations.

Depending on the vegetative communities involved, habitat improvement projects and off-site mitigation designed to reduce oil and gas-related impacts on GRSG and sagebrush habitat can both positively and negatively influence other wildlife species. Habitat restoration projects designed to benefit GRSG would ostensibly benefit other sagebrush obligate species, particularly nongame mammals and birds. Modification of other community types (pinyon/juniper and mountain shrub) to promote sagebrush may negatively influence those species that rely on those vegetative types for food, cover, or nesting material. Impacts may vary depending on scale. Prompt and effective reclamation practices associated with interim (pad) and final (pipeline) reclamation would accelerate the restoration of lands disturbed by development. This would benefit wildlife species in general by improving forage and cover resources (increased forb and perennial grass expression, reductions in annual, invasive species, and noxious weeds).

Summary of Impacts by Alternative

Under Alternative A, protective measures would vary by MZ (for existing LUPs, see **Chapter 2**), but generally this alternative would provide less restrictive measures on fluid minerals development than Alternatives B, C, and D. This would result in a greater potential for habitat loss or modification. Additionally, design features would be preferred (not required) (PDFs) in most instances. This could result in more direct and indirect impacts on sagebrush habitat and those wildlife species inhabiting the area. Overall, this alternative would have the greatest impacts on terrestrial wildlife species.

Under Alternative B, unleased areas in PPH would be closed to fluid minerals leasing (see exception criteria detailed in **Chapter 2**). No new surface occupancy would be allowed in PPH for existing leases, with exceptions for those leases located entirely in PPH or within the 4-mile lek perimeter (see **Chapter 2**). In both cases surface disturbance would be limited to one (well, pad, and pipeline) per section, with no greater than 3 percent total disturbance per section. Seasonal timing restrictions during the nesting and early brood-rearing periods would apply to exploratory wells only and would be limited to PPH.

Alternative B would provide greater benefit to terrestrial wildlife species than Alternatives A and D but fewer than Alternative C. Conservation measures applied under this alternative would be limited to PPH in nearly all instances and could influence 617,500 acres (25 percent) of all federally managed GRSG habitats (ADH).

The above protective measures would benefit those wildlife species whose ranges or habitat are coincident with PPH. Limiting disturbance to one per section, with no more than 3 percent, would also reduce the amount of direct habitat loss for terrestrial wildlife species whose ranges overlap PPH. However, scale of disturbance (both direct and indirect) would depend on lease size and configuration within each Colorado MZ. In instances where several small leases occur

entirely within PPH or the 4-mile lek perimeter, pad and road development may have substantial impacts on wildlife species, depending on timing.

Excluding or reducing surface-disturbing activities in PPH would shift development into habitats outside of PPH. This may influence those species that use non-sagebrush communities for nesting, cover, and forage. Of particular note would be woodland raptors and migratory birds that commonly nest in pinyon/juniper. Direct removal or modification that compromises nest stand character would reduce the habitat quality or carrying capacity for local raptor and migratory bird populations. This would depend largely on amount and distribution of development.

Under Alternative C ADH would be closed to fluid minerals leasing (see exception criteria outlined in **Chapter 2**). In general, conservation measures addressed in Alternative C are similar to those described for Alternative B; however, protections offered under this alternative would be expanded to include ADH, in most cases. This alternative applies further protective measures by prohibiting the construction of evaporative or infiltration reservoirs (coal bed methane wastewater). This would require agencies to explore options to amend, cancel, or buy out leases in ACECs and occupied habitats and would disallow waivers to be issued. See **Chapter 2** for a detailed description of conservation measures under this alternative.

Alternative C would provide the greatest protective measures for terrestrial wildlife species whose ranges or habitat are coincident with ADH. This could influence up to 1,094,000 acres (43 percent) of all federally managed GRSG habitat (ADH). Discussions in Alternative B regarding benefits and potential negative impacts on terrestrial wildlife are directly applicable to Alternative C.

Alternative D would make all unleased parcels in PPH an NSO area. Exception criteria would allow leasing in Colorado MZs where GRSG populations are healthy and stable and where development would not adversely affect GRSG populations. Development may be authorized in excess of the 5 percent disturbance cap (see **Chapter 2**). For leased areas, surface occupancy or disturbance would be prohibited within 4 miles of a lek in PPH during the lekking and early brood-rearing periods. Surface disturbance would be limited to 5 percent in any MZ, where practical. In those MZs where surface disturbance exceeds 5 percent, effective mitigation would be required to offset loss of sagebrush habitat; however, the authorized officer may approve disturbance in excess of 5 percent without requiring additional mitigation. Exceptions, waivers, and modifications may be granted at the discretion of the authorized officer and only with concurrence from the CPW.

Seasonal restrictions identical to those in Alternative B would also be applied to exploratory wells. Design features intended to reduce impacts on GRSG and sagebrush habitat would be preferred rather than required (PDFs).

Similar to Alternative B, conservation measures under Alternative D would be limited to PPH and could influence 617,500 acres (25 percent) of all federally managed GRSG habitats (ADH). However, the potential for direct habitat loss and indirect impacts would be greater under this alternative, compared with Alternatives B and C. This would be due largely to the 5 percent disturbance cap and allowance for development to occur in PPH (open for development). As such, this alternative would provide fewer protective measures to those terrestrial wildlife species whose ranges or habitats are coincident with PPH than Alternatives B and C; however, it would provide more protective measures than Alternative A. As addressed in Alternative B, relocating development into non-sagebrush types may negatively influence those species that use other vegetative communities.

Impacts from Solid Minerals-Coal Management on Terrestrial Wildlife

Subsurface Mining

Direct Habitat Loss, Disruption to Species, and Habitat Degradation. The largest coal resources and active mining in the range-wide planning area are in the LSFO, followed by the WRFO and GJFO. See **Section 3.7.1**, Minerals – Leasable, Existing Conditions. Aboveground appurtenant facilities generally associated with subsurface coal mines would result in vegetation removal or alteration and longer-term occupation of a site. Impacts on wildlife populations from mining and daily operations and maintenance of aboveground facilities, including traffic, are similar to those discussed under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*, above; however, these impacts may vary in scale, duration, and intensity.

Habitat Restoration/Improvement. Benefits to local wildlife populations attributed to habitat improvement projects, off-site mitigation, and reclamation associated with aboveground facilities are similar to those discussed under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*, above. Protections outlined in each alternative below would benefit those species whose ranges are coincident with PPH and ADH. These protections include siting new surface facilities outside of PPH, collocating facilities where appropriate, minimizing/limiting surface disturbance (including operations and maintenance), and applying PDFs. (See detailed discussion under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*.)

Summary of Impacts by Alternative. Alternative A-Impacts would vary by Colorado MZ (existing LUPs), with some federal lands being considered as unsuitable based on potential for resource impacts (see **Chapter 2**). Overall, this alternative would have the least restrictive measures on solid minerals leasing and development, and it would result in the greatest potential for habit loss and disruption; therefore, Alternative A would have the highest potential to impact terrestrial wildlife species.

Alternative B-Under this alternative, no new coal leases would be granted unless all appurtenant facilities are located outside of PPH or priority areas. New facilities associated with an existing lease would be placed outside of PPH when possible or in previously disturbed areas within PPH. New facilities would be required to be built to the minimum standard necessary. Minimization of surface-disturbing or -disruptive activities would be applied at the planning level to ADH.

Alternative B would result in the least potential for loss of GRSG habitat and would reduce the indirect influences from solid minerals development. Conservation measures designed to exclude or minimize surface-disturbing activities would provide the greatest benefit to those terrestrial wildlife species whose ranges or habitats are coincident with PPH. Conversely, relocating facilities into habitats outside of PPH would result in the incremental loss of forage or cover resources and a greater potential for disruption for those wildlife species outside of PPH.

Alternative C-Impacts on terrestrial wildlife are identical to those described under Alternative B.

Alternative D-No new coal leases would be granted unless all surface-disturbing activities were located outside of PPH, with exception criteria outlined in **Chapter 2**. Surface-disturbing activities would be limited to 5 percent within each Colorado MZ. If disturbance were to exceed 5 percent, effective mitigation to offset loss of habitat would be required. For existing coal leases, lessees would be encouraged to voluntarily follow PDFs that reduce or mitigate adverse impacts on GRSG and ADH (see **Chapter 2**). Impacts on terrestrial wildlife are similar to those described under Alternative B; however, because Alternative D allows for greater flexibility in

development potential (exception criteria, 5 percent disturbance cap, and voluntary commitment), it would result in greater potential for direct habitat loss and indirect impacts on terrestrial wildlife species than Alternatives B and C.

Surface Mines

Direct Habitat Loss, Habitat Fragmentation, Disruption to Species, and Habitat Degradation. Construction and occupation of surface mines result in a minimum of 30 years habitat loss of forage and cover resources for resident wildlife. These communities would not regain any functional utility for wildlife species for several decades and would greatly depend on reclamation effectiveness. In general, impacts on terrestrial wildlife species are similar to those described above under fluid minerals but may vary in scale, duration, and intensity.

Habitat Restoration/Improvement. Benefits to local wildlife populations are similar to those discussed above under *Subsurface Mining*.

Summary of Impacts by Alternative. Alternative A-Although impacts on terrestrial wildlife are similar to those discussed under Alternative A, Subsurface Mining, the scale of habitat loss is likely to be larger.

Alternative B-Under Alternative B, all surface mining would be found unsuitable under the criteria set forth in 43 CFR, Part 3461.5. Additionally, minimization of surface-disturbing or -disruptive activities would be applied at the planning level to ADH. Impacts on terrestrial wildlife species are similar to those discussed under Alternative B, Subsurface Mining.

Alternative C-Impacts on terrestrial wildlife are identical to those discussed under Alternative B.

Alternative D-Under this alternative, the requirements of 43 CFR, Part 3461, would be applied to determine unsuitability (see **Chapter 2**). Impacts on terrestrial wildlife are similar to those discussed under Alternative D, Subsurface Mining.

Impacts from Locatable Minerals Management on Terrestrial Wildlife

Direct Habitat Loss, Disruption to Species, and Habitat Degradation

Impacts from locatable minerals development on terrestrial wildlife populations are expected to be the same or similar to those discussed above under *Impacts from Fluid Minerals Management on Terrestrial Wildlife* but may vary in scale, duration and intensity.

Habitat Restoration/Improvement and Habitat Protection

Benefits to local wildlife populations attributed to restoration and reclamation are similar to those discussed above under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*. Protections outlined in each alternative below would benefit those species whose ranges are coincident with PPH and ADH. These protections are limiting surface disturbance, clustering developments, placing infrastructure in previously disturbed areas, minimizing road development, avoiding priority sagebrush habitats, and applying PDFs. See detailed discussion in the *Impacts from Fluid Minerals Management on Terrestrial Wildlife* section above.

Summary of Impacts by Alternative

Alternative A-Impacts would vary depending on MZ (existing LUPs); however, overall most public lands would be available for mining claim location with certain exceptions, such as

SRMAs, ACECs (LSFO), and WSAs (WRFO). Seasonal restrictions would be applied if deemed necessary in some situations, with limited potential for additional mitigation requirements. In general, this alternative would have the fewest restrictive measures on locatable minerals development and reclamation provisions. This would result in greater potential for direct habitat loss and indirect influences to terrestrial wildlife species in general.

Alternative B-Alternative B would propose the withdrawal of mineral entry in PPH, based on impacts on GRSG and associated habitats. See **Table 2.2**, Comparative Summary of Alternatives, for comparison of acres identified for withdrawal by alternative. Existing claims within the withdrawal area would be subject to validity exams or buyout. Additional effective mitigation and seasonal restrictions may be applied. RDFs outlined in **Chapter 2** would further reduce direct and indirect impacts in ADH.

Alternative B would provide the greatest protections to terrestrial wildlife species whose ranges or habitats are coincident with ADH, if areas proposed for withdrawal are withdrawn. Reclamation and restoration requirements would benefit those wildlife species as well in the short and long term. Surface-disturbing activities from locatable minerals development are expected to be relocated to areas outside of PPH. Avoidance of sagebrush communities could impact wildlife species that require non-sagebrush communities for forage, nesting, and cover. Impacts would depend on the level and distribution of development.

Alternative C-Impacts on terrestrial wildlife are identical to those described under Alternative B.

Alternative D-Under this alternative, validity exams would be required for mining claims within withdrawn areas. Appropriate effective mitigation would be included in plans of operation. Seasonal restrictions would be applied if deemed necessary. Design features outlined in **Chapter 2** would be applied to ADH but would not be required. Overall, Alternative D would offer fewer restrictive measures than Alternatives B and C; therefore, it would have a greater impact on terrestrial wildlife species whose ranges/habitats overlap PPH and ADH.

Impacts from Nonenergy Leasable Minerals Management on Terrestrial Wildlife

Direct Habitat Loss, Disruption to Species, and Degradation

Impacts from nonenergy leasable minerals development on terrestrial wildlife populations are expected to be the same or similar to those discussed under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*, above, but they may vary in scale, duration, and intensity.

Habitat Restoration/Improvement and Habitat Protection

Benefits to local wildlife populations attributed to reclamation are similar to those discussed under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*, above. Protections outlined in each alternative below would benefit those species whose ranges are coincident with PPH and PGH. These protections include limiting surface disturbance, avoiding PPH, collocating facilities where appropriate, minimizing/limiting surface disturbance (including operations and maintenance), and applying PDFs. See detailed discussion under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*.

Summary of Impacts by Alternative

Alternative A-Impacts would vary depending on MZ (existing LUPs). Under this alternative, a small percentage of PPH approximately 6 percent or 9,600 acres) in MZ 17 would be closed to

nonenergy leasable mineral leasing; the remainder of ADH would be open to leasing (including expansion of new leases), with no cap on surface-disturbing activities. As such, this alternative would allow for the greatest amount of direct habitat loss (and indirect influences) and would have the greatest impact on terrestrial wildlife species.

Alternative B-Under this alternative, all PPH would be closed to nonenergy leasable mineral leasing (1,106,600 acres, or 44 percent of federally managed GRSG habitat [ADH]). Additionally, existing mines would not be permitted to expand. RDFs would be applied for solution mining wells in PPH. By reducing the amount of direct habitat loss, Alternative B would provide the greatest benefit to terrestrial wildlife species, whose ranges or habitats are coincident with PPH. RDFs would also reduce both direct and indirect impacts of nonenergy minerals development. Conversely, the potential for nonenergy leasable minerals development to be relocated outside of PPH could result in direct habitat loss or modification in non-sagebrush communities (as well as indirect influences). This could have negative impacts on wildlife species inhabiting those areas.

Alternative C-Impacts on terrestrial wildlife species are identical to those described under Alternative B.

Alternative D-Under this alternative PPH currently available for nonenergy minerals leasing would remain open. Alternative D would consider allowing expansion of existing nonenergy mineral leases. Surface-disturbing activities would be limited to 5 percent in any MZ. If disturbance exceeds 5 percent, additional mitigation would be required to offset the resulting loss of GRSG habitat. Direct habitat loss attributed to the development and expansion of nonenergy leasable minerals, as well as indirect influences, would be greater under this alternative than Alternatives B and C. This would result in greater impacts on terrestrial wildlife species.

Impacts from Salable Mineral Management on Terrestrial Wildlife

Direct Habitat Loss, Disruption to Species, and Habitat Degradation

Impacts from salable minerals development on terrestrial wildlife populations are expected to be the same or similar to those discussed above under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*; however, they may vary in scale, duration, and intensity.

Habitat Restoration/Improvement and Habitat Protection

Benefits to local wildlife populations attributed to habitat restoration and reclamation are similar to those discussed under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*. Protections outlined for each alternative below would benefit those species whose ranges are coincident with PPH and PGH. These protections include siting new surface facilities outside of PPH, collocating facilities where appropriate, minimizing/limiting surface disturbance (including operations and maintenance), and applying PDFs. See detailed discussion under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*.

Summary of Impacts by Alternative

Alternative A-Impacts on terrestrial wildlife species would vary by MZ (existing LUPs); however, in most cases this alternative would allow for the continued development of salable minerals, with certain exceptions (such as WSAs and cultural sites; see **Chapter 2**). Overall, this alternative would provide the fewest restrictive measures on salable minerals development and subsequent reclamation requirements; therefore, it would potentially result in more habitat

loss than Alternatives B, C, and D. As such, this alternative would have the most potential to impact terrestrial wildlife species.

Alternative B-Under this alternative, PPH would be closed to mineral material sales (1,246,200 acres, or 50 percent of federally managed GRSG habitat [ADH]). All salable mineral pits located in PPH that are no longer in use would be restored to meet GRSG habitat conservation objectives. As such, Alternative B would provide the greatest benefit to those wildlife species whose ranges/habitats are coincident with PPH. It is anticipated that surface-disturbing activities from salable minerals development would be relocated outside of PPH. This would result in habitat loss or modification of other vegetative types (mountain shrub and pinyon/juniper). This could have negative impacts on those wildlife species associated with non-sagebrush communities.

Alternative C-Impacts on terrestrial wildlife species are identical to those described under Alternative B.

Alternative D-Under this alternative, PPH currently available for mineral material sales would remain open. Alternative D would consider allowing existing mineral material sale sites to continue operations (including expansions). Surface-disturbing activities would be limited to 5 percent within each MZ. Where disturbance exceeds 5 percent, mitigation to offset habitat loss would be necessary. Restoration of unused salable mineral pits would be required in ADH. Restoration/reclamation would be required as a long-term goal to improve GRSG habitat. In general, Alternative D could allow for more direct habitat loss by allowing salable minerals development to continue. This would have greater impacts on terrestrial wildlife species whose ranges/habitat are coincident with PPH than Alternatives B and C. Conversely, restoration/reclamation of unused pits would extend to ADH (compared with PPH under Alternatives B and C). This would allow for incremental gains in forage and cover resources for many wildlife species. This would greatly depend on reclamation success and effectiveness, but it would provide nominal benefit to most wildlife species in the short and long term.

Impacts from Wildfire Suppression, Fuels Management, and Fire Rehabilitation on Terrestrial Wildlife

Direct Habitat Loss and Habitat Fragmentation

Depending on the extent, location, severity, and seral type affected, unplanned ignitions would have short-term impacts on terrestrial wildlife species by removing or degrading habitat for some species, injuring or killing slow-moving species, causing habitat avoidance and changes in species movement patterns, or reducing population viability and increasing the contribution to the need to list a species. In areas that are available for fuels treatments, changes in vegetation can result in negative impacts on terrestrial wildlife, such as direct habitat loss, habitat fragmentation, and disruption to species; however, it can also result in beneficial impacts, such as habitat restoration.

A concern of resetting vegetation seral stage through fuels management is the invasion of undesirable plant species. Noxious and invasive weeds are often of lower value to wildlife and degrade wildlife habitat by reducing optimal cover or food. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds. Cheatgrass invasion is also a threat to some treatment areas. Invasive nonnative plants with little or no forage value for big game species are increasing in some areas. The greatest impacts have occurred to big game winter range areas with low precipitation rates. Not only can invasive species outcompete most native plants when moisture is limited, they can also change site-specific fire ecology and result in the loss of critical shrub communities. Cheatgrass would provide some

short-term forage benefits to big game species while in early stages of growth; however, it lacks the ability to provide high quality forage during most of the year.

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

Although both planned and unplanned wildland fire adversely impacts wildlife habitats in the short term by removing vegetation and disturbing soil, the long-term benefits of wildland fire often outweigh the short-term adverse impacts. For example, prescribed fire can be used to restore conditions benefiting wildlife species favoring early plant succession stages and young age classes of woody plants (McAninch et al. 1984). Prolonged fire suppression has allowed fuels to build up to the point that an unplanned wildfire is likely to be much larger in size and greater in intensity.

Some wildlife species thrive on the occurrence of fire. The herbaceous and woody plants that establish following a burn provide abundant leaves and seeds, which are used by small rodents and birds that in turn are important prey for a variety of avian and mammalian predators. Over the short-term, the wildlife community is changed dramatically by a fire, as taller and denser vegetation is replaced by a more open habitat. As the area gradually recovers, however, many of the pre-fire components become reestablished, and the area again supports a community associated with denser forests. This cycle may take decades or centuries, depending on the dominant plant species; or it might never occur if climatic conditions are no longer suitable for the former dominant species. Wallmo (1980) suggests that fire improves the palatability of forage and causes browse plants to resprout close to the ground, putting the current season's growth within reach of deer for several years. Additionally, wildland fire can improve the quality of wildlife habitat by releasing soil nutrients, reducing fuel load, or setting back trees encroaching into shrubland or grassland habitats.

Fuels treatments could be beneficial for species that depend on younger seral stages. In the long term, wildlife would benefit from most wildfires and fuels management due to an increase in vegetation productivity and to increased plant diversity and age classes; this would, in turn, provide additional forage, cover, and prey base. Mimicking natural periodic disturbance is often necessary in order to stimulate plant productivity, increase diversity, and increase nutritional value. Foraging opportunities for big game and other herbivores would increase as understory grasses, forbs, and shrubs become reestablished. The benefits for mule deer and elk are likely to be long term. Directly following application of fire there is generally more palatable browse available for wild ungulates. Improving vegetation in upland areas would provide more forage to big game species and other herbivorous species that occur in these areas and would result in direct beneficial impacts. In addition, fuels treatments in upland areas often result in increased forage production, which diverts livestock and wildlife use from riparian and wetland areas. This would increase the vigor and structural diversity of these plant communities.

Following a wildfire, ESR is implemented to protect and conserve habitats that have sustained damage or degradation from catastrophic wildfire. Typically these activities are beneficial for terrestrial wildlife species and are designed to improve the overall condition of the area, which in turn improves habitat for wildlife. For example, weed-free seeding would stabilize soil and reduce

the spread of noxious weeds. Additionally, replacing organic matter in disturbed areas would protect topsoil and provide a suitable bed for the restoration of a native vegetative community.

Disruption to Species

The noise from heavy equipment and chainsaws could temporarily disperse bird species from breeding and nesting habitat and wildlife from occupied habitat. Prescribed burning could also disturb nesting bird species from smoke inadvertently drifting into occupied habitat. These activities could remove suitable habitat or other desirable vegetation. Disturbances from heavy equipment, chainsaws, and prescribed burning would be localized and short term. Most wildlife species would move into adjacent untreated areas; however, direct mortality during the vegetation treatments is possible. TLs (such as those for big game birthing areas, raptor nesting, and big game winter habitat), as well as site-specific COAs, could mitigate the short-term impacts resulting from the treatments.

ESR treatments following a wildfire are effective in restoring wildlife habitat. However, equipment is often noisy, and noise may alter animal behavior or cause wildlife to leave an area during the disturbance period. These impacts would be short term and not likely to have much effect on the long-term health and habitat use of wildlife in the treatment area.

Summary of Impacts by Alternative

Alternative A would have the fewest restrictions for fuels management actions, with the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize fire operations beyond what has already been determined in the fire management plans for the area; therefore, Alternative A would have the greatest impact on terrestrial wildlife.

Alternative B is more restrictive than Alternative A, though all of the restrictions fall within PPH; therefore, impacts from fuels management on terrestrial wildlife are expected to be less than under Alternative A, but only within PPH. Additionally, Alternative B would prioritize fire operations in PPH and PGH, immediately after life and property; therefore, the potential for disturbance to terrestrial wildlife within these habitats is lower under Alternative B than Alternative A.

Alternative C would prioritize fire operations in PPH, immediately after life and property; therefore, the potential for disturbance to terrestrial wildlife within PPH is the same as Alternative B but less than Alternative B in PGH. With regard to fuels management, Alternative C is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management on terrestrial wildlife are expected to be less than Alternative B. Conversely, Alternative C does not offer as many protective management actions that could benefit terrestrial wildlife as Alternative B and D, so it has more potential for habitat degradation than the other alternatives.

Alternative D would give priority to fire operations in PPH and PGH, immediately after firefighter and public safety. However, this would happen only after other resource values managed by the BLM/USFS are considered and if an exemption is warranted. With regard to fuels management, Alternative D is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management on terrestrial wildlife are less than Alternative B. Concurrently, Alternative D offers the same protective measures as Alternative B but applies them to ADH; therefore, it has the potential for more benefits to terrestrial wildlife than Alternatives B and C.

Impacts from Habitat Restoration on Terrestrial Wildlife

Direct Habitat Loss and Habitat Fragmentation

Depending on the extent, location, treatment, and seral type affected, habitat restoration would have short-term impacts on terrestrial wildlife species. The extent of these disturbances would vary by the extent and type of treatment, as discussed in the sections that follow.

Over the short term, fire and other vegetation treatments could make habitats less suitable for some wildlife species, requiring displaced wildlife to find suitable habitat elsewhere. If these habitats were already at or near capacity in the number of wildlife they could support, displaced animals might perish or suffer lower productivity. In many cases, the treatments would return all or a portion of the treated area to an early successional stage, favoring early successional wildlife species. In areas where fire suppression has historically occurred, vegetation treatments could benefit native plant communities by mimicking a natural disturbance component that has been missing from these communities. Treatments would also restore native vegetation in areas where weeds and other invasive vegetation have displaced native plant species. Wildlife that occurred historically in these areas would likely increase in numbers, while species that have adapted to the disturbed conditions would decline.

A concern in habitat restoration is the invasion of undesirable plant species from soil disturbance. Noxious and invasive weeds are often of lower value to wildlife and degrade wildlife habitat by reducing optimal cover or food. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds. Cheatgrass invasion is also a threat to some treatment areas. Invasive nonnative plants with little or no forage value for big game species are increasing in some areas. Not only can invasive species outcompete most native plants when moisture is limited, they can also change site-specific fire ecology and result in the loss of critical shrub communities.

Treatments that remove large amounts of pinyon/juniper woodlands can adversely affect interior species of wildlife and species that feed on insects found on the plant surface and under the bark. Mule deer use pinyon/juniper woodlands, and much of mule deer winter habitat in northwest Colorado is pinyon/juniper. Removal of pinyon/juniper would reduce the amount of food and cover for these animals (Terrell and Spillet 1975). Additionally, pinyon/juniper woodlands support a greater diversity of bird species than many forest communities. Reptiles, rodents, rabbits, and other small and large mammals depend on these communities (Maser and Gashwiler 1978).

Disruption to Species

The noise from heavy equipment and chainsaws could temporarily disperse bird species from breeding and nesting habitat and wildlife from occupied habitat. Disturbances from heavy equipment, chainsaws, and prescribed burning would be localized and short term. Most wildlife species would move into adjacent untreated areas, but direct mortality during the vegetation treatments is possible. TLs (such as those for big game birthing areas, raptor nesting, and big game winter habitat), as well as site-specific COAs (such as TLs for migratory bird nesting), could mitigate the short-term impacts resulting from the treatments.

Habitat Protection

Removal of nonnative species and vegetation from habitats that support terrestrial wildlife populations would likely provide some degree of benefit to most terrestrial species that occur

on public lands. It would do this by creating more native habitat conditions and reducing the likelihood of a future catastrophic wildfire. The degree of benefit to terrestrial wildlife would depend, in large part, on the habitat needs of the species and its ability to avoid mechanical equipment or a prescribed fire.

Nonnative plant species reduce the suitability of some habitats to support terrestrial wildlife species. Some species require, or at the very least prefer, certain plants as food sources. Encroachment of nonnative plant species and displacement of native plant species that serve as important sources of food reduce the suitability of the habitat for these wildlife species. For these species, vegetation treatments would likely provide a long-term benefit to habitat and could improve the suitability of other areas. This could create additional habitat into which the population could expand.

Opening dense stands of pinyon and juniper benefits edge species, ground-feeding and ground-nesting birds, and small mammals. Opening 250 acres or less by mechanical means benefits deer, small mammals, and turkeys and other birds. Breeding bird densities differ in treated and untreated areas, with ground-nesting birds being more prevalent in chained versus unchained pinyon/juniper stands (Scott and Boeker 1977; Payne and Bryant 1998).

Leaving slash, debris, and downed trees provides microhabitat for rabbits and songbirds. If harvested material were windrowed or piled, it would provide hiding cover for small mammals and rotting vegetation that could be used by reptiles and amphibians for cover. These species could also forage on insects and other invertebrates found under this debris.

Restoring a variety of native plant species, possibly coupled with controlling noxious weeds and other invasive species, would maintain or improve migratory bird nesting habitat in the long term. Potential impacts on habitat of nongame mammals, native game birds, amphibians, and reptiles are expected to be relatively minor and short term and would be offset in the long term by improved habitat. In general, habitat mitigation treatments would provide a mosaic of perennial grass stands and patches of big sagebrush.

Summary of Impacts by Alternative

Alternative A would have the fewest restrictions for habitat restoration, with the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize habitat restoration and restoration guidelines beyond what has already been determined in the LUPs for the targeted areas; therefore, Alternative A would have the greatest impact on terrestrial wildlife species.

Requirements for habitat restoration are more restrictive under Alternative B than Alternative A. For example, restoration projects would be prioritized in GRSG habitat so impacts on other species that have different or contrary habitat requirements would be greater under this alternative.

Alternative C is more restrictive than Alternative B, so impacts from habitat restoration on terrestrial wildlife species are expected to be less than Alternative B. Additionally, Alternative C provides guidelines that are specific to the restoration of sagebrush for GRSG, so it would have more impacts on those terrestrial species that have different or contrary habitat requirements.

Alternative D is more restrictive than Alternative A but less than Alternatives B and C. Alternative D offers habitat restoration guidelines but also offers exemptions for other resources valued by the BLM/USFS; therefore, there is potential for less impact on terrestrial species under Alternative D from the habitat restoration guidelines than under Alternatives B and C.

Impacts from ACEC/Zoological Area Management on Terrestrial Wildlife

Habitat Protection

Areas that are designated as ACECs would be more beneficial to terrestrial wildlife than areas that are not designated as ACECs. Prohibiting surface-disturbing activities and other authorized activities would benefit terrestrial wildlife by precluding activities that would have direct and indirect impacts on terrestrial wildlife.

Alternative A recognizes all of the existing ACEC designations. This would have fewer beneficial impacts on terrestrial wildlife than Alternative C, which would make all PPH an ACEC.

Alternative B would also recognize only the existing ACEC designations. Impacts under Alternative B are expected to be the same as impacts under Alternative A.

Alternative C would recognize all of the existing ACECs and would also make all PPH an ACEC for protection of sagebrush habitat. Impacts on terrestrial wildlife under Alternative C are expected to be the same as for Alternatives A, B, and D. ACEC designations would provide no additional protections beyond what is included in the management actions for those alternatives for the protection of GRSG habitat.

Alternative D would recognize all of the existing ACECs but would not designate any new ACECs. Impacts from Alternative D are expected to be the same as for Alternatives A and B.

Summary of Impacts on Terrestrial Wildlife

Alternative A provides the least amount of protection for terrestrial wildlife in the planning area. Alternative A puts very few restrictions on development, which could result in the most modification of the landscape, and consequently, the most impacts on terrestrial wildlife. Alternative A would have the least potential to result in concentration of development in other habitats which do not support GRSG.

Alternative B provides a greater level of protection for terrestrial wildlife than Alternative A, but it would provide a lower level of protection than Alternative C. Alternative B also has a greater potential for development to occur outside of PPH which would have a greater impact to terrestrial wildlife in those areas.

Alternative C would provide the most protection for terrestrial wildlife. However, Alternative C would have a greater potential for development to occur outside of ADH which would have a greater impact to terrestrial wildlife in those areas. The most restrictions would be placed on development under Alternative C, which would afford the most protection for terrestrial wildlife.

Alternative D would provide more protection for terrestrial wildlife than Alternative A, but it would provide less protection overall than Alternatives B and C. More flexibility for development is built into Alternative D, which could result in higher levels of development than Alternatives B and C.

4.3.3. Aquatic Wildlife, Including Special Status Fish and Aquatic Species

Aquatic organisms include fish and amphibians that reside in streams and water bodies as well as those in wetlands and riparian areas.

Methodology and Assumptions

General Impacts on Aquatic Wildlife

Indicators of impacts on aquatic wildlife and the measurements used to describe the impacts (where available or appropriate) are described below:

- Loss or reduction of streamside vegetation/cover

Acres of riparian streamside habitat lost or depleted.

- Habitat alteration

Changes in habitat that makes it nonfunctional for select species or more conducive to competitive species.

- Increased sediment and turbidity

Likelihood of increased sediment loading in waters containing sediment-intolerant fish species; loss of recruitment, stress, habitat alteration, and habitat loss.

- Water depletions

Amount of water use.

- Decreased water quality

Likelihood of actions altering important water quality parameters, including pH, dissolved oxygen, temperature, and alkalinity.

- Disruption to species

Direct mortality of species, obstructions in movement patterns (human-made barriers), reductions in survival and recruitment, displacement (short- and long-term), and behavioral and physiological influences.

- Habitat protection

The number of acres protected via withdrawals, closures, NSO, and ACECs. Additionally, the likelihood of reduced surface disturbance.

- Habitat restoration

The likelihood of an increase or an improvement in habitat and water quality. The likelihood of reduced surface disturbance. Also the likelihood of increased species diversity in streamside vegetation and the likelihood of decrease in weeds.

Assumptions

The following list presents basic assumptions related to aquatic wildlife that apply to the impacts assessment for Alternatives A through D in this EIS.

- Impacts on fish and other aquatic wildlife populations and habitat are not discrete; some actions may benefit one species, while at the same time may result in adverse or beneficial impacts on another.
- Maintaining high-quality habitat conditions would have some influence on reducing the severity of outbreaks of, and subsequent losses from, diseases; however, the prevalence in the environment of various diseases cannot be fully controlled, especially at chronic levels of occurrence.
- The health of fish and other aquatic wildlife populations is directly related to the overall health and functional capabilities of aquatic, riparian, and wetland resources, which, in turn, is a reflection of overall watershed health.
- Fish populations fluctuate, sometimes widely, in response to natural factors, such as the abundance of prey or extremes in weather (such as flooding or drought).
- The analysis of roads and road density in a given watershed provides an approximation of the potential for impacts on fish and other aquatic wildlife. It is a measure of lands available for accelerated water transport and potential erosion and off-site sediment transport. However, the actual impacts and the degree of impacts resulting from roads depend on additional variables, including road class (dirt, gravel, paved), road condition (rutted, bar ditched, proper and adequate drainage features), topography, upland and riparian vegetation condition, soil characteristics, climate, and proximity of roads to fish-bearing streams.
- Impacts on fish and other aquatic wildlife are based on exposure/stressor/response
- Exposure-the likelihood that a given stressor will affect a given species
- Stressor-the portion(s) of an action that may cause some sort of a reaction by the species
- Response-the response (adverse, positive, neutral) of the species to the stressor
- Variation of identified impacts by alternative are determined based on
- Risk-the likelihood or probability of an action resulting in the identified impact
- Magnitude-the intensity and severity of the identified impact
- Duration-the length of time in which the identified impact would occur
- Scope-the spatial extent or size over which the identified impact would occur, as related to the proximity of the action to the species or habitat
- Unless otherwise noted, short-term impacts are defined as those expected to last 2 years or less.
- Unless otherwise noted, long-term impacts are defined as those expected to last longer than 2 years.

- Impacts analysis focuses on PPH and habitat that would be designated in an alternative, where actions are reasonably certain to result in an impact, be it direct, indirect, or cumulative, to a particular species or to its habitat. In general, aquatic habitats next to, downstream, or downslope of proposed actions are considered in the impacts analysis.

- Impacts analysis is grouped by species, where appropriate (sediment-intolerant aquatic species, for example, are grouped).

- Sediment-intolerant aquatic species include all trout species (brown, rainbow, brook, and cutthroat), mottled and Paiute sculpin, mountain whitefish, and most all amphibian species. Unless otherwise noted, impacts analysis focuses on these species.

- Unless otherwise noted, sediment-tolerant species (speckled dace, carp, white sucker, channel catfish, and fathead minnow) would be impacted in a similar fashion to sediment-intolerant species; however, any actions that would increase sediment and turbidity in the short term would result in negligible to minimal impacts on these species. Given their biology, feeding habits, habitat needs, and niche in the ecosystem, these species, generally, have a higher tolerance for increased sediments and turbidity to streams and rivers. Habitat alteration and water quality alteration, however, can impact these species in ways similar to sediment-intolerant species addressed above.

- Special status aquatic species that are sediment intolerant include Colorado River cutthroat trout, greenback cutthroat trout, boreal toad, and northern leopard frog. Sediment tolerant species include the Colorado pikeminnow, razorback sucker, bonytail, humpback chub, roundtail chub, pallid sturgeon, flannelmouth sucker, and bluehead sucker. The analysis groups these species as appropriate with regard to addressing impacts, especially those resulting from actions that could increase sediment to occupied habitats.

- Under all of the alternatives, proposed actions would comply with BLM Colorado Public Land Health Standard #3 (BLM 1997). Healthy, productive, and diverse plant communities support aquatic wildlife communities that are productive, resilient, diverse, and vigorous and that are able to reproduce and sustain natural fluctuations and ecological processes; therefore, implementing management actions that contribute to maintaining the condition and quality of wildlife habitat would ensure that BLM Colorado Public Land Health Standard #3 (BLM 1997) would be met throughout the life of the LUPA.

Water Depletions

Certain management actions (e.g., fluid minerals development) or activities (e.g., water developments) may reduce water flows, which can impact fish and aquatic wildlife in several ways. Reduced water directly correlates to a loss of wetted habitat, and reduced flows can result in reduced habitat complexity and diversity. Important microhabitats (such us spawning bars, backwaters, and side channels) can be lost. These impacts occur when sediments cannot be efficiently or effectively moved and, therefore, settle out into occupied habitats. Generally, flows are climate dependent; however, water diversions also play a large role with regard to localized flow regimes in a stream or river. Habitats for many fish and aquatic wildlife have been impacted by the alteration of the natural hydrograph of several rivers in northwest Colorado, which, in turn, has reduced seasonal peak flows. This has caused sediment buildup, loss of habitat complexity and diversity, and reduced spawning habitat.

USFWS has determined that any water depletion within the North Platte River, Laramie River, and Upper Colorado River basins jeopardizes the continued existence of one or more federally listed threatened or endangered species and adversely modifies or destroys designated and proposed critical habitat. Depletions within the North Platte River and Laramie River basins may affect and are likely to adversely affect the whooping crane, the interior least tern, the piping plover, the western prairie fringed orchid, and the pallid sturgeon. Depletions within the Upper Colorado River basin may affect and are likely to adversely affect the Colorado pikeminnow, bonytail chub, humpback chub, and razorback sucker.

Colorado River Basin

In 2008, the BLM prepared a programmatic biological assessment that addresses water depleting activities in the Colorado River basin. In response to the BLM's programmatic biological assessment, USFWS issued a programmatic biological opinion (#ES/GJ-6-CO-08-F-0010) on February 25, 2009.

USFWS determined that water depletions from the Colorado River basin resulting from BLM actions described in the programmatic biological opinion are not likely to jeopardize the continued existence of the Colorado pikeminnow, humpback chub, bonytail, and razorback sucker or to result in the destruction or adverse modification of their critical habitat. The programmatic biological opinion addresses internal and external BLM projects, including impoundments, diversions, water wells, pipelines, and spring developments.

USFWS determined that projects that fit under the umbrella of the programmatic biological assessment would avoid the likelihood of jeopardy or adverse modification of critical habitat for depletion impacts on the Upper Colorado River Basin. It determined that this would be the case if the projects were to deplete relatively small amounts of water (less than 125 acre-feet) and if the BLM makes a one-time contribution to the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin, in an amount equal to the average annual acre-feet depleted by each project. The programmatic biological opinion instructed the BLM to make an annual payment to the National Fish and Wildlife Foundation to cover all BLM-authorized actions that result in water depletions. Depletions from internal and external BLM projects outside of the fluid minerals program would be covered by this programmatic biological opinion. Water use values would be entered into water depletion logs that are submitted to the Colorado State Office at the end of each fiscal year.

Platte River Basin

The BLM participates in the Platte River Recovery Implementation Program to address water depletions from BLM actions in the North Platte River Basin. The Platte River Recovery Implementation Program was established in 2006 and is designed to assist in the conservation and recovery of the target species and their associated habitats along the central and lower Platte River in Nebraska. The Platte River Recovery Implementation Program, signed by Colorado, Nebraska, and Wyoming, provides a streamlined ESA compliance mechanism for all historic and most new water-related activities in the Platte River basin. As part of the Platte River Recovery Implementation Program, each state and the US Department of the Interior developed "depletion plans," specifying how they would ensure that water development results in no new depletions in the central Platte River.

For federal actions and projects covered under the Platte River Recovery Implementation Program, its Final EIS and the June 16, 2006, programmatic biological opinion serve as the

description of the environmental baseline and consequences for the impacts of the federal actions on the listed target species, whooping crane critical habitat, and other listed species in the central and lower Platte River addressed in the programmatic biological opinion. The primary water-depleting activities that the BLM completes are spring developments, pipeline construction, pond construction, and well drilling. USFWS determined in the programmatic biological opinion that the continued operation of existing and certain new water-related activities may adversely affect but would not likely jeopardize the continued existence of the endangered whooping crane, interior least tern, and pallid sturgeon or the threatened northern Great Plains population of the piping plover. Further, USFWS found that the continued operation of existing and certain new water-related activities may adversely affect but would not likely jeopardize the threatened western prairie fringed orchid associated with the central and lower reaches of the Platte River in Nebraska. It also determined that the activities were not likely to destroy or adversely modify designated critical habitat for the whooping crane.

In 2010, the BLM entered into a memorandum of agreement with USFWS to provide a mechanism for offsetting federal new depletions in the Platte River Basin of Colorado, which is consistent with the Platte River Recovery Implementation Program. Under the agreement, the BLM will consult annually with USFWS on proposed new and expanded water-related activities in the Laramie River Basin of Colorado. Based on that information, the BLM will have the option of seeking to offset the adverse impacts of depletions from those activities specified in the 2009 Agreement among the USFWS, State of Colorado, Jackson County Water Conservancy District, and South Platte Water-Related Activities Program, Inc. Concerning New Federal Water-Related Activities within the North Platte River Basin in Colorado, to the extent that adequate offsetting credit remains in the 87.5 acre-foot "account" provided under that agreement at the time of consultation.

For new BLM federal water-related activities in Jackson County, North Platte River Basin of Colorado, the BLM will consult annually with USFWS also, providing a characterization of the depletion and its purpose (agricultural, recreational, environmental). The BLM would have the option of seeking to offset the adverse impacts of depletions from those activities for the duration of the Platte River Recovery Implementation Program's first increment relative to the target species and designated critical habitat, by means of those activities specified in the 2009 Agreement, to the extent that adequate offsetting credit remains in the 87.5 acre-foot "account." This option would be provided under that Agreement at the time of consultation, and to the extent that no more than 100 acre-feet of aggregate federal new depletions in Jackson County are being addressed under the Agreement for exclusively "piscatorial, wildlife, and environmental" purposes.

The BLM made a one-time payment to USFWS in 2010 to allow the BLM to seek ESA coverage for impacts on the target species of new depletions from new federal water-related activities in the Platte River Basin of Colorado. Federal depletions would be covered by this programmatic biological opinion, and water use values will be entered into the KFO water depletion log that is submitted to the Colorado State Office and USFWS before February 1 each year.

Direct and Indirect Impacts on Aquatic Wildlife

Impacts from Travel Management on Aquatic Wildlife

Direct Habitat Loss, Habitat Fragmentation, and Disruption to Species

Impacts on resources are expected to be similar to those discussed under *Impacts from Management of Travel and Transportation on Terrestrial Wildlife*.

Habitat Degradation

Impacts on aquatic resources are expected to be similar to those discussed under *Impacts from Management of Travel and Transportation on Terrestrial Wildlife*.

Habitat Restoration/Improvement

In general, impacts on resources are expected to be similar to those discussed under *Impacts from Management of Travel and Transportation on Terrestrial Wildlife*. Designating an area as closed is expected to result in the eventual revegetation of the area on its own over time. This would lessen impacts on aquatic resources, such as sediment flow and turbidity, from these routes.

Impacts from Recreation Management on Aquatic Wildlife

Permitted Use

Permitted uses include BLM SRPs and USFS SUAs. These are typically granted for larger organized recreation groups, including those in competitive and noncompetitive events, and commercial outfitting services. Allowing competitive events is expected to result in impacts similar to those described under casual use; however, because these events typically involve a much larger concentration of people than casual use, the impacts would be magnified. Displacement of terrestrial wildlife as a result of noise disturbance would be intensified. Impacts from commercial outfitting services typically do not involve large concentrations of people at any one time.

Alternative A-Under Alternative A, the BLM and USFS would continue issuing SRPs and SUAs on a case-by-case basis and would continue to provide opportunities for competitive and noncompetitive events, and commercial outfitting services.

Alternative B-SRPs and SUAs would be authorized only where impacts on PPH would be neutral or beneficial. It is expected that other aquatic wildlife species would also benefit from these restrictions.

Alternative C-Same as under Alternative B.

Alternative D-This alternative limits impacts on disruption of the species as well as PPH, so it would also benefit aquatic wildlife species whose critical use periods coincide with these seasonal restrictions.

Impacts from Lands and Realty Management on Aquatic Wildlife

Habitat Alteration/Loss or Reduction of Streamside Vegetation or Cover/Water Quality Alteration/Increased Sediment Loading and Turbidity

In areas where ROWs are permitted, there would be more potential for impacts on aquatic wildlife than in areas where ROWs are excluded or avoided.

Construction and operation of ROW facilities would likely result in surface-disturbing activities. Potential impacts from surface disturbance include direct alteration of habitat or loss of individuals from equipment and vehicles. Habitat could also be affected by changes in water quality from

increased sedimentation and potential fuel spills. Equipment and vehicle traffic within ROWs and access roads could lead to small stream crossings. Vehicle crossings would result in mortalities to macroinvertebrates and possibly early life stages of fish, it and would alter bottom substrates. Habitat alteration could affect various activities or values for fish, such as cover, feeding, or life stage functions for spawning or early life stage development.

Potential construction at stream crossings would also remove riparian vegetation. Vegetative cover along stream banks provides cover for fish, shading, bank stability, and increased food and nutrient supply as a result of deposition of insect and vegetative matter into the watercourse. Riparian vegetation contributes woody material to streams that are used for fish cover and can be part of forming habitat features, such as pools. Vehicle and equipment disturbance within or near water bodies also would cause sedimentation. Sediment entering the water column would be redeposited in areas downstream of the disturbed area. The extent of the sedimentation effect would depend on the flow conditions, substrate composition, stream configuration, and types of aquatic communities within the affected areas.

The indirect impacts of sedimentation could range from potential detrimental impacts on species behavior, physiological functions, or spawning (Waters 1995). In general, trout species are more sensitive to increased turbidity than many of the warm water fish species. Sediment deposition in substrates used for spawning could detrimentally affect successful recruitment. Vehicle and equipment use and pipelines that cross or parallel aquatic systems would pose increased risk to aquatic biota from accidental spills or leaks of toxic substances. Depending on the substance, if it were to reach a water body, aquatic species could be exposed to toxic conditions. Impacts could range from sub-lethal, including reducing feeding behavior, lethargy, habitat avoidance, and physical stress, to direct mortality. The magnitude of impacts would depend on the substance and volume, flow conditions, channel configuration, and presence of aquatic species. Selecting BMPs would help to reduce potential risks.

Excluding, limiting, or collocating ROWs in GRSG habitats would benefit aquatic wildlife species whose ranges are coincident with PGH or PPH or are close downstream. In addition, disturbance caps, NSOs, and TLs can protect aquatic wildlife species from disturbances.

Alternative A would have the most areas available for ROWs and would have more potential to impact aquatic wildlife than Alternatives B, C, and D.

Alternative B would have fewer areas available for ROWs through restrictions to protect GRSG habitat. Conservation measures would be more protective under Alternative B than Alternatives A and D, but it would be less protective than Alternative C. In addition, Alternative B would encourage land exchanges that allow for consolidation of federally managed lands in GRSG habitats, facilitating habitat conservation; therefore, impacts on aquatic wildlife whose ranges overlap with PGH and PPH would be less than Alternatives A and D but greater than Alternative C.

Alternative C would have the most protective measures for GRSG and so would have the least impacts on aquatic wildlife species whose ranges overlap with PGH and PPH. In addition, Alternative C would encourage land exchanges that allow for consolidation of federally managed lands in GRSG habitats, facilitating habitat conservation and management.

Alternative D would be more protective than Alternative A but less protective than Alternatives B and C.

Impacts from Wind Energy Development on Aquatic Wildlife

Impacts from wind energy development on aquatic wildlife are expected to be similar to those discussed under *Impacts from Lands and Realty Management on Aquatic Wildlife*.

Impacts from Industrial Solar Energy Development on Aquatic Wildlife

Impacts from solar energy development on aquatic wildlife are expected to be similar to those discussed under *Impacts from Lands and Realty Management on Aquatic Wildlife*.

Impacts from Range Management on Aquatic Wildlife

Habitat Alteration/Loss or Reduction of Streamside Vegetation or Cover/Water Quality Alteration/Increased Sediment Loading and Turbidity

In areas that are available for livestock grazing, there could be more impacts on aquatic wildlife than in areas where livestock grazing is excluded.

The primary potential impacts on fish and other aquatic species from livestock grazing is habitat alteration, loss or reduction of streamside vegetation/cover, water quality alteration, and increased sediment loading and turbidity. Where livestock grazing is occurring in watersheds containing occupied habitats of sediment-intolerant species (e.g., trout, sculpin species, and mountain whitefish), there is an increased risk of the identified impacts to occur. This is because these species require cold, clear, well-oxygenated water in which to thrive. Impacts are most likely to occur in site-specific areas where improper grazing is occurring. Improper livestock grazing could result in direct adverse impacts at site-specific locations to select streams containing sediment-intolerant aquatic species.

Livestock grazing could lead to changes in vegetation plant species and functional group composition through vegetation removal, disturbance, and trampling and increased potential for weed introduction and spread. Livestock and wildlife grazing in riparian areas can prevent regeneration of woody and herbaceous riparian vegetation necessary to stabilize stream banks. Grazing can also reduce litter and fine fuel loading, which could alter fire size and severity.

Livestock often use riparian areas for water and shade, which may cause greater impacts on these areas by concentrating livestock use. Livestock could cause impacts by altering stream functionality and vegetation structural diversity. Livestock could also contribute to the spread of invasive species in riparian areas.

Livestock grazing can increase sediment load in streams from animal concentration areas, collapsing banks, stream-channel alteration, and vegetation removal in riparian areas. Increased sediment in streams, rivers, and reservoirs decreases the potential for wild fish to reproduce, fills in pools, leads to channel degradation, and increases stream temperatures. Changes in water temperature also would result from changes in the amount of vegetative cover. Changes in the aquatic habitat would lead fish to alter their uses of the stream, moving to different areas for feeding and spawning, depending on habitat conditions.

Livestock near aquatic systems could change coldwater aquatic habitat quality through nutrient inputs from manure (Larsen et al. 1994). In addition, livestock grazing could change aquatic habitat connectivity when they are allowed next to or within aquatic systems; grazing could alter bank stabilization and water quality and thus alter habitat conditions in certain areas. Water

developments near tributary creeks could affect the hydrologic regime of these systems by withdrawing water.

Under all alternatives, the BLM is managing livestock grazing to comply with all of the BLM Colorado Public Land Health Standards. The BLM could, as needed, change permit terms, adjust AUMs for livestock, implement grazing systems, require rotation or deferment, impose utilization limits, and implement additional measures, such as range improvements, as necessary and feasible to reduce impacts. Intensive livestock management can reduce the magnitude of the impacts listed above by allowing vegetation to adequately rest and recover between periods of domestic grazing. However, vegetation may be damaged until it is detected and management is changed.

Vegetation Management and Range Improvements

In areas that are available for livestock grazing, there would be more impacts on aquatic wildlife from vegetation management activities and range improvements than in areas where livestock grazing is excluded.

Areas available for livestock grazing would primarily be associated with vegetation management and range improvements, such as fencing, water developments, weed treatments, chemical, biological, or mechanical vegetation treatments, burning, and seeding of disturbed areas or weed-treated areas. The primary impacts from rangeland vegetation management are habitat alteration and increased sediment loading and turbidity. Where treatments are occurring in watersheds containing occupied habitats of sediment-intolerant species (e.g., trout, sculpin species, and mountain whitefish), there is an increased risk of the identified impacts to occur because these species require cold, clear, well-oxygenated water in which to thrive.

Treatment of rangeland vegetation could result in limited indirect impacts on streams containing sediment-intolerant fish and other aquatic species. For example, there is the potential for the increased spread of weeds where vegetation is treated, which would, in turn, reduce upland habitat condition and increase erosion potential. However, these impacts would be short term and of limited scope and intensity. Where vegetation treatments are used to restore riparian areas (e.g., the removal of tamarisk), there is the potential for short-term impacts on aquatic species, including habitat alteration, increased sediment loading and turbidity, and the reduction or loss of streamside vegetation/cover. Removal of invasive species would result in the loss or reduction of streamside vegetation/cover, which would impact fish in the short term. This activity, however, results in long-term beneficial impacts on aquatic species because native vegetation is, or would be, restored. This would improve stream bank stability, water absorption and infiltration rates, and habitat diversity.

Fish and other aquatic wildlife are considered before the identification and planning of any site-specific projects, and impacts are mitigated. All vegetation treatments are designed with the primary goals of long-term watershed improvement and meeting Standard 3 and Standard 4. In spite of the potential for short-term impacts, rangeland vegetation management results in long-term beneficial impacts on fish and other aquatic wildlife by improving upland watershed health and maintaining productive habitats that provide adequate groundcover. This, in turn, allows for natural water infiltration and absorption rates and limited erosion potential.

In areas where range improvements associated with livestock management are constructed (such as fencing and upland water developments), there is the potential for short-term impacts on aquatic species, including habitat alteration, increased sediment loading and turbidity, and loss of vegetation. Road construction needed in order to access range improvements can create chronic

long-term point sources for increased sedimentation and turbidity. Upland water developments also tend to concentrate livestock use, which can impact amphibians as sedimentation and turbidity increases and shoreline vegetation is lost. Water developments would permanently remove vegetation within the development's footprint and would concentrate livestock in certain areas, thus reducing vegetation cover and increasing the likelihood for weed invasion and spread. This can reduce watershed health and result in poor soil retention, increased runoff, and poor water infiltration and absorption. However, many of these range improvements would result in long-term benefits to fish and other aquatic species. This is because livestock distribution would be improved, grazing would be reduced along streams, and, in some cases, amphibian habitat would be created as the result of stock pond creation.

Noxious and invasive weed management includes herbicide use, biological controls, and mechanical or manual treatments in weed-infested areas. In areas where proactive weed management in the form of treatments are occurring, or would occur, there is the potential for short-term impacts on aquatic species, including the loss or reduction of streamside vegetation/cover and increased sediment loading and turbidity resulting from the loss of vegetation before the establishment of desirable species. All weed treatments would result in long-term beneficial impacts on fish and other aquatic species and to their habitats. This is because native vegetation is, or would be, restored, thereby improving watershed health and, in select cases, stream bank stability, water quantity, and habitat diversity.

Weed management is conducted in accordance with the *National Vegetation Treatments Using Herbicides on Public lands in 17 Western States Final Programmatic EIS* (BLM 2009). The analysis of aquatic species and their habitats was addressed in this document, which set the parameters for the treatment of weeds within and near aquatic habitats. In addition, weed management is subject to the BLM Colorado Public Land Health Standards (BLM 1997), which help guide vegetation management on public lands. In areas where these standards are being met, there are reduced potential impacts on fish and other aquatic wildlife resulting from off-site erosion and increased sedimentation due to degraded weed-infested habitats.

Implementation-level grazing decisions would comply with BLM Colorado Public Land Health Standards. Where the standards are being met, rangeland management is expected to result in minimal impacts on fish and other aquatic wildlife. Healthy, productive, and diverse plant communities support aquatic wildlife communities that are productive, resilient, diverse, and vigorous and that are able to reproduce and sustain natural fluctuations and ecological processes; therefore, implementing management actions that contribute to maintaining the condition and quality of aquatic wildlife habitat would ensure that BLM Colorado Public Land Health Standards #3 and #4 would be met throughout the life of the LUPA.

Summary of Impacts by Alternative.

Alternative A would allow livestock grazing and would have the most potential for vegetation management and rangeland improvements, with the fewest restrictions; therefore, Alternative A would have the greatest impact on aquatic wildlife.

The potential for vegetation management and rangeland improvements is expected to be the same under Alternative B; however, more restrictions would be in place to protect GRSG habitat, so it would have fewer impacts on aquatic wildlife.

Alternative C would allow no livestock grazing in ADH, and on treatments that benefit GRSG would be allowed; therefore, Alternative C would have the fewest impacts on aquatic wildlife because it would have the least potential for vegetation management and rangeland improvements.

Alternative D would have the same areas available for livestock grazing as Alternatives A and B. Impacts on aquatic wildlife are expected to be similar under Alternative D as they would be under Alternative B.

Water Depletions

See discussion on water depletions under *Assumptions* at the beginning of the *Aquatic Wildlife, Including Special Status Fish and Aquatic Species* section. In areas that are available for livestock grazing, there would be more impacts on aquatic wildlife from water depletions than in areas where livestock grazing is excluded.

Summary of Impacts by Alternative.

Alternative A would allow livestock grazing, and have the most potential for projects that result in water depletions; therefore, Alternative A would have the greatest impact on aquatic wildlife, including special status species.

The potential for projects that result in water depletions is expected to be the same under Alternative B; however, more restrictions would be in place to protect GRSG habitat, so it would have fewer impacts on aquatic wildlife, including special status species.

Alternative C would not allow livestock grazing in ADH, and no new water developments would be allowed from spring or seep sources in ADH; therefore, Alternative C would have the fewest impacts on aquatic wildlife, including special status species, because it would have the least potential for projects that result in water depletions.

Alternative D would have the same areas available for livestock grazing as Alternatives A and B. Impacts on aquatic wildlife, including special status species, are expected to be more restrictive under Alternative D than under Alternatives A and B.

Impacts from Wild Horse Management on Aquatic Wildlife

Impacts on aquatic wildlife from wild horse management are similar but to a less broad extent as impacts from livestock grazing.

Alternative A would place the fewest restrictions on wild horse management, and so it would have the most potential for impacts on aquatic wildlife.

Alternative B would place some restrictions on the management of wild horses. Impacts on aquatic wildlife would be less than Alternatives A and D but are similar to Alternative C.

Alternative C is expected to have the same impacts as Alternative B because the management prescriptions for Alternatives B and C are much the same for managing wild horses.

Alternative D would have fewer impacts than Alternative A but greater impacts than Alternatives A and C because it would allow more flexibility in the management of wild horses.

Impacts from Fluid Minerals Management on Aquatic Wildlife

Loss or Reduction of Streamside Vegetation/Habitat Alterations/Disruption to Species

Fluid minerals development may result in the loss, reduction, or alteration of streamside riparian vegetation. Vegetation loss can alter the nutrient dynamics of an aquatic ecosystem and may result in increased water temperatures, light levels, and autotrophic (pertaining to organisms that form nutritional organic substances from simple inorganic substances, such as carbon dioxide) production. Increased stream temperatures can affect certain aquatic species, such as trout, by reducing their growth efficiency and increasing their likelihood of succumbing to disease.

Changes in a stream's food web can alter the composition of food and thus energy sources that are available to resident fish and aquatic invertebrates. Terrestrial insect diversity and productivity also decreases with reductions in streamside vegetation, which affects food availability for resident fish. Loss or reduction of riparian vegetation can also increase peak flows as vegetation is not sufficient in root mass, size, or abundance to sufficiently slow stream velocities. In addition, the loss of streamside vegetation reduces water percolation and infiltration, leading to unnaturally high and frequent runoff (Holechek et al. 1989). This can result in accelerated bank erosion and sloughing, increased siltation, elevated stream temperatures, widened and braided stream channels, and loss of overhanging banks. All of these are important factors affecting trout productivity in a given stream (Armour 1977; Behnke 1979a, 1979b; Claire and Storch 1977; Gardner 1950; Glinski 1977; Kaufman et al. 1983).

Stream and stream bank alteration can affect aquatic species in many ways. Actions that affect stream banks can result in soil compaction, increased erosion, and subsequent widening of stream channels. Stream widening results in a loss of habitat complexity and diversity and reduced water depths. This can reduce available habitat and increase stream temperatures. Increased temperatures can increase physiological stress, reduce feeding, and increase disease. Stream bank alteration also exposes bare soils, which provides for points of invasion by weedy species and increases the risk of further erosion of the stream bank. Actions that increase the amount of soil exposed to the erosive effects of water will increase sediment loading and turbidity. This can alter feeding by fish that require water clarity to forage and capture prey.

Increased Sediment and Turbidity and Decreased Water Quality

Actions that cause increases in sediment loading into streams can impact sediment intolerant aquatic species in many ways. Increased sediments in the stream environment reduce dissolved oxygen and raise stream temperature and can cover spawning/rearing areas, thereby reducing the survival of fish embryos and juveniles (USFS 2002). Excessive sedimentation can also fill in important pool habitats, reducing their depth and making them less usable to fish and other aquatic organisms. High sediment transport can fill pools and cause reduction or loss of essential salmonid juvenile rearing habitat (Frissell 1992). Pool habitats are important as over-summer and over-winter thermal refugia and, when coupled with stream flows, are often a limiting factor in many small mountain streams.

A number of sub-lethal effects on resident trout may also occur as a result of sedimentation, including avoidance behavior, reduced feeding and growth, and physiological stress (Waters 1995). Over the long term, increased sediment loading reduces primary production in streams (USFS 2002). Reduced macroinvertebrate productivity and diversity results when excessive sediment fills in the interstitial spaces of stream substrates needed by these aquatic invertebrates. Food webs can be altered as sediment-intolerant macroinvertebrates are replaced by sediment-tolerant species. Reduction in stream productivity can disrupt the food chain and reduce food sources for resident fish species. All of these impacts can reduce population density.

Suspended sediment causes turbidity within streams, which reduces clarity; trout are visual feeders and require clear water in which to forage. The longer the duration of high turbidity the more damage is likely to fish and other aquatic organisms (Newcombe and MacDonald 1991). Roads increase surface runoff and sedimentation, and where they cross water, in-channel structures are often required, such as culverts. Bridges that remove aquatic habitat may be barriers to fish passage (Barrett et al. 1992; Bryant 1981). The effects of changes in water quality are well documented on trout species.

Increased levels of development may increase the risk for leaks or spills and sediments entering aquatic systems. Spills (e.g., of oil, condensate, and produced water) of sufficient concentration that enter streams at or above occupied habitat are likely to have direct impacts on fish populations. Effects can range from sub-lethal (stress, reduced feeding behavior, habitat avoidance) to direct mortality, depending on the type and amount of substance and stream flows. Oil pollution can affect fish (including endangered fish) by asphyxiation, destruction of food organisms, chronic toxicity resulting in reduced resistance to infection and other stresses, and interference with behavior.

Considering the number of federal and state regulations that require fugitive sediment and potential contaminants be managed and contained on-site (e.g., Colorado Oil and Gas Conservation Commission Rules and BLM Onshore Orders), it is unlikely that sediment sufficient to degrade downstream aquatic habitats would be generated regardless of alternative. Individual actions that may affect critical habitat or fish populations would prompt ESA Section 7 consultation with USFWS and would result in the development of conservation actions that would prevent substantive adverse direct and indirect influences.

Water Depletions

See discussion on water depletions under *Assumptions* at the beginning of the *Aquatic Wildlife, Including Special Status Fish and Aquatic Species* section.

Habitat Protection/Restoration

Protections afforded to GRSG under the various alternatives would benefit aquatic systems whose ranges are coincident with PPH or ADH. Conservation measures associated with each alternative, such as excluding development and limiting surface disturbance (disturbance cap), would reduce or eliminate impacts from oil and gas development (see below). Additionally, RDFs and PDFs would also reduce both direct and indirect impacts on sagebrush habitats. They also would provide incidental benefits to aquatic systems located in PPH and ADH.

Summary of Impacts by Alternative

Alternative A-Potential impacts on aquatic systems would vary based on MZ and would largely depend on stipulations outlined in each resource area's LUP. In general, Alternative A would require the fewest restrictions on fluid minerals development, so potential impacts on aquatic systems, including potential for water depletions, would be greatest under this alternative. In most cases, NSO and CSU stipulations, and the current suite of state and federal processes regulating the potential for off-site sediment and contaminant delivery would be fully capable of reducing projected oil and gas development effects on discountable levels for aquatic systems.

Alternative B-Alternative B would have more restrictions on fluid minerals development than Alternatives A and D but fewer than Alternative C. Such restrictions would reduce the amount

of surface disturbance (as a potential source of sediment and proximity of development as potential contaminant source) in PPH. Examples of these restrictions are closing PPH to fluid minerals leasing, prohibiting surface-disturbing activities in PPH for leased parcels (with certain exceptions), applying a 4-mile NSO around leks, and limiting permitted disturbances to one per section with no greater than 3 percent per section.

RDFs including clustering development, placing infrastructure in previously disturbed areas, road design and placement, in addition to others (see **Chapter 2**) would also decrease the potential for direct and indirect disturbance of aquatic systems in PPH.

Conservation measures applied under Alternative B would be limited to PPH in nearly all instances and could influence 617,500 acres (25 percent) of all federally managed GRSG habitats (ADH). In general, conservation measures required under this alternative would benefit aquatic systems in PPH.

Relocating development into areas outside of PPH or unsuitable inclusions with PPH may have some potential to indirectly influence aquatic systems; however, mitigations would reduce the risk of direct and indirect impacts on aquatic habitats These include COAs, NSO, and CSU stipulations, and state and federal regulatory processes that regulate the potential for off-site sediment and contaminant delivery.

In certain MZs where GRSG habitat is limited and naturally fragmented (e.g., MZ 17), restrictions in PPH, coupled with NSO and CSU stipulations for riparian/aquatic habitats, could limit development options, shifting development into areas more susceptible to erosion (e.g., steeper slopes). This could lead to heavier sedimentation loads, increased fugitive contaminants, and less effective reclamation, all of which increase the risk of indirectly influencing aquatic systems in the immediate area. In general, this alternative would reduce impacts on aquatic systems in areas coincident with PPH more than Alternatives A and D.

Alternative C-Impacts on aquatic wildlife and associated habitats are similar to those described for Alternative B, but conservation measures would be expanded to include ADH in nearly all instances. Under Alternative C, protective measures (see Alternative B and **Chapter 2**) would influence approximately 1,094,000 acres (43 percent) of all federally managed GRSG habitat (ADH). Both direct and indirect impacts from fluid minerals development would be the least under this alternative and as such would provide the greatest benefit to those aquatic systems located within ADH. Similar to Alternative B, excluding or limiting surface-disturbing activities in ADH would likely shift development into other areas, with the potential to impact aquatic systems in certain MZs (see discussion above for Alternative B).

Alternative D-Alternative D would have more restrictions on fluid minerals development than Alternative A but fewer than Alternatives B and C. Under this alternative, an NSO stipulation would be applied to all unleased PPH with exception, modification, and waiver criteria. A 5 percent disturbance cap would be applied to each MZ with certain exception, modification, and waiver criteria (see **Chapter 2**).

Similar to Alternative B, conservation measures applied under Alternative D would be limited to PPH in nearly all instances and could influence 617,500 acres (25 percent) of all federally managed GRSG habitats (ADH). Potential for direct and indirect impacts on aquatic systems would be greater under Alternative D, compared with Alternatives B and C, due largely to the 5 percent disturbance cap and greater potential for surface-disturbing activities to occur (PPH open for development). However, as stated above, NSO and CSU stipulations in addition to

site-specific mitigation measures would reduce or eliminate the risk of direct and indirect impacts on aquatic systems.

Impacts from Solid Minerals-Coal Management on Aquatic Wildlife

Impacts from solid minerals development (surface and subsurface) on aquatic wildlife populations and habitats are expected to be the same or similar to those discussed above under *Impacts from Fluid Minerals Management on Aquatic Wildlife* but may vary in scale, duration, and intensity.

Impacts from Locatable Minerals Management on Aquatic Wildlife

Impacts from locatable minerals development on aquatic wildlife populations and habitats are expected to be the same or similar to those discussed above under *Impacts from Fluid Minerals Management on Aquatic Wildlife* but may vary in scale, duration, and intensity.

Impacts from Nonenergy Leasable Minerals Management on Aquatic Wildlife

Impacts from nonenergy leasable minerals development on aquatic wildlife populations and habitats are expected to be the same or similar to those discussed above under *Impacts from Fluid Minerals Management on Aquatic Wildlife* but may vary in scale, duration, and intensity.

Impacts from Salable Mineral Management on Aquatic Wildlife

Impacts from salable minerals development on aquatic wildlife populations and habitats are expected to be the same or similar to those discussed under *Impacts from Fluid Minerals Management on Aquatic Wildlife* but may vary in scale, duration, and intensity.

Impacts from Fuels Management on Aquatic Wildlife

Direct Habitat Loss/Modification/Fragmentation

A hot fire near an occupied stream, in combination with low flows and high air temperatures, could render some stream reaches inhospitable by removing riparian vegetation as well as upland vegetation on nearby slopes.

Some species have become adapted to fluctuations in climate and environmental conditions over their evolutionary history. Trout are particularly vulnerable to environmental change brought on by fire due to their dependence on cold, clean water. Loss of riparian vegetation could result in unfavorably warm water due to loss of shading. Warm water may affect survivorship and reproduction, in part because warmer waters have lower levels of dissolved oxygen. Denuded riparian habitats also make stream banks vulnerable to erosion and increase the potential for inflow of upland runoff containing high levels of sediments that would normally be filtered. Loss of riparian vegetation could also reduce the amount of allochthanous (from outside the stream) prey available for aquatic wildlife. Burning of riparian areas under proposed burning plans is unlikely due to low intensity burning strategies and moist riparian plant communities.

Complete removal of upland vegetation is also unlikely, but if it were to occur as a result of the fire, it could lead to increased erosion and sediment loading, which would reduce stream habitat quality. Fine sediments would reduce productivity of macroinvertebrates that serve as the principal prey for many aquatic species.

Decreased Water Quality/Increased Sedimentation and Turbidity

Soil erosion after fire can increase sediment input into the stream, which can silting over spawning gravels, smother macroinvertebrate habitat, and fill pools. These impacts depend on the intensity of the burn, slope, aspect proximity to the stream, and time lag to and intensity of precipitation. In a prescribed burn, fire intensities are expected to be low, which would reduce sedimentation effects. Some potential also exists for increased transport of soils into streams from mowing treatments in upland shrubland habitat.

Fire suppression may also increase sediment input into streams. Fire lines would need to be properly constructed and rehabilitated to minimize possible sedimentation. Use of fire retardant would not be allowed within 300 feet of any stream, and use of stream water for fire suppression would have to be approved and closely tracked and monitored throughout the suppression period.

Mechanical treatments in pinyon/juniper woodlands would consist primarily of thinning and piling of debris, often in combination with hand cutting, and then burning or chipping/shredding. Any accelerated rates of runoff and sedimentation from upland areas as a result of mechanical treatments would be small and site specific and would progressively diminish as these surrounding areas achieved proper functioning condition.

Removal of vegetation could temporarily increase erosion of surficial soils into nearby streams. Water yield and surface water runoff from the treated areas may increase in response to high-intensity storms. However, because of the small scale of most treatments, the retention of most of the plant cover in a treated area, and the maintenance of vegetated buffers along streams and around ponds, treatment projects are not expected to cause significant habitat changes for aquatic organisms.

Following a wildfire, ESR efforts are implemented to protect and conserve habitats that have sustained damage or degradation from suppression or prescribed fire. These activities are beneficial overall but can have short-term negative impacts on aquatic wildlife species, such as increased sedimentation and erosion during the implementation of these protective measures.

Habitat Quality and Protection/Habitat and Water Quality Improvement

A prescribed fire would also contribute to decreasing the threat of a future catastrophic wildland fire that would change large blocks of habitat indiscriminately and probably would result in substantial increases in sediment loading. Over the long term, all treatment methods that remove nonnative and competing vegetation are likely to benefit aquatic habitats by reducing sediment inflow; therefore, vegetation treatments would eventually increase the amount of suitable habitat, potentially increasing populations of desirable species requiring relatively clean waters.

Another long-term benefit of the removal of woody fuels from sagebrush habitats is the decrease in the risk of a future high severity wildfire. Pinyon and juniper removal would greatly reduce the chance of a high-intensity fire that could spread to woody riparian vegetation. Diverse, vigorous, and dense stands of native riparian vegetation help to protect streams from the direct and indirect impacts of wildfires by buffering streams from temperature increases and filtering ash, woody debris, and mud carried in runoff from nearby slopes. Some disturbance to riparian areas could provide for short-term impacts but long-term maintenance. However, generally, late seral, climax riparian areas provide the best streamside habitat and cover and shading for fish.

Following a wildfire, ESR efforts are often implemented to protect and conserve habitats that have sustained damage or degradation from suppression or prescribed fire. Typically these activities are beneficial for aquatic wildlife species and are designed to improve the overall condition of

the area, which in turn improves habitat for wildlife. For example, weed-free seeding would stabilize soil and reduce the spread of noxious weeds. Additionally, replacing organic matter in disturbed areas would protect topsoil and provide a suitable bed for the restoration of a native vegetative community.

Summary of Impacts by Alternative

Alternative A would have the fewest restrictions for fuels management actions, with the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize fire operations beyond what has already been determined in the fire management plans for the area; therefore, Alternative A would have the greatest impact on aquatic wildlife.

Alternative B is more restrictive than Alternative A, though all of the restrictions fall within PPH; therefore, impacts from fuels management on aquatic wildlife are expected to be less than Alternative A, but only within PPH. Additionally, Alternative B would prioritize fire operations in PPH and PGH, immediately after life and property; therefore, the potential for disturbance to aquatic wildlife species within these habitats is lower under Alternative B than Alternative A.

Alternative C would prioritize fire operations in PPH, immediately after life and property; therefore, the potential for disturbance to aquatic wildlife within PPH is the same as Alternative B, but less than Alternative B in PGH. With regard to fuels management, Alternative C is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management on aquatic wildlife species are expected to be less than Alternative B. Conversely, Alternative C does not offer as many protective management actions that could benefit aquatic wildlife as Alternative B and D, so it has more potential for habitat degradation than the other alternatives.

Alternative D would give priority to fire operations in PPH and PGH, immediately after firefighter and public safety, but only after other resource values managed by the BLM/USFS are considered and if an exemption is warranted. With regard to fuels management, Alternative D is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management on aquatic wildlife are expected to be less than Alternative B. Concurrently, Alternative D offers the same protective measures as Alternative B but applies them to ADH; therefore, it has the potential for more benefits to aquatic wildlife species than Alternatives B and C.

Impacts from Habitat Restoration on Aquatic Wildlife

Direct Habitat Loss/Modification/Fragmentation

Some species have become adapted to fluctuations in climate and environmental conditions over their evolutionary history. However, habitat restoration near an occupied stream, in combination with low flows and high air temperatures, could render some stream reaches inhospitable by removing riparian and upland vegetation on nearby slopes. Trout are particularly vulnerable to environmental change brought on by vegetation removal due to their dependence on cold, clean water. Loss of riparian vegetation could result in unfavorably warm water due to loss of shading. Warm water may affect survivorship and reproduction, in part because warmer waters have lower levels of dissolved oxygen. Denuded riparian habitats also make stream banks vulnerable to erosion and increase the potential for inflow of upland runoff containing high levels of sediments that would normally be filtered. Loss of riparian vegetation could also reduce the amount of

allochthanous prey available for aquatic wildlife. Removing vegetation near riparian areas under proposed projects is unlikely due to the application of vegetative buffers near riparian areas.

Decreased Water Quality/Increased Sedimentation and Turbidity

Mechanical treatments in pinyon/juniper woodlands would consist primarily of thinning and piling debris, often in combination with hand cutting, and then burning or chipping/shredding. Any accelerated rates of runoff and sedimentation from upland areas as a result of mechanical treatments would progressively diminish as these surrounding areas achieved proper functioning condition. For mechanical treatments in the shrubland communities, mowing of sagebrush, followed by seeding or drilling would be the most likely to occur. Treatments would target woody species (e.g., big sagebrush, rabbitbrush, and greasewood), with the goal of increasing certain other species of shrubs and native perennial grasses and forbs.

Removal of vegetation could temporarily increase erosion of surficial soils into nearby streams. Water yield and surface water runoff from the treated areas may increase in response to high-intensity storms. However, because of the retention of most of the plant cover in a treated area and the maintenance of vegetated buffers along streams and around ponds, treatment projects are not expected to cause significant habitat changes for aquatic organisms.

Habitat Quality and Protection/Habitat and Water Quality Improvement

Over the long term, all treatment methods that remove nonnative and competing vegetation are likely to benefit aquatic habitats by reducing sediment inflow; therefore, vegetation treatments would eventually increase the amount of desirable vegetation, potentially increasing populations of desirable aquatic species requiring relatively clean waters.

Another long-term benefit of the removal of woody fuels from sagebrush habitats is the decrease in the risk of a future high severity wildfire. Pinyon and juniper removal would greatly reduce the chance of a high-intensity fire that could spread to woody riparian vegetation. Diverse, vigorous, and dense stands of native riparian vegetation help to protect streams from the direct and indirect impacts of wildfires by buffering streams from temperature increases and filtering ash, woody debris, and mud carried in runoff from nearby slopes. Some disturbance to riparian areas could provide for short-term impacts but long-term maintenance. However, generally, late seral, climax, riparian areas provide the best streamside habitat and cover and shading for fish.

Summary of Impacts by Alternative

Alternative A would have the fewest restrictions for fuels management actions, with the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize fire operations beyond what has already been determined in the fire management plans for the area; therefore, Alternative A would have the greatest impact on aquatic wildlife.

Alternative B is more restrictive than Alternative A, though all of the restrictions fall within PPH; therefore, impacts from fuels management on aquatic wildlife are expected to be less than Alternative A but only within PPH. Additionally, Alternative B would prioritize fire operations in PPH and PGH immediately after life and property. Therefore, the potential for disturbance to aquatic wildlife species within these habitats is lower in Alternative B than in Alternative A.

Alternative C would prioritize fire operations in PPH immediately after life and property; therefore, the potential for disturbance to aquatic wildlife within PPH is the same as Alternative B but less than Alternative B in PGH. With regard to fuels management, Alternative C is more

restrictive than Alternative B since all of the management actions fall within ADH. Therefore impacts from fuels management on aquatic wildlife species are expected to be less than Alternative B. Conversely, Alternative C does not offer as many protective management actions that could benefit aquatic wildlife as Alternative B and D; therefore, it has more potential for habitat degradation than the other alternatives.

Alternative D would give priority to fire operations in PPH and PGH immediately after firefighter and public safety, but only after other resource values managed by the BLM/USFS are considered and if an exemption is warranted. With regard to fuels management, Alternative D is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management on aquatic wildlife are expected to be less than Alternative B. Concurrently, Alternative D offers the same protective measures as Alternative B but applies them to ADH; therefore, it has the potential for more benefits to aquatic wildlife species than Alternatives B and C.

Impacts from ACEC/Zoological Area Management on Aquatic Wildlife

Habitat Protection

Areas that are designated as ACECs would be more beneficial to aquatic wildlife than areas that are not designated. Prohibiting surface-disturbing activities and other authorized activities would benefit aquatic wildlife by precluding activities that would have direct and indirect impacts on aquatic wildlife.

Alternative A would recognize all of the existing ACEC designations. This would have fewer beneficial impacts on aquatic wildlife than Alternative C, which would make all PPH an ACEC.

Alternative B would also recognize only the existing ACEC designations. Impacts from Alternative B are expected to be the same as impacts from Alternative A.

Alternative C would recognize all of the existing ACECs and would also make all PPH an ACEC to protect sagebrush habitat. Impacts on aquatic wildlife under Alternative C are expected to be the same as for Alternatives A, B, and D. ACEC designations would provide no additional protections beyond what is included in the management actions for those alternatives for the protection of GRSG habitat.

Alternative D would recognize all of the existing ACECs but does not propose to designate any new ACECs. Impacts from Alternative D are expected to be the same as for Alternatives A and B.

Summary of Impacts on Aquatic Wildlife

Alternative A provides the least amount of protection for aquatic wildlife in the planning area. Alternative A puts very few restrictions on development, which could result in the most modification of the landscape, and consequently, the most impacts on aquatic wildlife.

Alternative B provides a greater level of protection for aquatic wildlife than Alternative A, but it would provide a lower level of protection than Alternative C.

Alternative C would provide the most protection for aquatic wildlife. The most restrictions would be placed on development, which would afford the most protection for aquatic wildlife.

Alternative D would provide more protection for aquatic wildlife than Alternative A, but it would provide less protection than Alternatives B and C. More flexibility for development is built into Alternative D, which could result in higher levels of development than Alternatives B and C.

4.4. Special Status Species

4.4.1. General Description

This section discusses impacts on special status species, including federally listed species, BLM and USFS sensitive species, and state-listed species, from proposed management actions of other resources and resource uses. Existing conditions concerning special status species are described in **Section 3.3**, Special Status Species.

To analyze the potential impacts of the alternatives on special status species, information was gathered from inventories, recovery plans, conservation agreements, the Colorado Natural Heritage Program database, relevant scientific literature, and other sources identifying the potential distribution of these species in and next to the planning area. The analysis is also based on professional expertise of BLM and USFS specialists, the BLM Colorado State Office, CPW, and other professional organizations.

In determining impacts, the BLM and USFS staff considered how the action would affect listed or candidate species known or suspected to occur in an area. Direct and indirect impacts were considered, together with the impacts of activities that are interrelated or interdependent. Impacts were quantified when

possible; in the absence of quantitative data, best professional judgment, based on scientific reasoning, was used. In the following discussion, impacts are sometimes described by using ranges of potential impacts or in qualitative terms, if appropriate.

Special status fish and wildlife health within the planning area is directly related to the overall ecosystem health, habitat abundance and fragmentation, and wildlife security provided; thus, most resource management has at least an indirect impact on fish and wildlife. A large proportion of actions under all alternatives are mitigation measures for other actions and protective measures intended to minimize or reduce impacts on the health of populations or habitats.

Although data on known locations and habitats within the planning area are available, the data are neither complete nor comprehensive concerning all special status species known to occur or with potential habitat. Known and potential special status species and habitat were considered in the analysis, but the potential for species to occur outside these areas was also considered; as a result, some impacts are discussed in more general terms. Further, special status species and potential special status species habitat distributions over the landscape are patchy and localized.

4.4.2. Greater Sage-Grouse

Methodology and Assumptions

General Impacts on Greater Sage-Grouse

Indicators of impacts on GRSG and the measurements used to describe the impacts (where available or appropriate) are described below:

- Direct Habitat Loss

Acres of habitat lost. Direct habitat loss results when habitat is destroyed or converted to a form that is unsuitable for the impacted species. Direct habitat loss can be a short-term or long-term impact.

- Habitat Fragmentation

Habitat fragmentation occurs when contiguous habitat is broken into smaller blocks by surface-disturbing activities. Habitat fragmentation could lead to the following:

- Likelihood of reduced habitat quality and interference with movement patterns, leading to a decreased ability to breed or overwinter successfully to a degree that would lead, in turn, to substantial population declines
- Likelihood that individual habitat blocks would be reduced
- Likelihood of increased percentage of edge habitat on smaller blocks when compared to larger blocks
- Disruption to Species

Direct mortality of species, including predation, collisions with structures (fences, towers, vehicles), and disease; interference with movement patterns due to fragmented landscapes; short- or long-term displacement and physiological or behavioral influences (avoidance of otherwise functional habitats).

- Habitat Degradation

Weed infestation and understory and overstory reductions indicators (reductions in herbaceous ground cover, lack of residual cover, change in understory plant composition):

Miles disturbed (for limits on travel management, recreation, unleased areas)

Miles/acres disturbed. (It is assumed that habitat next to roads that are impacted by dust and dust suppression activities would have some lower level of understory next to the impacted habitat.)

- Habitat Restoration or Improvement

The likelihood of improving habitat quality (e.g., increased species diversity, increased habitat connectivity, and decreased weeds).

- Habitat Protection

Acres protected through stipulations, withdrawals, closures, and special designations (e.g., ACECs). Also, the likelihood of reduced or prohibited surface disturbance.

Assumptions

In addition to the assumptions listed under **Section 4.3.2**, Terrestrial Wildlife, the following would apply specifically to GRSG:

- In general, GRSG are highly sensitive to habitat fragmentation, development, or changes in habitat conditions. This is because GRSG inhabit and require large, intact sagebrush ecosystems, and are especially sensitive to disturbance and human presence.
- Alternatives proposing to protect the most GRSG habitat from disturbance are anticipated to have the greatest beneficial impact on GRSG.
- Not all habitats within mapped priority and general GRSG ranges are capable of supporting GRSG populations.
- The mapped ADH represents all occupied habitat for the GRSG. Protection of these areas is sufficient for all occupied habitat of the GRSG in Colorado.
- Historic and potential habitat is not considered in this analysis.

Implementing protective measures specific to water developments may have some influence on reducing the severity of outbreaks and subsequent losses from West Nile virus; however, the prevalence in the environment of West Nile virus cannot be fully controlled, particularly at chronic levels of occurrence.

Direct and Indirect Impacts on Greater Sage-Grouse

Impacts from Travel Management on Greater Sage-Grouse

Habitat Degradation

Impacts are the same as those discussed under *Impacts from Management of Travel and Transportation on Terrestrial Wildlife* (**Section 4.3.2**).

Alternative A-Under this alternative, some of the areas within GRSG habitat would remain open to cross-country travel. This alternative has the highest potential for impacts on GRSG through habitat degradation.

Alternative B-Under this alternative, all areas within PPH would be limited to designated routes, and no PPH would be open to cross-country travel. This alternative would reduce the likelihood of impacts from travel management on GRSG.

Alternative C-Same as Alternative B.

Alternative D-Same as Alternative B.

Direct Habitat Loss/Habitat Fragmentation/Disruption to Species

Impacts are the same as those discussed under *Impacts from Management of Travel and Transportation on Terrestrial Wildlife*.

Alternative A-Under this alternative, the fewest acres would have seasonal restrictions on casual use; some of the areas within GRSG habitat would remain open to cross-country travel. This alternative has the highest potential for impacts on GRSG due to the lack of restrictions on activities that cause these impacts.

Alternative B-Under this alternative, no areas within PPH would be designated as open to cross-country travel. The field offices and ranger districts would determine where closures and

seasonal restrictions are necessary within PPH to limit impacts on GRSG. This alternative would reduce the likelihood of impacts from travel management on GRSG.

Alternative C- This alternative would have the least potential to impact GRSG because restrictions on route construction would be applied to ADH.

Alternative D-This alternative would include the potential for seasonal limitations as necessary in ADH and would seasonally prohibit camping and other nonmotorized recreation within 4 miles of a lek. In this case, benefits to GRSG could be expanded to ADH and all habitat within 4 miles of a lek.

Habitat Restoration

Impacts are the same as those discussed under *Impacts from Management of Travel and Transportation on Terrestrial Wildlife*.

Alternative A-Under this alternative, the fewest acres would be closed to cross-country travel. This alternative would have the fewest acres of habitat restoration as a result of natural revegetation.

Alternative B-Under this alternative, no areas within PPH would be designated as open to cross-country travel. The field offices and ranger districts would determine where closures are necessary within PPH to limit impacts on GRSG. This alternative is expected to provide more habitat restoration than Alternative A.

Alternative C-Same as Alternative B.

Alternative D-Same as Alternative B.

Impacts from Recreation Management on Greater Sage-Grouse

Permitted Use

Impacts from permitted use and the proposed alternatives are the same as those described under terrestrial wildlife.

Alternative A-Under Alternative A, the BLM and the USFS would continue issuing SRPs and SUAs on a case-by-case basis. They would continue to provide opportunities for competitive and noncompetitive events and commercial outfitting services.

Alternative B-SRPs and SUAs would be authorized only where impacts on PPH would be neutral or beneficial. This alternative is expected to provide more protection for GRSG than Alternative A.

Alternative C-Same as Alternative B.

Alternative D-This alternative limits impacts on disruption of the species as well as PPH and thus would provide the most protections for GRSG.

Impacts from Lands and Realty Management on Greater Sage-Grouse

Direct Habitat Loss/Fragmentation/Degradation

In areas where ROWs are permitted, there would be more impacts on GRSG and their habitat than in areas where ROWs are excluded or avoided.

Construction and operation of ROW facilities, such as pipelines, roads, and transmission lines, may result in habitat loss, fragmentation, and degradation. Surface disturbance during construction removes vegetation and important habitat components for GRSG and, in most cases, renders the habitat unsuitable. ROWs, such as those for roads and industrial facilities, may lead to permanent loss of GRSG habitat. Other ROWs, such as those for pipelines or buried power lines, may lead to a more short-term loss of habitat if the area were reclaimed after construction. However, following natural succession regimes, sagebrush communities would take 20 to 30 years to return to preconstruction conditions. In addition to removing vegetation, long-term occupancy of structures and facilities leads to direct habitat loss.

ROWs may also lead to habitat fragmentation and degradation. ROW projects can reduce patch size and increase edge habitats. Since GRSG require large blocks of intact habitat, linear disturbances reduce habitat quality. Surface disturbance can also lead to new weed infestations and spread weeds where infestations already occur. Noxious and invasive weeds are often of lower value to wildlife, and degrade wildlife habitat by reducing optimal cover or food. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds. Not only can invasive species outcompete most native plants when moisture is limited, they can also change site-specific fire ecology and result in the loss of critical shrub communities. The loss and degradation of sagebrush habitat can reduce the carrying capacity of local breeding populations of GRSG, especially in areas where high quality sagebrush habitat is limited (Braun 1998; Connelly et al. 2000).

Disruption Impacts

Both the construction and operation phases of ROW projects can lead to disruption impacts. Noise and an increase in human presence during construction may displace GRSG into lower quality habitat and may disrupt breeding and nesting (Holloran 2005). Although construction impacts are generally short term, many impacts would continue during routine maintenance and operation of the ROWs. GRSG would likely avoid habitat in the vicinity of infrastructure (Holloran et al. 2010), resulting in indirect habitat loss. In addition, noise and an increase in traffic during ROW operation and maintenance would disturb and likely displace GRSG (Lyons and Anderson 2003; Holloran 2005). Avoidance of habitat would be most prevalent during levels of high human activity, such as ROW construction. GRSG may avoid otherwise suitable habitat as the density of roads and infrastructure increases (Holloran 2005).

GRSG and other prairie gallinaceous birds (those in the order Galliformes, including domestic poultry and game birds) have evolved in habitat devoid of tall structures. ROW projects involving tall structures, such as power lines (distribution and transmission lines), communication towers, and meteorological towers, may lead to avoidance of suitable habitat (Pitman et al. 2005; Pruett et al. 2009; Wisdom et al. 2011). Although peer-reviewed science that demonstrated a clear avoidance of tall structures is limited for GRSG, studies conducted on species that have similar life history (i.e., the lesser and greater prairie-chickens) have shown that use of habitat is reduced when these habitats are located near tall structures (Pitman et al. 2005; Pruett et al. 2009).

Avian predators, particularly raptors and corvids (i.e., crows, ravens, and magpies), are attracted to overhead utility lines because they provide perches for various activities, including hunting (Avian Power Line Interaction Committee 2006). Increased predation and harassment of GRSG

may occur from new ROW projects involving power lines or other tall structures (Connelly et al. 2004). In addition, ROW roads may increase mammalian predator densities.

Construction and operation of ROW facilities may also lead to direct mortality of GRSG. The potential for GRSG mortality from project construction would be low and likely limited to nesting hens or young chicks that have limited mobility. Direct mortality may occur when GRSG collide with turbines, power lines, or meteorological towers or their supporting infrastructure, such as guy wires (Connelly et al. 2004; Beck et al. 2006). In addition, an increase of traffic on roads from ROW maintenance and operations can lead to direct mortality through vehicle/GRSG collisions.

Habitat Protection

ROW exclusion or avoidance areas would reduce or eliminate the above-described impacts on GRSG and their habitat by not allowing ROWs in PGH or PPH. Disturbances caps would limit surface disturbance and habitat fragmentation in GRSG habitat.

Withdrawals and Land Tenure. Withdrawing PPH from mineral entry and other authorized activities would be beneficial to wildlife habitats. Prohibiting surface-disturbing and disrupting activities would benefit GRSG by eliminating impacts from these activities.

In general, the BLM/USFS would consider and analyze benefits to the public from any proposed acquisition or disposal action using land tenure adjustment criteria, with the goal that the exchange, acquisition, or disposal would increase public benefits, including those for GRSG. Any acquisition of land that includes high-value habitat can result in beneficial impacts on GRSG by maintaining or enhancing the habitat using BLM/USFS management restrictions or mitigation for surface-disturbing and disruptive activities. Any disposal of BLM-administered or National Forest System land with high-value habitat is typically avoided; such disposals could increase the risk of habitat loss through development because there would not be any BLM/USFS-required mitigation. Lands no longer administered by the BLM or USFS could also experience increased human presence that can increase disturbance to wildlife in the area. Consolidating land ownership through land tenure adjustments increases the manageability of lands and results in more contiguous blocks of habitat, which would beneficially impact GRSG.

Summary of Impacts by Alternative

Alternative A would have the most areas available for ROWs, with few restrictions in place to protect GRSG specifically. It would have the most potential for impacts on GRSG and their habitat than Alternatives B, C, and D. The impacts described above would be greatest under this alternative.

Alternative B would have fewer areas available for ROWs through restrictions to protect GRSG habitat. Under this alternative, PPH would be managed as an exclusion area, and PGH would be managed as an avoidance area for new ROW projects. Conservation measures would be more protective under Alternative B than Alternatives A and D, but less protective than Alternative C, due to restrictions on siting options. In addition, Alternative B would encourage consolidation of management of GRSG habitats, facilitating habitat conservation. These management actions would be more protective than conservation measures under Alternatives A and D, but less protective than Alternative C; therefore, potential impacts on GRSG would be less than Alternative A and D but would be greater than Alternative C.

Alternative C would have the most protective measures for GRSG. Under this alternative, ADH would be managed as an exclusion area for new ROW projects. In addition, Alternative C would encourage consolidation of GRSG habitats, facilitating habitat conservation and management. This alternative would have the fewest impacts on GRSG and their habitat.

Under Alternative D, PPH would be managed as an avoidance area. ROW projects would also be allowed in PPH if the project would not adversely affect GRSG populations. This alternative would be more protective than Alternative A but less protective than Alternatives B and C.

Impacts from Wind Energy Development on Greater Sage-Grouse

Direct Habitat Loss/Fragmentation/Degradation

In areas where wind energy facilities are permitted, there would be more impacts on GRSG and their habitat than in areas where wind energy facilities are excluded. Impacts on GRSG from construction and operation of wind energy facilities are similar to those for ROWs and include direct habitat loss, fragmentation, and degradation (see *Impacts from Lands and Realty Management on Greater Sage-Grouse* above).

Disruption Impacts

In areas where wind energy facilities are permitted, there would be more impacts on GRSG and their habitat than in areas where wind energy facilities are excluded. Impacts on GRSG from construction and operation of wind energy facilities are similar to those for ROWs and include disruption, avoidance, and potential direct mortality (see *Impacts from Lands and Realty Management on Greater Sage-Grouse* above).

Summary of Impacts by Alternative

Alternative A does not exclude wind energy developments specifically from GRSG habitat. In addition, this alternative would have the most areas available for ROWs and would lead to more impacts than Alternatives B, C, and D.

Although Alternative B does not exclude wind energy developments specifically from GRSG habitat, this alternative would have fewer areas available for ROWs. Conservation measures would be more protective under Alternative B than under Alternatives A and D but less protective than Alternative C; therefore, impacts on GRSG are less under Alternatives A and D but greater than Alternative C.

Alternative C would have the most protective measures by precluding wind developments from ADH; therefore, it would have the fewest impacts on GRSG.

Although Alternative D does not address wind energy specifically, Alternative D would be more protective in respect to all ROWs than Alternative A but less protective than Alternatives B and C.

Impacts from Solar Energy Development on Greater Sage-Grouse

Direct Habitat Loss/Fragmentation/Degradation

In areas where solar energy facilities are permitted, there would be more impacts on GRSG and their habitat than in areas where solar energy facilities are excluded.

Impacts on GRSG from construction and operation of solar energy facilities are similar to impact for ROWs and would include direct habitat loss, fragmentation, and degradation (see *Impacts from Lands and Realty Management on Greater Sage-Grouse* above).

Disruption Impacts

In areas where solar energy facilities are permitted, there would be more impacts on GRSG and their habitat than in areas where solar energy facilities are excluded.

Impacts on GRSG from construction and operation of solar energy facilities are similar to those for ROWs and include disruption, avoidance, and potential direct mortality (see ***Impacts from Lands and Realty Management on Greater Sage-Grouse*** above).

Summary of Impacts by Alternative

Alternative A does not exclude solar facilities specifically from GRSG habitat. In addition, this alternative would have the most areas available for ROWs, with few restrictions in place to protect GRSG, and would lead to more impacts than Alternatives B, C, and D.

Although Alternative B does not exclude solar facilities specifically from GRSG habitat, this alternative would have fewer areas available for ROWs. Conservation measures would be more protective under Alternative B than Alternatives A and D but less protective than Alternative C. Therefore, impacts are less than Alternatives A and D but greater than Alternative C.

Alternative C would have the most protective measures for GRSG by precluding solar facilities from ADH and therefore would have the fewest impacts.

Although Alternative D does not address solar facilities specifically. It would be more protective in respect to all ROWs than Alternative A but less protective than Alternatives B and C.

Impacts from Range Management on Greater Sage-Grouse

Impacts from range management on GRSG are the same or similar to the impacts from range management on terrestrial wildlife discussed in **Section 4.3.2**, Terrestrial Wildlife, with the addition of the following:

Habitat Degradation

In areas that are available for livestock grazing, there could be more impacts on GRSG than in areas where livestock grazing is excluded.

Potential impacts of herbivory (plant eating) on GRSG habitat include long-term impacts of historic overgrazing on sagebrush habitat and GRSG habitat changes due to herbivory (Beck and Mitchell 2000).

By altering habitat components necessary for GRSG habitats, livestock grazing can impact the suitability and extent of GRSG habitats (Wyoming Sage-Grouse Working Group 2003). Holloran et al. (2005) suggest that annual livestock grazing in GRSG nesting habitats may adversely impact the next year's nesting success.

Important objectives in managing livestock grazing are to maintain residual cover of herbaceous vegetation to reduce predation during nesting (Beck and Mitchell 2000) and to maintain the integrity of riparian vegetation and other wetlands (Crawford et al. 2004). Proper livestock

management (timing, location, and intensity) can assist in meeting GRSG habitat objectives and reduce fuels (Briske et al. 2011). Adams et al. (2004) identify grazing intensity and timing and duration of grazing as the most important factors in maintaining herbaceous cover for GRSG. Other GRSG habitat management objectives that control livestock movements and grazing intensities can be achieved broadly through rotational grazing patterns or locally through water and salt placements (Beck and Mitchell 2000).

Implementation-level grazing decisions would comply with Standards for Public Land Health and Guidelines for Livestock Grazing Management (BLM 1997a). If livestock grazing is the cause for lands not achieving Public Land Health Standards, changes would be made in order to address the kind, numbers, and class of livestock, as well as the season, duration, distribution, frequency, and intensity of grazing use.

Alternative A would allow livestock grazing, with no restrictions in place to protect GRSG habitat specifically and therefore would have the greatest impact on GRSG.

Alternative B would have the same areas available for livestock grazing as Alternative A, but more restrictions would be in place to protect GRSG habitat. Those restrictions include but are not limited to: prioritization of land health assessments in PPH, modification or marking of fences, and restrictions on range improvements and locations of supplements in PPH. Therefore, Alternative B would have fewer impacts on GRSG.

Alternative C would have no areas available for livestock grazing within ADH and therefore would have the fewest impacts on GRSG habitat. Under Alternative C there would be potential for fence construction in order to prevent trespass onto public lands from adjacent privately-owned allotments. Fences have the potential to affect GRSG through direct mortality and habitat fragmentation. Alternative D would be similar to Alternative B but would be slightly more restrictive as GRSG habitat objectives within grazing allotments would be applied to ADH and not just PPH. This alternative has fewer impacts than Alternative A and greater impacts than Alternative C.

Disruption to Species

Actions that result in habitat loss or disruption to GRSG include: grazing, vegetation management, and range improvements in areas where livestock grazing is excluded.

Potential impacts of grazing and associated activities on GRSG include direct impacts of herbivores on GRSG, such as trampling of nests and eggs, altered GRSG behavior due to presence of herbivores, and impacts on GRSG and their behavior from structures associated with grazing management (Beck and Mitchell 2000). Additionally, collisions with infrastructure have been shown to cause mortality to a number of North American and European tetraonids (Bevanger 1990; Baines and Summers 1997, Bevanger and Broseth 2000; Baines and Andrew 2003). In particular, mortality associated with fence collisions have been documented in lesser prairie-chickens *(Tympanuchus pallidicinctus)* in Oklahoma (Wolfe et al. 2007) and GRSG in Idaho (Stevens 2011). Stevens et al. (2012) showed that topographic features, proximity to active leks, lek size, and fence design and density can influence collision potential and frequency. It was shown that fences pose a higher risk to GRSG in less rugged terrain and in close proximity (especially within 1.25 miles) of active leks (Stevens 2011). Furthermore, fences in areas with higher GRSG population densities had higher collision rates. Fence post type and width of fence segment were also shown to influence collision risk. Fences with more numerous and visible posts, such as larger, wooden posts, had fewer instances of collision. Areas where fence densities exceed

1.6 miles per square mile may also pose a risk to GRSG (Stevens 2011). Consideration should be taken when evaluating the need for fences and includes proper siting and design. Marking fences in high priority GRSG habitats may also reduce the risk of collision (Stevens 2011).

Alternative A would allow livestock grazing and has the most potential for vegetation management and rangeland improvements with the fewest restrictions; therefore, Alternative A would have the greatest impact on GRSG.

The potential for livestock grazing, vegetation management, and rangeland improvements is expected to be the same under Alternative B as under Alternative A; however, more restrictions would be in place to protect GRSG habitat, so it would have fewer impacts on GRSG.

Under Alternative C ADH would be an exclusion area for livestock grazing and only treatments that benefit GRSG would be allowed. While the removal of livestock would be expected to lead to substantial improvements in herbaceous understories which would benefit GRSG; in all practicality the only way to keep livestock out of these areas would be through the construction of fences. An estimated 5,000 miles of fence would need to be constructed under Alternative C (see Table 4.6, "Livestock Grazing Management-Alternative C" (p. 705), , in **Section 4.13**, Range Management). Some level of GRSG injury or mortality could occur; however, potential for injury and mortality could be moderated through fence design and siting considerations (see discussion above). Collision risk would be low in large, continuous blocks of publicly-owned lands where potential fences would follow the perimeter of ADH. In areas where there is a mosaic of BLM-administered lands or National Forest System lands and privately-owned lands it is suspected that fence collisions may be more frequent since private lands would likely require fencing that could bisect higher quality brood and nesting habitat. In contrast, if livestock were removed from BLM-administered or National Forest System lands, there would be no need to maintain existing fences, particularly in areas with large, continuous tracts of BLM-administered or National Forest System lands. Removal of these fences could reduce the potential for collisions particularly if located in higher quality habitats. While impacts associated with fence construction should be carefully considered, overall Alternative C would have the fewest impacts on GRSG because it would have the least potential for vegetation management and rangeland improvements.

Alternative D would have the same areas available for livestock grazing as Alternatives A and B, but more flexibility to apply treatments would be allowed. Impacts on GRSG are expected to be greater under Alternative D than Alternative B and less than Alternative A.

Impacts from Wild Horse Management on Greater Sage-Grouse

Degradation of Habitat

Grazing by wild horses would be similar to permitted livestock grazing (see above) and could reduce habitat effectiveness by changing structure, composition, or diversity of vegetation. Since horse diets consist primarily of grass, and horses can clip vegetation close to the ground, year-round grazing by wild horses can remove important cover for nest and young concealment. This could lead to increased predation of GRSG nests and young, if habitat were to lack hiding cover (Connelly et al. 1991; Schroeder and Baydack 2001). Horses can also reduce or fragment shrub canopy by trampling, rubbing, and consuming it (Beever and Aldridge 2011). Beever et al. (2008) conducted a study of vegetation response to removing horses in 1997 and 1998 and concluded that sites from which horses had been removed exhibited 1.1 to 1.9 times greater shrub cover, 1.2 to 1.5 times greater total plant cover, 2 to12 greater plant species richness, 1.9 to 2.9 times greater native grass cover, and 1.1 to 2.4 times greater frequency of native grasses than did

horse-occupied sites. Loss of grass and shrub cover reduces the quality of seasonal habitats for GRSG. Horses may also congregate in dry areas, especially during the hot months. This may degrade important brood-rearing areas, which are vital to survival of GRSG chicks (Beever and Aldridge 2011).

Under all alternatives, the BLM has the ability to adjust appropriate management levels of wild horses if resource damage were occurring. However, only Alternatives B, C, and D provide management guidelines specific to GRSG habitat.

Disruption to Species

Wild horse gathers would create short-term localized disturbance to wildlife from human activity related to gathers. Vehicles, helicopters, wranglers on horseback, and the wild horses themselves would contribute to wildlife stress and displacement. Management of wild horses may result in range improvement projects, such as fences and water developments. Disturbance from construction and maintenance of range projects are similar to impacts described under *Impacts from Range Management on Greater Sage-Grouse* (see above). In addition, wild horses themselves could disrupt GRSG.

Summary of Impacts by Alternative

Alternative A would place the fewest restrictions on wild horse management, and therefore would have the most potential for impacts on GRSG.

Alternative B would place some restrictions on the management of wild horses. Under this alternative, gathers would be prioritized in ADH and GRSG habitat objectives, and management considerations would be incorporated into HMA plans. These management strategies would benefit wildlife species whose ranges overlap PPH and PGH. Overall, impacts on GRSG would be less than Alternatives A and D but are similar to Alternative C.

Alternative C is expected to have the same impacts as Alternative B because the management prescriptions for Alternative B and C are much the same for wild horses.

Alternative D would be similar to Alternatives B and C but would consider all resource values in conjunction with GRSG when managing wild horses. There may be a slight increase in impacts on GRSG from this alternative in comparison to Alternatives B and C. However, Alternative D would be more protective than Alternative A.

Impacts from Fluid Minerals Management on Greater Sage-Grouse

Impacts on GRSG would be greater in those MZs that are strongly influenced by energy development or are expected to experience increases in energy development in the near future. **Table 3.40**, Acres of Leased and Unleased Federal Mineral Estate in GRSG Habitat-Fluid Leasable Minerals, in **Section 3.7**, Minerals – Leasable, illustrate acres of PPH and PGH that are currently leased and unleased (medium and high potential).

Direct Habitat Loss/Fragmentation/Indirect Habitat Loss or Avoidance

Direct Habitat Loss-Direct habitat loss from fluid minerals development would be attributed to vegetation clearing (from well pad, access road, and ancillary facilities construction) and longer-term facility occupation. Loss or modification of big sagebrush communities would not regain any shrubland character for GRSG for 20 to 30 years, following interim or final reclamation,

or longer depending on length of occupation. In some cases, shrubland may not regain functional utility (e.g., roads and permanent facilities) to support GRSG over the life of the plan amendment. Small herbaceous inclusions in sagebrush-dominated landscapes can serve as important sources of herbaceous and invertebrate forage for brooding GRSG. Because of population size and habitat configuration (natural geographic patterns), these impacts may be more pronounced in certain zones (e.g., Colorado MZ 17). Conservation measures outlined in each alternative would reduce the potential for direct habitat loss across sagebrush landscapes within each MZ.

Habitat Fragmentation/Alteration-Development of well pads, roads, and associated anthropogenic (human-caused) features would reduce intact sagebrush communities, creating a mosaic across the landscape and increasing edge habitat. GRSG populations generally require large expanses of intact sagebrush habitat (Connelly et al. 2004). Fragmented or altered landscapes (attributed to energy development) lead to diminished habitat base and have been shown to influence lek activity, nesting and brood-rearing success, adult and chick survival, and winter habitat selection (Holloran et al. 2010). Additionally, surface-disturbing activities can alter plant community composition, decrease species diversity, and may lead to the proliferation of noxious weeds and invasive plant species. Shifts in understory composition that lead to more annual dominated or single-species dominated communities could influence local GRSG populations by reducing nesting success and chick survival. Because of population size and habitat configuration (natural geographic patterns), these impacts may be more pronounced in certain zones (e.g., Colorado MZ 17).. Conservation measures outlined in certain alternatives would reduce the potential for fragmentation and degradation across sagebrush landscapes within each MZ.

Indirect Habitat Loss/Avoidance-In addition to direct habitat loss and alteration, noise and human activity (including impacts from roads) from fluid minerals development has been shown to influence GRSG behavior. Recent studies have consistently demonstrated that oil and gas development and its infrastructure influence GRSG behavior and demographics at distances of up to 4 miles (NTT 2011). This prompts declines in lek persistence and male attendance, yearling and adult hen survival, and nest initiation rates. It also elicits strong avoidance response in yearling age classes, nesting/brooding hens, and wintering birds.

Most GRSG researchers have used various measures of lek use to infer population responses in GRSG subjected to development-related disturbances. Without exception, this work documents increased rates of lek inactivity and declining male attendance in response to increased frequency (vehicle use), intensity (well density), duration, and proximity of development and infrastructure (Doherty 2008; Lyon and Anderson 2003; Walker et al. 2007; Harju et al. 2010; Holloran 2005; see also discussion in Manier et al. 2013). Doherty (2008) found impacts on GRSG lek persistence and attendance increase with development intensity and proximity. At well densities (as a measure of development activity) of one to three per section, rates of lek inactivity were twice that of background levels, and bird abundance at remaining leks declined 30 to 55 percent. Rates of lek inactivity increased two to five times at well densities of four to eight per section. Influences became undetectable at distances of 2 miles or more. Doherty (2008) considered development activity at intensities of one well or fewer per section in GRSG habitat to be compatible with the conservation of GRSG populations. Holloran et al. (2010) demonstrated marked avoidance of all development infrastructure by yearling male GRSG. Although adult GRSG exhibit strong fidelity to nesting areas, there are strong indications that infrastructure and activity avoidance by and reduced survival of GRSG, particularly in yearlings, drives declines in GRSG populations that are subjected to development.

Noise from drilling, roads, and ancillary structures has been implicated as an important determinant in declining male lek attendance (Blickley et al. 2012; Holloran 2005; Manier et al. 2013). Holloran (2005) found that leks within 3 miles of drilling experienced significantly greater rates of decline than controls. But this effect was asymmetric and primarily affected leks positioned downwind of drilling. Likewise, Blickley et al. (2012) found that chronic noise led to a decrease in male lek attendance and was more pronounced for road noise than drilling noise. Anthropogenic noise may displace birds in and around the area of disturbance. Noise may also indirectly influence GRSG survival by masking sounds of predators. Additionally, anthropogenic noise may mask communication between males and females, resulting in decreases in abundance (Blickley et al. 2012). Vegetation and topography would influence the distance of impact and may influence GRSG differently, depending on MZ.

Many attributes of road networks, such as road density, frequency of use, and timing of use, appear to adversely influence affected populations, including declines in lek attendance and avoidance of high traffic areas (Holloran 2005; Wyoming Wildlife Consultants 2009; Blickley et al. 2012).

Holloran (2005) found road densities that exceeded 0.7 mile per square mile within 2 miles of a lek caused progressive declines in average annual lek attendance from 15 percent (0.7 to 1 mile per square mile) to 56 percent at 1.7 miles per square mile. Birds less consistently avoided producing pads that incorporated fluids gathering systems, which implies that GRSG may also be sensitive to the frequency of vehicle use (Wyoming Wildlife Consultants 2009). On leks within a mile of main access roads, male attendance declined 35 percent in areas used early in the morning during the strutting period; however, attendance declined by 11 percent in the absence of traffic (Holloran 2005). Male lek attendance declined 13 percent and up to 60 percent when vehicle use frequency exceeded 50 axles per day. In addition to indirect influences, vehicle traffic from road systems can also lead to injury or direct mortality of GRSG.

Although the use of traditional stipulations have been widely criticized as ineffective, recent research (Holloran 2005; Holloran et al. 2010; Wyoming Wildlife Consultants 2009) demonstrates that those measures formerly adopted and espoused by the BLM, State Wildlife Agencies, and USFWS (i.e., NSO and TL stipulations addressed below) are capable of reducing impacts associated with avoidance. However, based on current understandings, impacts are not reduced to the degree necessary to stem progressive declines in populations subjected to pervasive or prolonged development. With known weaknesses in the efficacy of traditional stipulations, it is likely that some GRSG populations (defined by MZ) and GRSG habitat may be substantially influenced by fluid minerals development. In those MZs with limited fluid minerals development, conventional TL stipulations and NSO stipulations, siting considerations and moves would likely be sufficient to avoid important habitat features and seasonal activities from reproduction and winter use. It is unlikely that fluid mineral development in those MZs with development occurring at extremely low densities or in fringe areas (Doherty 2008) would have any marked influence on the abundance or persistence of GRSG populations. However, it should be noted that fringe populations are important to the overall range of GRSG.

Habitat Protection/Restoration

Conservation measures outlined in each alternative, including excluding development in PPH, limiting the amount of surface disturbance, designing roads to the minimum standards necessary, collocating facilities, and NSO and TL stipulations, would benefit GRSG. This would come about by reducing or eliminating the amount of sagebrush modified or lost to energy development, in addition to reducing the amount of or potential for indirect influences. Restoration projects related

to fluid mineral development designed to promote or enhance sagebrush would benefit GRSG in both the short and long term (depending on project design). Interim and final reclamation of ROWs and well pads that use seed mixes with species that provide greater horizontal and vertical ground cover (in contrast to pre-disturbance composition) and that promote more diverse structural and flowering forms may prove important as substrate for invertebrate prey for GRSG, as well as a cover resource in the short term.

Summary of Impacts by Alternative

See **Table 3.41**, Acres of Oil and Gas Leasing Categories in Decision Area PPH and PGH, for a comprehensive table of current stipulations and unleased acres by Colorado MZ.

Alternative A-In general, Alternative A would have the least protective measures for GRSG and sagebrush habitat, but this would vary depending on MZ (existing LUPs). Protective measures would generally include seasonal restrictions during the breeding, brood-rearing, and winter periods, NSO stipulations of 0.25 or 0.60 mile from a lek, and 1 and 5 percent voluntary disturbance caps on existing leases (see **Chapter 2** for specifics). Certain lands (such as WSAs) would be closed to fluid minerals leasing, but this would benefit GRSG and sagebrush habitats only where they are coincident. Overall, Alternative A would have the greatest impacts on GRSG and sagebrush habitat.

Alternative B-Alternative B would have more restrictions on fluid minerals development than Alternatives A and D but fewer than Alternative C. Conservation measures outlined in this alternative would close PPH to fluid minerals leasing with exception criteria. For leased lands this alternative would exclude new surface occupancy within PPH. Exceptions include cases where a lease is entirely in PPH, a 4-mile NSO would be placed around the lek, with disturbance limited to one per section and no greater than 3 percent disturbance in the section. If an entire lease lies within the 4-mile lek perimeter, disturbance would be limited to one per section with no greater than 3 percent disturbance in that section, with development placed the greatest distance from the lek. Development across the landscape (one per section) could be more detrimental to GRSG than clustering of development in strategic locations to minimize impacts on GRSG habitat. Seasonal restrictions (prohibiting drilling during nesting and brood-rearing) would be applied only to exploratory wells in PPH (all other wells would not have seasonal restrictions). On undeveloped leases, surface disturbance would not exceed 3 percent of GRSG habitat within each lease but would remain subject to persistent long-term behavioral influences from vehicle access and pad activity (see below). See **Chapter 2** for a detailed description of conservation measures under this alternative.

Conservation measures applied under this alternative would be limited to PPH in nearly all instances and could influence 617,500 acres (25 percent) of all federally managed GRSG habitats (ADH). The potential for direct habitat loss would be greater under this alternative than Alternative C, but it would be more protective than Alternatives A and D. Exception criteria described above would allow development in PPH in certain situations, with a disturbance cap of 3 percent, or one disturbance per section. RDFs, including road siting, road design, collocation/clustering facilities, and limiting noise, would further reduce direct habitat loss/modification and disruption (indirect influences) to GRSG.

Traditional TLs (generally applied during the nesting and brood-rearing season) would be applied only for exploratory wells. While timing restrictions have been shown to be less effective in those areas with large-scale disturbance or prolonged activity, recent research provides evidence that these stipulations are capable of reducing impacts from avoidance in areas with lower levels of

development (Holloran 2005; Holloran et al. 2010; Wyoming Wildlife Consultants 2009). See discussion above for Indirect Habitat Loss/Avoidance. Eliminating TLs, particularly during the breeding season, may increase impacts from fluid minerals development for certain GRSG populations specifically, those populations where there has been little to no development activities (see discussion above). Furthermore, the scale of disturbance (both direct and indirect) would depend on lease size and configuration within each MZ. Without the application of traditional timing stipulations, development under this alternative could have substantial negative impacts on GRSG during the breeding and nesting season.

Alternative C-Conservation measures addressed in Alternative C are similar to those described above in Alternative B; however, protections offered under Alternative C would be expanded to ADH in most cases. This alternative applies further protective measures by prohibiting the construction of evaporative or infiltration reservoirs (coal bed methane wastewater), requiring agencies to explore options to amend, cancel, or buy out leases in ACECs and occupied habitats, and disallowing waivers to be issued. See **Chapter 2** for a detailed description of conservation measures under this alternative.

Overall, Alternative C would provide the greatest protective measures for GRSG and sagebrush habitat, potentially influencing up to 1,094,000 acres (43 percent) of all federally managed GRSG habitat (ADH). Limiting disturbance to no greater than one well per section is considered to be compatible with the conservation of GRSG populations (Doherty 2008), although, as stated above, this may not apply with equal efficacy to all GRSG populations. The potential for the direct loss of sagebrush habitat and subsequent impacts on GRSG would be the least under this alternative.

Discussions for Alternative B regarding lack of TLs on nonexploratory wells are also applicable to this alternative. Overall Alternative C would have the least potential to directly or indirectly influence GRSG and sagebrush habitats. Prohibiting surface-disturbing activities, including vehicle travel and other human activity on exploratory wells during the nesting and brood-rearing season in ADH, would substantially reduce the potential for nest disruption/displacement, increase adult and chick survival, and sustain lek attendance/numbers. RDFs, including road siting and design, collocation/clustering facilities, and limiting noise, would further reduce direct habitat loss/modification and disruption to GRSG.

Alternative D would be less restrictive than Alternatives B and C but more restrictive than Alternative A in most instances. Under this alternative, surface occupancy or disturbance would be prohibited within 4 miles of a lek in PPH during the lekking and early brood-rearing periods. Surface disturbance would be limited to 5 percent in any MZ. In those MZs where surface disturbance exceeds 5 percent, effective mitigation would be required to offset loss of sagebrush habitat; however, the authorized officer may authorize disturbance in excess of 5 percent if data-based documentation is available to warrant a conclusion that GRSG populations are healthy and stable or increasing. Exceptions, waivers, and modifications may be granted at the discretion of the authorized officer and only with the concurrence of CPW. Seasonal restrictions would be applied within 4 miles of an active lek in ADH. Design features intended to reduce impacts on GRSG and sagebrush habitat would be voluntary (PDFs) rather than required.

Similar to Alternative B, conservation measures would be limited to PPH and would apply to no more than 617,500 acres (25 percent) of all federally managed GRSG habitats (ADH). The potential for direct habitat loss would be greater under this alternative, compared with Alternatives B and C, due largely to the 5 percent disturbance cap and allowance for development to occur in PPH (open for development). However, all new leases in PPH would be managed as

NSO. CSUs and TLs would be applied if exceptions were granted to NSO and to reduce indirect impacts largely dependent on the amount of ongoing fluid minerals development in each MZ. In most cases design features under Alternative D would be voluntary (incorporated in management actions where necessary, appropriate, and technically feasible). As such, this alternative would have greater potential to negatively influence GRSG populations and sagebrush habitat, both directly and indirectly than Alternatives B and C, but less than Alternative A.

Impacts from Solid Minerals-Coal Management on Greater Sage-Grouse

Subsurface Mines

Direct Habitat Loss/Degradation/Disruption to Species. Aboveground appurtenant facilities generally associated with subsurface coal mines would result in vegetation removal or alteration and longer-term occupation of a site. Impacts on GRSG populations from drilling and daily operations and maintenance of aboveground facilities, including traffic, are similar to those discussed above under *Impacts from Fluid Minerals Management on Greater Sage-Grouse*; however, the impacts may vary in scale, duration, and intensity.

Habitat Restoration/Protection. Benefits to local GRSG populations attributed to habitat improvement projects, off-site mitigation, and reclamation are similar to those discussed under *Impacts from Fluid Minerals Management on Greater Sage-Grouse*. Protections are outlined in each alternative below include siting new surface facilities outside of PPH, collocating facilities where appropriate, minimizing/limiting surface disturbance (including roads and operations and maintenance), and applying PDFs. These measures would benefit GRSG populations in both the short and long term. See detailed discussion under *Impacts from Fluid Minerals Management on Greater Sage-Grouse*.

Summary of Impacts by Alternative.

Alternative A-Impacts would vary by MZ (existing LUPs), with some federal lands being considered as unsuitable, based on potential for resource impacts (see **Table 2.2**, Comprehensive Summary of Alternatives). Impacts on GRSG habitat from surface coal mining are likely to be greater in scale in terms of habitat loss. Overall, this alternative would have the fewest restrictive measures on solid minerals leasing and development and would result in the greatest potential for direct loss or modification of sagebrush habit and greater potential for direct and indirect impacts on GRSG; therefore, Alternative A would have the highest potential to impact GRSG and sagebrush communities.

Alternative B-Under this alternative, no new coal leases would be granted unless all appurtenant facilities were located outside of PPH or priority areas. New facilities associated with an existing lease would be placed outside of PPH when possible or in previously disturbed areas within PPH. New facilities would be required to be built to the minimum standard necessary. Minimization of surface-disturbing or disruptive activities would be applied at the planning level to ADH. Alternative B would result in the least potential for loss of sagebrush habitat and would reduce the indirect influences from solid minerals development. Conservation measures designed to exclude or minimize surface-disturbing activities would provide the greatest benefit to GRSG and sagebrush communities.

Alternative C-Impacts on GRSG and their habitat under this alternative are identical to those described under Alternative B.

Alternative D-No new coal leases would be granted unless all surface-disturbing activities were located outside of PPH, with exception criteria outlined in **Chapter 2**. Surface-disturbing activities would be limited to 5 percent within each MZ. If disturbance exceeds 5 percent, effective mitigation to offset loss of habitat would be required. For existing coal leases, lessees would be encouraged to voluntarily follow PDFs that reduce or mitigate adverse impacts on GRSG and ADH (see **Chapter 2**). Impacts on GRSG and sagebrush communities are similar to those described for Alternative B; however, because Alternative D allows for greater flexibility in development potential (exception criteria, 5 percent disturbance cap, and voluntary commitment), it would result in greater potential for direct habitat loss and direct and indirect impacts on GRSG than Alternatives B and C.

Surface Mines

Direct Habitat Loss/Disruption of Species/Degradation/Fragmentation. Construction and occupation of surface mines typically results in longer term loss of forage and cover for GRSG. These communities may not regain any functional utility for several decades, but this would greatly depend on reclamation effectiveness. In general, impacts on GRSG are similar to those described under *Impacts from Fluid Minerals Management on Greater Sage-Grouse*, but they may vary in scale, duration, and intensity.

Habitat Restoration/Protection. Benefits to local GRSG populations attributed to habitat improvement, off-site mitigation, and reclamation of surface-disturbing activities are similar to those discussed under *Impacts from Fluid Minerals Management on Greater Sage-Grouse*. Protections outlined for each alternative below, including siting new surface facilities outside of PPH, collocating facilities where appropriate, minimizing/limiting surface disturbance (including operations and maintenance), and applying PDFs, would benefit GRSG in both the short and long term. See detailed discussion under *Impacts from Fluid Minerals Management on Greater Sage-Grouse*.

Summary of Impacts by Alternative. Alternative A-Impacts on GRSG and sagebrush communities are similar to those described for Alternative A above for subsurface coal mining.

Under Alternative B, all surface mining would be found unsuitable under the criteria set forth in 43 CFR, Part 3461.5. Additionally, surface-disturbing or disruptive activities would be minimized at the planning level for ADH. Impacts on GRSG and sagebrush habitat are similar to those described for Alternative B above for subsurface coal mining.

Under Alternative C, impacts on GRSG and sagebrush habitat are identical to those described for Alternative B.

Alternative D-Under this alternative, the requirements of 43 CFR, Part 3461, would be applied to determine unsuitability. Impacts on GRSG and sagebrush habitat are similar to those described for Alternative D above for subsurface mining.

Impacts from Locatable Minerals Management on Greater Sage-Grouse

Direct Habitat Loss/Degradation/Disruption to Species

Impacts from locatable minerals development on GRSG populations and sagebrush habitat are the same or similar to those discussed above under *Impacts from Fluid Minerals Management on Greater Sage-Grouse*, but they may vary in scale, duration, and intensity.

Habitat Restoration/Protection

Benefits to local GRSG populations from restoration and reclamation are similar to those discussed under *Impacts from Fluid Minerals Management on Greater Sage-Grouse*. Protections outlined in each alternative below, including limiting surface disturbance, clustering development, placing infrastructure in previously disturbed areas, minimizing road development, avoiding priority sagebrush habitats, and applying RDFs and PDFs, would benefit GRSG populations. See detailed discussion under *Impacts from Fluid Minerals Management on Greater Sage-Grouse*.

Summary of Impacts by Alternative

Alternative A-Impacts would vary depending on MZ (existing LUPs), but, overall, most BLM-administered or National Forest System lands would be available for mining claim location, with certain exceptions, such as SRMAs and ACECs (LSFO) and WSAs (WRFO). Seasonal restrictions would be applied if deemed necessary in some situations, with the potential for additional mitigation requirements. In general, this alternative would have the least restrictive measures on locatable minerals development and reclamation, resulting in a greater potential for direct loss of sagebrush habitat and direct and indirect impacts on GRSG.

Alternative B-Alternative B would withdraw mineral entry in PPH, based on impacts on GRSG and associated habitats. Existing claims within the withdrawal area would be subject to validity exams or buyout. Additional effective mitigation and seasonal restrictions may be applied. RDFs outlined in **Chapter 2** would further reduce direct and indirect impacts in ADH. Alternative B would provide the greatest protections for GRSG and sagebrush habitat by reducing the amount of habitat lost. It would also reduce the amount of indirect impacts from locatable minerals development. Reclamation and restoration requirements would benefit GRSG in the short term but would greatly depend on reclamation success and effectiveness.

Alternative C-Impacts on GRSG and sagebrush habitat are identical to those described for Alternative B.

Alternative D-Under this alternative, validity exams would be required for mining claims within withdrawn areas. Appropriate effective mitigation would be included in plans of operation. Seasonal restrictions would be applied if deemed necessary. Design features outlined in **Chapter 2** would be applied to ADH but would not be required. Overall, Alternative D would offer fewer restrictive measures than Alternatives B and C and subsequently would have a greater impact on GRSG and sagebrush habitat.

Impacts from Nonenergy Leasable Minerals Management on Greater Sage-Grouse

Direct Habitat Loss/Degradation/Disruption to Species

Impacts from nonenergy leasable minerals development on GRSG populations and habitat are the same or similar to those discussed above under *Impacts from Fluid Minerals Management on Greater Sage-Grouse* but may vary in scale, duration and intensity.

Habitat Restoration/Protection

Benefits to local GRSG populations attributed to reclamation are similar to those discussed under *Impacts from Fluid Minerals Management on Greater Sage-Grouse*. Minimization measures outlined in each alternative below, including limiting surface disturbance, avoiding PPH, collocating facilities where appropriate, minimizing/limiting surface disturbance (including

operations and maintenance), and applying PDFs, would benefit GRSG populations. See detailed discussion under *Impacts from Fluid Minerals Management on Greater Sage-Grouse*.

Summary of Impacts by Alternative

Alternative A-Impacts would vary based on MZ (existing LUPs). Under this alternative a small percentage of PPH in MZ 17 would be closed to nonenergy leasable mineral leasing, with the remainder of ADH open to leasing (including expansion of new leases). There would be no cap on surface-disturbing activities; as such, this alternative would allow for the greatest amount of direct habitat loss (and indirect influences) and would have the greatest impact on GRSG and sagebrush habitat.

Alternative B-Under this alternative all PPH would be closed to nonenergy leasable mineral leasing (1,106,600 acres, or 44 percent of all federally managed GRSG habitat [ADH]). Additionally, expansions of existing mines would not be permitted. RDFs would be applied for solution mining wells in PPH. Alternative B would result in the least sagebrush habitat lost to nonenergy leasable minerals development and would also have the least potential for indirect influences on GRSG. Overall, Alternative B would provide the greatest benefit to GRSG and sagebrush habitat.

Alternative C-Impacts on terrestrial wildlife species are identical to those described for Alternative B.

Alternative D-Under this alternative, PPH currently available for nonenergy minerals leasing would remain open. Additionally this alternative would consider allowing expansion of existing nonenergy mineral leases. Surface-disturbing activities would be limited to 5 percent in any MZ. If disturbance exceeds 5 percent, additional mitigation would be required to offset the resulting loss of GRSG habitat. Direct habitat loss attributed to the development and expansion of nonenergy leasable minerals, as well as indirect influences, would be greater under this alternative than Alternatives B and C and would result in greater impacts on GRSG and sagebrush habitat.

Impacts from Salable Mineral Management on Greater Sage-Grouse

Direct Habitat Loss/Degradation/Disruption to Species

Impacts from salable minerals development on GRSG populations and habitat are expected to be the same or similar to those discussed above under *Impacts from Fluid Minerals Management on Greater Sage-Grouse* but may vary in scale, duration, and intensity.

Habitat Restoration/Protection

Benefits to local GRSG populations attributed to habitat restoration and reclamation are similar to those discussed under *Impacts from Fluid Minerals Management on Greater Sage-Grouse*. Protections outlined in each alternative below, including siting new surface facilities outside of PPH, collocating facilities where appropriate, minimizing/limiting surface disturbance (including operations and maintenance), and applying PDFs, would benefit GRSG populations. See detailed discussion under *Impacts from Fluid Minerals Management on Greater Sage-Grouse*.

Summary of Impacts by Alternative

Alternative A-Impacts on GRSG species would vary by MZ (existing LUPs), but in most cases this alternative would allow for the continued development of salable minerals (with

certain exceptions, such as WSAs and cultural sites; see **Chapter 2**). Overall, this alternative would provide the fewest restrictive measures on salable minerals development and subsequent reclamation requirements and therefore could result in more habitat loss than Alternatives B, C, and D. As such, this alternative would have the most potential to impact GRSG and sagebrush habitat.

Alternative B-Under this alternative, PPH would be closed to mineral material sales (1,246,200 acres, or 50 percent of all federally managed GRSG habitat [ADH]). All salable mineral pits located in PPH that are no longer in use would be restored to meet GRSG habitat conservation objectives. This alternative would result in the least direct habitat lost to mineral materials development; however, the reclamation provision would apply only to PPH, whereas reclamation provisions called for in Alternative D would apply to ADH. Benefits to GRSG would depend heavily on reclamation success and effectiveness. In general, Alternative B would provide the greatest benefit to GRSG and sagebrush habitat.

Alternative C-Impacts on GRSG and sagebrush habitat are identical to those described for Alternative B.

Alternative D-Under this alternative, PPH currently available for mineral material sales would remain open. Alternative D would consider allowing existing mineral material sale sites to continue operations (including expansions). Surface-disturbing activities would be limited to 5 percent within each MZ. Where disturbance were to exceed 5 percent, mitigation to offset habitat loss would be necessary. Restoration of salable mineral pits that are no longer in use would be required in ADH. Restoration/reclamation would be required as a long-term goal to improve GRSG habitat. In general, Alternative D could allow for more direct habitat loss by allowing salable minerals development to continue. This would have greater impacts on GRSG and sagebrush habitat than Alternatives B and C. Conversely, restoration/reclamation of pits that are no longer in use would extend to ADH (compared with PPH in Alternatives B and C), allowing for incremental gains in forage and cover. This would greatly depend on reclamation success and effectiveness, but it would provide nominal benefit to GRSG in the short term as the BLM/USFS routinely require reclamation that generally satisfies GRSG -related habitat values.

Impacts from Wildfire Suppression, Fuels Management, and Fire Rehabilitation on Greater Sage-Grouse

Direct Habitat Loss/Modification/Fragmentation

Depending on the extent, location, severity of a fire, and seral vegetation (stage or (relating to the natural succession within a plant community of an ecosystem) type affected, unplanned ignitions would have short-term impacts on GRSG. They would do this by removing or degrading habitat, injuring or killing slow-moving animals, causing habitat avoidance and changes in species movement patterns, or potentially reducing population viability. In areas that are available for fuels treatments, changes in vegetation can result in negative impacts on GRSG, such as direct habitat loss, habitat fragmentation, and disruption to species; however, it can also result in beneficial impacts, such as habitat restoration.

A concern associated with resetting vegetation seral stage through fuels management is the invasion of undesirable plant species. Noxious and invasive weeds are often of lower value to wildlife and degrade wildlife habitat by reducing optimal cover or food. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds. Cheatgrass invasion is also a threat to some treatment areas. The greatest impacts have

occurred on GRSG winter range areas with low precipitation rates. Not only can invasive species outcompete most native plants when moisture is limited, they can also change site-specific fire ecology and result in the loss of critical shrub communities.

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

Disruption Impacts

The noise from heavy equipment and chainsaws could temporarily disperse GRSG from breeding and nesting habitat and from other occupied habitats. Prescribed burning could also disturb nesting bird species, from smoke inadvertently drifting into occupied habitat. These activities also could remove suitable habitat or other desirable vegetation. Disturbances from heavy equipment, chainsaws, and prescribed burning would be localized and short term. Most wildlife species would move into adjacent untreated areas; however, direct mortality during the vegetation treatments is possible. TLs and site-specific COAs could mitigate the short-term impacts from the treatments.

ESR treatments following a wildfire are effective in restoring wildlife habitat; however, equipment is often noisy, and noise may alter animal behavior or cause wildlife to leave an area during the disturbance. These impacts would be short term and are not likely to have much effect on the long-term health and habitat use in the treatment area.

Habitat Protection

Although both planned and unplanned wildland fire adversely impact wildlife habitats in the short term by removing vegetation and disturbing soil, the long-term benefits of wildland fire often outweigh the short-term adverse impacts. For example, prescribed fire can be used to restore conditions benefiting wildlife species favoring early plant succession stages and young age classes of woody plants (McAninch et al. 1984). Prolonged fire suppression has allowed fuels to build up to the point that an unplanned wildfire is likely to be much larger and greater in intensity. Some wildlife species thrive on the occurrence of fire. The herbaceous and woody plants that establish following a burn provide abundant foliar tissue and seeds. These are more palatable for GRSG and provide an influx of insects that provide valuable nourishment for GRSG chicks. Over the short term, the plant community is changed dramatically by a fire, as taller and denser vegetation is replaced by a more open habitat. As the area gradually recovers, however, many of the pre-fire components become reestablished, and the area again supports a healthy plant community. This cycle may take decades or centuries, depending on the dominant plant species. Alternatively, vegetation restoration might never occur if climatic conditions are no longer suitable for the former dominants. Wallmo (1980) suggests that fire improves the palatability of forage and causes browse plants to resprout close to the ground, putting the current season's growth within reach for several years. Additionally, wildland fire can improve the quality of GRSG habitat by releasing soil nutrients, reducing fuel load, or setting back trees encroaching into shrubland or grassland habitats.

Fuels treatments could be beneficial for species that depend on younger seral stages. In the long term, GRSG could benefit from some wildfires and most fuels management, due to an increase

in vegetation productivity and to increased plant diversity and age classes. This would, in turn, provide additional forage and cover. Mimicking natural periodic disturbance is often necessary in order to stimulate plant productivity and increase diversity and nutritional value. Foraging opportunities for GRSG would increase as understory grasses, forbs, and shrubs reestablish. In addition, fuels treatments in upland areas often result in increased forage production, which diverts livestock and wildlife use from riparian and wetland areas, thereby increasing the vigor and structural diversity of these plant communities.

Following a wildfire, ESR is implemented to restore habitats that have sustained damage or degradation from catastrophic wildfire. Typically these activities are beneficial for GRSG and are designed to improve the overall condition of the area, which in turn improves habitat for wildlife. For example, weed-free seeding would stabilize soil and reduce the spread of noxious weeds. Additionally, replacing organic matter in disturbed areas would protect topsoil and provide a suitable bed for the restoration of a native vegetative community.

Summary of Impacts by Alternative

Alternative A would have the fewest restrictions for fuels management actions, with the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize fire operations beyond what has already been determined in the fire management plans for the area; therefore, Alternative A would have the greatest impact on GRSG.

Alternative B is more restrictive than Alternative A, though all of the restrictions fall within PPH. Restrictions include no habitat treatments in winter range and no sagebrush treatments using fire in less than 12-inch precipitation zones in PPH. Therefore, impacts from fuels management on GRSG are expected to be less than Alternative A, but only within PPH. Additionally, Alternative B would prioritize fire operations in PPH and PGH immediately after life and property; therefore, the potential for disturbance to GRSG within these habitats is lower in Alternative B than in Alternative A.

Alternative C would prioritize fire operations in PPH immediately after life and property; therefore, the potential for disturbance to GRSG within PPH is the same as Alternative B but less than Alternative B in PGH. With regard to fuels management, Alternative C is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management on GRSG are expected to be less than Alternative B.

Alternative D would give priority to fire operations in PPH and PGH, immediately after firefighter and public safety, but only after considering other resource values managed by the BLM/USFS and determining if an exemption is warranted. With regard to fuels management, Alternative D is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management to GRSG are expected to be less than Alternative B. Concurrently, Alternative D offers the same protective measures as Alternative B but applies them to ADH so it has the potential for more benefits to GRSG than Alternatives B and C.

Impacts from Habitat Restoration/Improvement on Greater Sage-Grouse

Direct Habitat Loss/Modification/Fragmentation from Habitat Restoration

Depending on the extent, location, treatment, and seral type affected, habitat restoration would have short-term impacts on GRSG by possibly temporarily removing or degrading habitat, injuring or killing slow-moving animals, and causing habitat avoidance and changes in species movement

patterns. In areas that are available for habitat restoration, changes in vegetation can result in negative impacts on GRSG, such as direct habitat loss, habitat fragmentation and disruption; however, it can also result in beneficial impacts, such as long-term habitat restoration. For example, sagebrush mowing can temporarily reduce the amount of winter forage, but in the long term it would reinvigorate decadent sagebrush that would offer less value in its pre-treated state.

A concern of habitat restoration is the invasion of undesirable plant species from soil disturbance. Noxious and invasive weeds are often of lower value to wildlife and degrade wildlife habitat by reducing optimal cover or food. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds. Cheatgrass invasion is also a threat to some treatment areas. Invasive nonnative plants with little or no forage value for GRSG are increasing in some areas. Invasive species can outcompete most native plants when moisture is limited and results in the loss of critical shrub communities through changes in site-specific fire ecology..

Disruption Impacts

The noise from heavy equipment and chainsaws could temporarily disperse GRSG from breeding and nesting habitat and at other times from occupied habitat. Disturbances from heavy equipment, chainsaws, and prescribed burning would be localized and short term. Most GRSG would move into adjacent untreated areas; however, direct mortality during the vegetation treatments is possible. TLs (such as those for lekking and nesting), as well as site-specific COAs, could mitigate the short-term impacts resulting from the treatments.

Habitat Protection

Removal of nonnative species and vegetation from habitats that support GRSG populations would benefit most populations that occur on public lands by creating more native habitat conditions and reducing the likelihood of a future catastrophic wildfire. The degree of benefit to GRSG would depend, in large part, on the current habitat condition and the effectiveness of the treatments.

Nonnative plant species reduce the suitability of some habitats to support GRSG. This species requires certain plants as food. Aside from GRSGs' dependence on sagebrush for winter forage, a variety of perennial grasses and forbs make up a large part of their summer diet and provide habitat for insects, which are essential for successful brood-rearing. Such treatments as interseeding sagebrush stands with a mixture of native grasses and forbs would increase the forage quality as well as the quantity.

For GRSG, it is often the structure, rather than the species composition, of the habitat that makes it suitable. In some cases, invasive plant species alter the structure of habitats, making them less suitable for supporting sensitive wildlife species. Encroachment of nonnative plant species and displacement of native plant species that serve as important sources of food reduce the suitability of the habitat for GRSG. For this species, vegetation treatments would likely provide a long-term benefit to habitat and could improve the suitability of other areas. This could create additional habitat into which the population could expand. Treatments to control encroaching pinyon and juniper trees as well as weed infestations would likely provide a long-term benefit.

Conversion of agricultural fields and restoration of degraded habitat, such as cheatgrass monoculture, would provide long-term benefits to GRSG. Historically many of these areas were sagebrush stands that could have supported GRSG populations. Areas that were converted for agricultural use offer some benefit to GRSG, though much of this depends on the diversity of

plant species. The less plant diversity, the less benefit to GRSG. Converting these areas to sagebrush would benefit GRSG by providing valuable cover and forage, though establishment of a suitable stand could take several years. An area that is severely degraded, such as a cheatgrass monoculture, has little value to wildlife in general and almost none to GRSG. Restoring these areas would have the same benefits as converting agricultural lands, but at a much greater scale.

Summary of Impacts by Alternative

Alternative A would have the fewest restrictions for habitat restoration actions, with the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize habitat restoration and provide restoration guidelines beyond what has already been determined in the LUPs for the targeted areas; therefore, Alternative A would have the greatest impact and least benefit for GRSG.

There are no discernible differences in impacts on GRSG under all of the action alternatives because GRSG habitat treatments would be prioritized in ADH.

Impacts from ACEC/Zoological Area Management on Greater Sage-Grouse

Alternative A would recognize all of the existing ACEC designations (see **Table 3.62**, ACECs within GRSG Habitat on BLM-Administered Lands). Areas that are designated as ACECs would likely be more beneficial to GRSG than areas that are not so designated.

Alternative B would also recognize all of the existing ACEC designations. Impacts from Alternative B are the same as impacts from Alternative A.

Alternative C would recognize all of the existing ACECs and would also make all PPH an ACEC. Impacts on GRSG under Alternative C are expected to be the same as for Alternatives A, B, and D. ACEC designations would provide no additional protections beyond what is included in the management actions for those alternatives for the protection of GRSG habitat.

Alternative D would recognize all existing ACECs; no new ACECs would be proposed. Impacts from Alternative D are the same as for Alternatives A and B.

Summary of Impacts on Greater Sage-Grouse in PPH, PGH and Linkage Areas

Table 4.2, Comparison of Alleviated Threats to GRSG in Northwest Colorado by Alternative, describes a summary of, which actions could result in greater impacts as detailed in the above analysis to GRSG by alternative, and by the threats to the Northwest Colorado GRSG populations identified by USFWS.

Acreages cited under Alternative A include all acres currently identified/designated in existing LUPs. There is no identified PPH, PGH, or Linkage/Connectivity habitat associated with this alternative. Acreage values for Alternatives B, C, and D include only identified GRSG habitats classified as PPH, PGH, or Linkage/Connectivity (ADH).

Table 4.2. Comparison of Alleviated Threats to GRSG in Northwest Colorado by Alternative

The major threat to GRSG habitats in populations occurring across WAFWA Management Zones II and VII is energy development, primarily oil and gas development and supporting infrastructure (USFWS 2013). Resources/Resource Uses identified as threats to the Northwest Colorado populations of GRSG in the Conservation Objectives Team Report are identified with an asterisk*				
Resource/Resource Use	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Oil and Gas Development*				
Unleased Fluid Minerals				
Areas closed to fluid mineral leasing (acres)	100,200 Existing acres closed to fluid mineral leasing (mostly WSAs).	1,347,400 No new areas would be leased in PPH.	2,473,000 No new areas would be leased in ADH.	100,200 No new areas would be closed to leasing. No surface occupancy would be allowed in PPH.
Areas open to mineral leasing with NSO stipulation (acres)	350,300 Various stipulations apply, but most are not specific to GRSG or GRSG habitat.	350,300 PPH would be closed to new fluid mineral leasing.	350,300 ADH would be closed to new fluid mineral leasing.	1,315,700 No surface occupancy would be allowed in PPH. No exceptions to NSO would be granted within 0.6-miles of active leks in ADH. If exceptions, modifications, or waivers are granted, additional stipulations may apply.
Leased Fluid Minerals				
Restrictions on surface disturbance for leased fluid minerals	Low level of protection for GRSG in ADH. Various stipulations apply, but most are not specific to GRSG or GRSG habitat.	High level of protection for GRSG in PPH. Apply 4-mile NSO around leks in PPH and limit disturbances to 1 per section with no more than 3 percent disturbance in that section.	Highest level of protection for GRSG in ADH. Apply 4-mile NSO around leks in PPH and limit disturbances to 1 per section with no more than 3 percent disturbance in that section.	High level of protection for GRSG in PPH. Apply a TL/CSU in PPH that would prohibit surface occupancy or disturbance within 4 miles of a lek during lekking and early brood-rearing. Limit permitted disturbance to 5 percent in any Colorado MZ.

The major threat to GRSG habitats in populations occurring across WAFWA Management Zones II and VII is energy development, primarily oil and gas development and supporting infrastructure (USFWS 2013). **Resources/Resource Uses identified as threats to the Northwest Colorado populations of GRSG in the Conservation Objectives Team Report are identified with an asterisk***				
Resource/Resource Use	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Summary of Impacts on GRSG from Oil and Gas Development	Alternatives B, C and D close priority habitat to surface occupancy which responds to the need (identified in the Conservation Objectives Team Report, April 2013) to stop population decline and habitat loss by eliminating activities known to negatively impact GRSG and their habitats through reduction in the threat of habitat loss, degradation and fragmentation. Each action alternative closes GRSG habitat – the greater number of acres the greater reduction in potential activities known to negatively impact GRSG and GRSG habitat. The action alternatives are also in agreement with the following conservation measures identified in the Conservation Objectives Team Report specific to energy development: 1. Avoid energy development in priority areas for conservation (Doherty et al. 2010). Identify areas where leasing is not acceptable, or not acceptable without stipulations for surface occupancy that maintains GRSG habitats. 2. If avoidance is not possible within priority areas for conservation due to pre-existing valid rights, adjacent development or split estate issues, development should only occur in non-habitat areas, including all appurtenant structures, with an adequate buffer that is sufficient to preclude impacts on GRSG habitat from noise and other human activities. By limiting disturbances within PPH (Alternative B and D) and ADH (Alternative C), the objective of reducing threats to intact shrub land would have more restrictions on fluid mineral development than Alternatives A and D, but would have fewer than Alternative C. See page 4-79 for a complete summary of impacts from fluid minerals management on GRSG.			
Infrastructure*/Anthropogenic				
ROW avoidance areas (acres)	127,600 Various areas managed as ROW avoidance, but most are not specific to protect GRSG and GRSG habitat.	127,600 No new acres of avoidance since PPH would be an exclusion area.	127,600 No new acres of avoidance since ADH would be an exclusion area.	930,500 Specific criteria would have to be met in order to permit disturbances For example, projects must demonstrate that GRSG populations are stable or increasing at objective levels in that Colorado MZ and disturbances would be capped at 5 percent.

The major threat to GRSG habitats in populations occurring across WAFWA Management Zones II and VII is energy development, primarily oil and gas development and supporting infrastructure (USFWS 2013). **Resources/Resource Uses identified as threats to the Northwest Colorado populations of GRSG in the Conservation Objectives Team Report are identified with an asterisk***				
Resource/Resource Use	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
ROW exclusion areas (acres) – per BLMLUP Handbook, no exceptions permitted	25,600 Various ROW exclusion areas designated, but most are not specific to protect GRSG and GRSG habitat.	930,500 PPH would be a ROW exclusion area.	1,702,800 ADH would be a ROW exclusion area.	25,600 No new exclusion areas for general ROWs identified.
Avoidance areas for large transmission lines (greater than 230 kilovolts) (acres)	No avoidance areas for large transmission lines identified.	No avoidance areas for large transmission lines identified.	No avoidance areas for large transmission lines identified.	67,000 Parcels identified as avoidance areas for large transmission lines. Specific criteria would have to be met in order to permit disturbances. For example, projects must demonstrate that GRSG populations are stable or increasing at objective levels in that Colorado MZ and disturbances would be capped at 5 percent.
Exclusion areas for large transmission lines (greater than230 kilovolts) (acres) – per BLM LUP Handbook, no exceptions permitted	No exclusion areas for large transmission lines identified.	All ROWs would be excluded in PPH.	All ROWs would be excluded in ADH.	881,700 PPH, except areas identified as avoidance for large transmission lines would be exclusion area for large transmission lines.

The major threat to GRSG habitats in populations occurring across WAFWA Management Zones II and VII is energy development, primarily oil and gas development and supporting infrastructure (USFWS 2013). **Resources/Resource Uses identified as threats to the Northwest Colorado populations of GRSG in the Conservation Objectives Team Report are identified with an asterisk***				
Resource/Resource Use	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Travel management open/closed/limited areas respectively	202,600/52,600/ 1,472,100 Various restrictions on route construction and upgrades, but most are not specific to protect GRSG and GRSG habitat.	202,600/52,600/ 921,600 Restrictions on route construction and upgrades would be applied to PPH.	202,600/52,700/ 921,600 Restrictions on route construction and upgrades would be applied to ADH and would include a 4-mile buffer from leks.	202,600/52,600/ 921,600 Construction and upgrades of routes would be subject to 5 percent disturbance cap.
Summary of Impacts on GRSG from Infrastructure	Alternatives B, C, and D close priority habitat to surface occupancy which responds to the need (identified in the Conservation Objectives Team Report, April 2013) to stop population decline and habitat loss by eliminating activities known to negatively impact GRSG and their habitats through reduction in the threat of habitat loss, degradation and fragmentation. Each action alternative closes GRSG habitat – the greater number of acres the greater reduction in potential activities known to negatively impact GRSG and GRSG habitat. The action alternatives are in agreement with the following conservation objectives/options identified in the Conservation Objectives Team Report specific to infrastructure: 1. Avoid development of infrastructure within priority areas for conservation (objective). 2. Avoid construction of these features in GRSG habitat, both within and outside of priority areas for conservation (option). 3. Restrictions limiting use of roads should be enforced (option). Alternative A, in general has the least protections for GRSG and GRSG habitat from development of infrastructure. Alternative B would have more restrictions on route construction and upgrades, as well as ROWs than Alternative A and D, but would have fewer than Alternative C. See page 4-71 for a complete summary of impacts from lands and realty on GRSG. See page 4-69 for a complete summary of impacts from travel management on GRSG.			
Agriculture/Urbanization*				
Areas identified for disposal	Various parcels identified for disposal for consolidation of management without regard for GRSG habitat.	Under all action alternatives, GRSG habitat would NOT be identified for disposal, unless consolidation of ownership would benefit GRSG or GRSG habitat.		

The major threat to GRSG habitats in populations occurring across WAFWA Management Zones II and VII is energy development, primarily oil and gas development and supporting infrastructure (USFWS 2013). **Resources/Resource Uses identified as threats to the Northwest Colorado populations of GRSG in the Conservation Objectives Team Report are identified with an asterisk***				
Resource/Resource Use	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Areas identified for acquisition	No parcels identified in existing plans for acquisition.	Seek to acquire state and private lands with intact subsurface mineral estate by donation, purchase or exchange in order to best conserve, enhance or restore GRSG habitat.	Strive to acquire GRSG habitat in ADH.	Consider GRSG habitat values in acquisitions in ADH.
Summary of Impacts on GRSG from Agriculture/ Urbanization	Across all action alternatives, the BLM/USFS would take advantage of opportunities to consolidate GRSG habitat. Although agriculture and urbanization have been identified as threats in Northwest Colorado, the BLM/USFS has limited management authority over those types of activities. The Colorado Department of Natural Resources' Colorado Greater Sage-Grouse Conservation Plan: The Colorado Package (**Appendix N**) identifies those actions included in the conservation strategy in the 2008 Greater Sage Grouse Conservation Plan. The Colorado Department of Natural Resources Package includes a list of those actions (including actions tied to agriculture and urbanization) and their associated responsible parties, implementation and effectiveness to date. The action alternatives are in agreement with the following conservation objectives/options identified in the Conservation Objectives Team Report specific to infrastructure: 1. Limit urban and exurban development in GRSG habitats and maintain intact native sagebrush plant communities (objective). 2. Acquire and manage GRSG habitat to maintain intact ecosystems (option). See page 4-71 for a complete analysis of land tenure on GRSG.			
Conifer Invasion*				
Areas prioritized for vegetation treatments	Few restrictions on habitat restoration actions, with the most potential for vegetation disturbance. There would be no prioritization of habitat restoration in GRSG habitat.	Across all action alternatives, treatments would be prioritized to consider GRSG habitat requirements.		
Grazing				
Areas closed to livestock grazing (acres)	No areas identified as closed to livestock grazing.	No areas identified as closed to livestock grazing.	1,702,800 BLM-administered and National Forest System lands within ADH would be closed to livestock grazing.	No areas identified as closed to livestock grazing.

The major threat to GRSG habitats in populations occurring across WAFWA Management Zones II and VII is energy development, primarily oil and gas development and supporting infrastructure (USFWS 2013). **Resources/Resource Uses identified as threats to the Northwest Colorado populations of GRSG in the Conservation Objectives Team Report are identified with an asterisk***				
Resource/Resource Use	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Areas available for livestock grazing (acres)	BLM-administered and National Forest System lands within the planning area would be available for livestock grazing.	1,702,800 BLM-administered and National Forest System lands within ADH would be available for livestock grazing.	No areas would be available for livestock grazing on BLM-administered and National Forest System lands within ADH.	1,702,800 BLM-administered and National Forest System lands within ADH would be available for livestock grazing.
Wild horse and burro management	Gathers prioritized without consideration of GRSG habitat requirements.	Prioritize HMAs for gathers that are within PPH.	Prioritize HMAs for gathers that are within PPH.	GRSG habitat requirements would be considered with other resource values when prioritizing gathers.
Summary of Impacts on GRSG from Grazing	GRSG habitat considerations within livestock grazing allotments and wild horse management areas would be similar across all action alternatives. Range improvements are more restricted under Alternative B than under Alternative D. Under Alternative C, the potential for increased fencing in order to prevent trespass exists. Under Alternative A, grazing would be managed to achieve the standards of rangeland health. Consequently in most scenarios, GRSG habitat requirements would be addressed. However in some localized situations a lack of focus on GRSG-specific issues would result in adverse impacts. The most specific concern is the potential for project infrastructure up to within 0.25-mile of leks that could cause fragmentation, raptor perches, and inappropriate fence locations and designs. Alternative B puts specific focus on GRSG habitat requirements in priority habitat to preclude adverse impacts with regard to both the livestock themselves and project infrastructure. Because Alternative C closes ADH to grazing, adverse issues on public lands would be precluded, but actions taken on private land to compensate for loss of public grazing might affect GRSG habitat and could be substantial (for example, volumes of fencing would likely be constructed to hold livestock on private lands). Alternative D would apply the specific focus on GRSG habitat described for Alternative B to ADH. For additional detail on impacts from range management, see the impacts from range management on GRSG section, beginning on page 4-75. For additional detail on impacts from wild horse management, see the impacts from wild horse management on GRSG sections, beginning on page 4-78.			
Invasive Species				
Weed control priority areas	Analysis of the impacts from weeds on GRSG were considered in the impacts on GRSG section, including, under the impacts from lands and realty on GRSG, impacts from fluid minerals on GRSG and impacts from wildfire suppression, fuels management and fire rehabilitation sections. However, weed infestations are not considered a top threat in Northwest Colorado by the Conservation Objectives Team Report (USFWS 2013).			
Wildfire				
Suppression priority areas	Analyses of the impacts from wildfire suppression on GRSG were considered in the impacts on GRSG section, in the impacts from wildfire suppression, fuels management and fire rehabilitation section. However, wildfire suppression was not considered a top threat in Northwest Colorado by the Conservation Objectives Team Report (USFWS 2013.			

The major threat to GRSG habitats in populations occurring across WAFWA Management Zones II and VII is energy development, primarily oil and gas development and supporting infrastructure (USFWS 2013). **Resources/Resource Uses identified as threats to the Northwest Colorado populations of GRSG in the Conservation Objectives Team Report are identified with an asterisk***				
Resource/Resource Use	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Disease				
Although impacts from West Nile Virus to GRSG are considered in the analysis, the vast majority of GRSG habitat in Northwest Colorado exists at elevations above where West Nile virus is commonly found (Naugle et al. 2005). See RDFs, PDFs, and SDFs for a description of features designed to reduce the threat of West Nile Virus (**Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features).				
Coal Mining				
Areas identified as unsuitable for coal mining	Various areas found unsuitable for coal mining, but few tied specifically to protection of GRSG habitat.		Under Alternatives B and C, the BLM/USFS would find PPH unsuitable for surface mining. The BLM/USFS would grant no new sub-surface mining leases unless all facilities could be located outside of PPH.	Under Alternative D, the BLM would apply the unsuitability criteria to ADH for surface mining. The BLM would grant no new sub-surface mining leases unless all facilities could be located outside of ADH. Any disturbances associated with coal mining would be subject to the 5 percent disturbance cap.
Weather				
There is no resource program in an LUP for addressing this threat to GRSG and its habitat.				
Predation				
See RDFs and SDFs for Lands and Realty and Minerals for a description of features designed to reduce the threat of predation (**Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features).				
Prescribed Fire				
Areas suitable for prescribed fire use	Treatments considered on a case-by-case basis, and not prioritized specific to GRSG habitat.	No treatments would be allowed in known winter range in PPH, unless treatment is designed to strategically reduce wildfire risk around or in winter range and will maintain winter habitat range quality.	No treatments would be allowed in known winter range in ADH, unless treatment is designed to strategically reduce wildfire risk around or in winter range and will maintain winter habitat range quality.	Performance-based objectives, which include canopy cover, would be used when considering treatments in ADH (70/30 sagebrush thresholds).
Water Development				
Identify number, type, and location of range water developments	Although impacts from West Nile Virus to GRSG are considered in the analysis, the vast majority of GRSG habitat in Northwest Colorado exists at elevations above where West Nile virus is commonly found (Naugle et al. 2005). See RDFs, PDFs, and SDFs for a description of features designed to reduce the threat of West Nile Virus (**Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features).			
Hard Rock Mining				

The major threat to GRSG habitats in populations occurring across WAFWA Management Zones II and VII is energy development, primarily oil and gas development and supporting infrastructure (USFWS 2013). **Resources/Resource Uses identified as threats to the Northwest Colorado populations of GRSG in the Conservation Objectives Team Report are identified with an asterisk***				
Resource/Resource Use	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Locatable Minerals	Various areas recommended for withdrawal/ currently withdrawn (mostly special designations). May be some overlap with GRSG habitat.	Alternatives B and C would propose a withdrawal from locatable mineral entry in PPH. Existing claims in PPH would be subject to validity exams.		No new proposed withdrawal from locatable mineral entry. Validity exams would be required in PPH in currently withdrawn areas.
Salable Minerals/Mineral Materials	Various areas closed to mineral material sales. May be some overlap with GRSG habitat.	Under Alternatives B and C, PPH would be closed to mineral material sales.		Existing mineral material sales sites could continue and potentially expand in PPH, subject to mitigation and the 5 percent disturbance cap in the Colorado MZs.
Summary of Impacts on GRSG from Hard Rock Mining	Alternatives B and C would be more protective to GRSG and GRSG habitat than Alternatives A and D. Effective mitigation for existing mining claims and mineral material sites is similar across all action alternatives. See the impacts from locatable minerals on GRSG section (page 4-87) and the impacts from salable minerals section to GRSG section (page 4-89) for a complete analysis.			
Hunting				
There is no resource program in an LUP for addressing this threat to GRSG and its habitat.				
Climate Change				
There is no resource program in an LUP for addressing this threat to GRSG and its habitat. However, the BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado include provisions for altering grazing management practices in response to drought conditions. In addition, several programs have contingency plans for management during drought conditions.				
Contaminants				
There are no management actions in this LUPA for addressing this threat to GRSG and its habitat. Regulations applied to mineral development and **Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features, include requirements and design features to prevent the potential threat of contaminants.				
Source: BLM 2013a				

4.4.3. Other Special Status Species of Issue

Special Status Terrestrial Wildlife

General Description

This section discusses impacts on special status terrestrial wildlife from proposed management actions of other resources and resource uses.

To analyze the potential impacts of the alternatives on special status terrestrial wildlife, information was gathered from inventories, recovery plans, conservation agreements, the Colorado Natural Heritage Program database, relevant scientific literature, and other sources identifying the potential distribution of these species in and next to the planning area. The analysis is also based on professional expertise of BLM/USFS specialists, BLM Colorado State Office specialists, CPW, and other professional organizations.

Methodology and Assumptions

General Impacts on Special Status Terrestrial Wildlife

General impacts on special status terrestrial wildlife are identical to those discussed in **Section 4.3.2**, Terrestrial Wildlife.

Assumptions

The following list presents basic assumptions about special status terrestrial species that apply to the impacts assessment for Alternatives A through D in this EIS.

- The BLM and the USFS are primarily responsible for managing habitat, whereas state and federal wildlife management agencies (the CPW and USFWS) primarily oversee management of special status species.
- All permitted activities that could affect federally threatened or endangered species would be required to undergo ESA Section 7 consultation with USFWS.
- Implementation-level actions would be further assessed at an appropriate spatial and temporal scale and level of NEPA analysis. Before any implementation-level activity, a special status species analysis or inventory would occur, in accordance with the NEPA, to determine if any such species would be present in the project area.
- The BLM/USFS would continue to manage special status fish and wildlife habitats in coordination with the CPW and USFWS.
- Activities that lead to the listing of a species would not be authorized (6840 – Special Status Species Management Manual).
- Management actions aimed at benefiting specific species can have adverse or beneficial impacts on other species.
- Disturbance during sensitive periods adversely impacts special status species.
- Federal oil and gas regulations prevent the BLM/USFS from being able to apply new or additional lease stipulations to existing leases. However, federal regulations do allow the BLM/USFS to apply other protection measures, in conjunction with planning and implementing oil and gas projects. These include applying stipulations consistent with the most recent LUPs as terms and conditions for discretionary approvals (e.g., ROW actions) and applying COAs to augment protections related to lease activities.
- The BLM/USFS will use best available information, management and conservation plans, and other research and related directives to guide wildlife habitat management on BLM-administered and National Forest System lands.

- Under all of the alternatives, proposed actions would comply with BLM Colorado Public Land Health Standard #3. Healthy, productive, and diverse plant communities support terrestrial wildlife communities that are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations and ecological processes; therefore, implementing management actions that contribute to maintaining the condition and quality of wildlife habitat would ensure that BLM Colorado Public Land Health Standard #3 would be met throughout the life of the plan amendment.

Direct and Indirect Impacts on Special Status Terrestrial Wildlife

Impacts from implementing management for the following resources or resource uses would be the same or similar to those discussed under Direct and Indirect Impacts on Terrestrial Wildlife and Direct and Indirect Impacts on Greater Sage-Grouse: travel and transportation management, recreation management, lands and realty management, wind energy development, solar energy development, range management, wild horse management, and ACECs.

Impacts from Fluid Minerals Management on Special Status Terrestrial Wildlife

In general, impacts on special status terrestrial species would be similar to those discussed under *Impacts from Fluid Minerals Management on Terrestrial Wildlife* and *Impacts from Fluid Minerals Management on Greater Sage-Grouse*. Those species more closely associated with sagebrush communities or whose ranges are largely coincident with PPH and PGH (e.g., Brewer's sparrow, and to a lesser extent white-tailed prairie dog, black-footed ferret, Western burrowing owl, and ferruginous hawk) would be expected to benefit from conservation measures designed to protect GRSG and sagebrush habitat under each alternative. These species would benefit from conservation measures designed to protect GRSG and sagebrush habitat under each alternative.

Conversely, excluding or avoiding development in GRSG habitats may lead to increased activity in other vegetation types (e.g., pinyon/juniper, mountain shrub, and aspen/spruce/fir). Special status species associated with these habitat types, such as northern goshawk, BLM-sensitive bat species, Canada lynx, and Columbian sharp-tailed grouse, may be adversely influenced to varying degrees, depending on alternative and development scenarios. Conservation measures designed to decrease or eliminate disturbance to sagebrush communities would reduce the indirect influences of fluid minerals development on those species more closely associated with sagebrush communities. In addition to COA's applied to special status raptor nests and important vegetation communities for migratory bird nesting (e.g., aspen and riparian communities), NSO and TL stipulations would be effective in allowing nesting activity to progress undisturbed during important reproductive timeframes.

Habitat improvement projects or off-site mitigation designed to reduce oil and gas-related impacts on GRSG and sagebrush habitat could both positively and negatively influence other wildlife species, depending on the vegetation communities involved. Habitat restoration projects designed to benefit GRSG would ostensibly benefit other sagebrush obligate species (particularly nongame mammals and birds). Modifying other community types (pinyon/juniper and mountain shrub) to promote sagebrush may adversely influence the species that rely on those vegetative types for food or for cover or nesting substrate. Impacts may vary, depending on scale. Prompt and effective reclamation practices would accelerate the restoration of lands disturbed by development, thus benefiting wildlife species in general by improving forage and cover resources (increased forb and perennial grass expression, reductions in annual invasive species and noxious weeds).

Impacts from Solid Minerals-Coal Management on Special Status Terrestrial Wildlife

Impacts from solid minerals development on special status terrestrial wildlife are the same or similar to those discussed under *Impacts from Solid Minerals-Coal Management on Terrestrial Wildlife*, *Impacts from Solid Minerals-Coal Management on Greater Sage-Grouse*, and *Impacts from Fluid Minerals Management on Special Status Terrestrial Wildlife*, above.

Impacts from Locatable Minerals Management on Special Status Terrestrial Wildlife

Impacts from locatable minerals development on special status terrestrial wildlife are the same or similar to those discussed in *Impacts from Locatable Minerals Management on Terrestrial Wildlife*, *Impacts from Locatable Minerals Management on Greater Sage-Grouse*, and *Impacts from Fluid Minerals Management on Special Status Terrestrial Wildlife*, above.

Impacts from Nonenergy Leasable Minerals Management on Special Status Terrestrial Wildlife

Impacts from nonenergy leasable minerals development on special status terrestrial wildlife are the same or similar to those discussed in *Impacts from Nonenergy Leasable Minerals Management on Terrestrial Wildlife*, *Impacts from Locatable Nonenergy Leasable Minerals Management on Greater Sage-Grouse*, and *Impacts from Fluid Minerals Management on Special Status Terrestrial Wildlife*, above.

Impacts from Salable Mineral Management on Special Status Terrestrial Wildlife

Impacts from salable minerals development on special status terrestrial wildlife are the same or similar to those discussed in *Impacts from Salable Mineral Management, Management on Terrestrial Wildlife*, *Impacts from Salable Mineral Management on Greater Sage-Grouse*, and *Impacts from Fluid Minerals Management on Special Status Terrestrial Wildlife*, above.

Impacts from Fuels Management on Special Status Terrestrial Wildlife

Direct Habitat Loss/Modification/Fragmentation from Fuels Management.

Depending on the extent, location, severity, and seral type affected, unplanned ignitions would have short-term impacts on special status wildlife species. It would do this by removing or degrading habitat for some species, injuring or killing slow-moving species, causing habitat avoidance and changes in species movement patterns, or reducing population viability and increasing the contribution to the need to list a species. In areas that are available for fuels treatments, changes in vegetation can result in negative impacts on special status wildlife species, such as direct habitat loss, habitat fragmentation, and disruption to species; however, it can also result in beneficial impacts, such habitat restoration.

A concern of resetting vegetation seral stage through fuels management is the invasion of undesirable plant species. Noxious and invasive weeds are often of lower value to wildlife and degrade wildlife habitat by reducing optimal cover or food. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds. Cheatgrass invasion is also a threat to some treatment areas. Invasive nonnative plants with little or no forage value for special status wildlife species are increasing in some areas. The greatest impacts have occurred on winter range areas with low precipitation rates. Not only can invasive species outcompete most native plants when moisture is limited, they can also change site-specific fire ecology and result in the loss of critical shrub communities. Cheatgrass may provide some short-term forage benefits to special status wildlife species while in early stages of growth; however, it lacks the ability to provide high quality forage during most of the year.

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

Disruption Impacts.

The noise from heavy equipment and chainsaws could temporarily disperse bird species from breeding and nesting habitat and wildlife from occupied habitat. Prescribed burning could also disturb nesting bird species, as the result of smoke inadvertently drifting into occupied habitat. These activities could remove suitable habitat or other desirable vegetation. Disturbances from heavy equipment, chainsaws, and prescribed burning would be localized and short term. Most wildlife species would move into adjacent untreated areas; however, direct mortality during the vegetation treatments is possible. TLs (such as those for big game birthing areas, raptor nesting, and big game winter habitat), as well as site-specific COAs (such as TLs for migratory bird nesting), could mitigate the short-term impacts resulting from the treatments.

ESR treatments following a wildfire are effective in restoring wildlife habitat, but equipment is often noisy, and noise may alter animal behavior or cause wildlife to leave an area during the disturbance. These impacts would be short term and are not likely to have much effect on the long-term health and habitat use of wildlife in the treatment area.

Habitat Protection.

Although both planned and unplanned wildland fire adversely impacts wildlife habitats in the short term by removing vegetation and disturbing soil, the long-term benefits of wildland fire often outweigh the short-term adverse impacts. For example, prescribed fire can be used to restore conditions benefiting wildlife species favoring early plant succession stages and young age classes of woody plants (McAninch et al. 1984). Prolonged fire suppression has allowed fuels to build up to the point that an unplanned wildfire is likely to be much larger and greater in intensity.

Some wildlife species thrive on the occurrence of fire. The herbaceous and woody plants that establish following a burn provide abundant foliar tissue and seeds, which are used by small rodents and birds that in turn are important prey for a variety of avian and mammalian predators. Over the short term, the wildlife community is changed dramatically by a fire, as taller and denser vegetation is replaced by a more open habitat. As the area gradually recovers, however, many of the pre-fire components become reestablished, and the area again supports a community associated with denser forests. This cycle may take decades or centuries, depending on the dominant plant species, or it might never occur if climatic conditions are no longer suitable for the former dominants.

Wallmo (1980) suggests that fire improves the palatability of forage and causes browse plants to resprout close to the ground, putting the current season's growth within reach of deer for several years. Additionally, wildland fire can improve the quality of wildlife habitat by releasing soil nutrients, reducing fuel load, or setting back trees encroaching into shrubland or grassland habitats.

Fuels treatments could be beneficial for species that depend on younger seral stages. In the long term, wildlife would benefit from most wildfires and fuels management due to an increase in

vegetation productivity and to increased plant diversity and age classes, which would, in turn, provide additional forage, cover, and prey base.

Mimicking natural periodic disturbance is often necessary in order to stimulate plant productivity, increase diversity, and increase nutritional value. Foraging opportunities for big game and other herbivores would increase as understory grasses, forbs, and shrubs reestablish. The benefits for mule deer and elk are likely to be long term. Directly following application of fire there is generally more palatable browse available for wild ungulates. Improving vegetation in upland areas would provide more forage to big game species and other herbivorous species that occur in these areas and would result in direct beneficial impacts. In addition, fuels treatments in upland areas often increase forage production, which diverts livestock and wildlife use from riparian and wetland areas, thereby increasing the vigor and structural diversity of these plant communities.

Following a wildfire, ESR is implemented to protect and conserve habitats that have sustained damage or degradation from catastrophic wildfire. Typically these activities are beneficial for special status wildlife species and are designed to improve the overall condition of the area, which in turn improves habitat for wildlife. For example, weed-free seeding would stabilize soil and reduce the spread of noxious weeds. Additionally, replacing organic matter in disturbed areas would protect topsoil and provide a suitable bed for the restoration of a native vegetative community.

Summary of Impacts by Alternative

Alternative A would have the fewest restrictions for fuels management actions and the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize habitat restoration beyond what has already been determined in the fire management plans for the area; therefore, Alternative A would have the greatest impact on special status wildlife.

Alternative B is more restrictive than Alternative A, though all of the restrictions fall within PPH; therefore, impacts from fuels management on special status wildlife are expected to be less than Alternative A, but only within PPH. Additionally, Alternative B would prioritize fire operations in PPH and PGH immediately after life and property; therefore, the potential for disturbance to special status wildlife species within these habitats is lower under Alternative B than Alternative A. The greatest amount of benefit under Alternative B would be provided to those species whose ranges overlap PPH. There is potential to negatively influence those special status species that use other habitat types.

Alternative C would prioritize fire operations in PPH immediately after life and property; therefore, the potential for disturbance to special status wildlife within PPH is the same as Alternative B but less than Alternative B in PGH. With regard to fuels management. Alternative C is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management on special status wildlife species are expected to be less than Alternative B. Conversely, Alternative C does not offer as many protective management actions that could benefit special status wildlife as Alternatives B and D; therefore, it has more potential for habitat degradation than the other alternatives. However, the greatest amount of benefit under Alternative C would be provided to those species whose ranges overlap ADH. There is potential to negatively influence those special status species that use other habitat types.

Alternative D would give priority to fire operations in PPH and PGH, immediately after firefighter and public safety, but only after the BLM/USFS considers other resource values that it manages and determines if an exemption is warranted. With regard to fuels management, Alternative D

is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management on special status wildlife are less than Alternative B. Concurrently, Alternative D offers the same protective measures as Alternative B but applies them to ADH; therefore, it has the potential for more benefits to special status wildlife species than Alternatives B and C.

Impacts from Habitat Restoration Special Status Terrestrial Wildlife

Direct Habitat Loss/Modification/Fragmentation from Habitat Restoration. Depending on the extent, location, treatment, and seral type affected, habitat restoration would have short-term impacts on special status wildlife species. It would do this by removing or degrading habitat for some species, injuring or killing slow-moving species, causing habitat avoidance and changes in species movement patterns, or reducing population viability and increasing the contribution to the need to list a species. In areas that are available for habitat restoration, changes in vegetation can result in negative impacts on special status wildlife species, such as direct habitat loss, habitat fragmentation, and disruption to some species; however, it can also result in beneficial impacts, such long-term habitat restoration for others. For example, the removal of encroaching pinyon and juniper is beneficial for sagebrush-dependent species, but it has negative impacts on pinyon- and juniper-dependent species.

A concern associated with habitat restoration is the invasion of undesirable plant species from the soil being disturbed. Noxious and invasive weeds are often of lower value to wildlife and degrade habitat by reducing optimal cover or food. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds. Cheatgrass invasion is also a threat to some treatment areas. Invasive nonnative plants with little or no forage value for big game species are increasing in some areas. Not only can invasive species outcompete most native plants when moisture is limited, they can also change site-specific fire ecology and result in the loss of critical shrub communities.

Disruption Impacts.

The noise from heavy equipment and chainsaws could temporarily disperse bird species from breeding and nesting habitat and wildlife from occupied habitat. Disturbances from heavy equipment, chainsaws, and prescribed burning would be localized and short term. Most wildlife species would move into adjacent untreated areas, but direct mortality during the vegetation treatments is possible. TLs (such as those for big game birthing areas, raptor nesting, and big game winter habitat), as well as site-specific COAs (such as TLs for migratory bird nesting), could mitigate the short-term impacts resulting from the treatments.

Habitat Protection.

Removing nonnative species and vegetation from habitats that support special status wildlife populations would likely provide some degree of benefit to most special status species that occur on public lands. It would do this by creating more native habitat conditions and reducing the likelihood of a future catastrophic wildfire. The degree of benefit to special status wildlife would depend, in large part, on the habitat needs of the species and its ability to avoid a fire.

Nonnative plant species reduce the suitability of some habitats to support special status wildlife species. Some species require, or at the very least prefer, certain plants as food. Encroachment of nonnative plant species and displacement of native plant species that serve as important sources of food reduce the suitability of the habitat for these wildlife species. For these species, vegetation

treatments would likely provide a long-term benefit to habitat and could improve the suitability of other areas, potentially creating additional habitat into which the population could expand.

For some special status wildlife species, it is the structure, rather than the species composition of the habitat, that makes it suitable. For example, the southwestern willow flycatcher occurs in riparian areas with dense growths of deciduous shrubs and trees (USFWS 1995). In some cases, invasive plant species alter the structure of habitats, making them less suitable for supporting sensitive wildlife species (e.g., the encroachment of pinyon and juniper into GRSG habitat). For these species, treatments to control weed infestations would likely provide a long-term benefit. In other cases, nonnative plant species may invade an area without making drastic structural changes. In such cases, the suitability of the habitat, though not ideal, is maintained (e.g., thickets of salt cedar and Russian olive providing nesting habitat for the southwestern willow flycatcher). For these species, vegetation treatments may result in some improvement of habitat, but the long-term benefits may not outweigh the short-term risks to the species associated with certain treatment methods.

Summary of Impacts by Alternative.

Alternative A would have the fewest restrictions for habitat restoration actions, with the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize habitat restoration and restoration guidelines beyond what has already been determined in the LUPs for the targeted areas; therefore, Alternative A would have the greatest impact on special status wildlife species.

Alternative B is more restrictive than Alternative A, so impacts from habitat restoration on special status wildlife species are expected to be less than Alternative A. Additionally, Alternative B provides guidelines that are specific to the restoration of sagebrush for GRSG; therefore, Alternative B would have more impacts on those special status species that have different or contrary habitat requirements.

Alternative C is more restrictive than Alternative B, so impacts from habitat restoration on special status wildlife species are less than Alternative B. Additionally, Alternative C provides guidelines that are specific to the restoration of sagebrush for GRSG, so it would have more impacts on those special status species that have different or contrary habitat requirements.

Alternative D is more restrictive than Alternative A but less than Alternatives B and C. Alternative D offers habitat restoration guidelines but offers exemptions for other resources valued by the BLM/USFS; therefore, there is potential for less impact on special status species for Alternative D from the habitat restoration guidelines than from Alternatives B and C.

Impacts from ACEC/Zoological Area Management on Special Status Terrestrial Wildlife

Impacts from ACECs on special status terrestrial wildlife are the same or similar to those discussed under *Impacts from ACEC/Zoological Area Management on Terrestrial Wildlife* and *Impacts from ACEC/Zoological Area Management on Greater Sage-Grouse*.

Summary of Impacts on Special Status Terrestrial Wildlife

Alternative A provides the least amount of protection for special status terrestrial wildlife in the planning area. It puts very few restrictions on development, which could result in the most modification of the landscape, and consequently, the most special status terrestrial wildlife.

Alternative B provides a greater level of protection for special status terrestrial wildlife than Alternative A, but would provide a lower level of protection than Alternative C.

Alternative C would provide the most protection for special status terrestrial wildlife. The most restrictions would be placed on development under Alternative C, which would afford the most protection for special status terrestrial wildlife.

Alternative D would provide more protection for special status terrestrial wildlife than Alternative A but would provide less protection than Alternatives B and C. More flexibility for development is built into Alternative D, which could result in higher levels of development than Alternatives B and C.

Special Status Plant Species

General Description

This section discusses impacts on vegetation from proposed management actions of other resources and resource uses.

To analyze the potential impacts of the alternatives on vegetation, information was gathered from inventories, the Colorado Natural Heritage Program database, relevant scientific literature, and other sources identifying the potential distribution of vegetation in and next to the planning area. The analysis is also based on professional expertise of BLM/USFS specialists, BLM Colorado State Office specialists, CPW, and other professional organizations.

Methodology and Assumptions

General Impacts on Special Status Plant Species

Indicators of impacts on special status plant species and the measurements used to describe the impacts (where available or appropriate) are described below:

Direct Mortality. Distributions of special status plants across the landscape vary in number and in the number of plants per occurrence. In small occurrences, loss of a portion of the plants can compromise: loss of occurrences can compromise species viability.

- Number of plants lost
- Number of occurrences suffering mortality

Direct Habitat Loss. Direct habitat loss results when habitat is destroyed or converted to a form that is unsuitable for the impacted species. Direct habitat loss can be short term or permanent. Short-term habitat loss can coincide with habitat improvement projects, such as removal of encroaching junipers in sagebrush habitats. In general, because special status plants have very specific habitat requirements, any habitat disturbance that alters any required habitat constituent for a particular species will result in habitat loss. Whether habitat loss is short-term or long-term, habitat occupied at the time of loss will coincide with direct mortality to plants and potential extirpation of special status plant occurrences.

- Acres of habitat lost, both short-term and long-term

Habitat Degradation and Disruption to Species. Habitat degradation occurs as an indirect effect of ground-disturbing activities, including roads, trails, power lines, well pads, and pipelines. The

area of potential habitat degradation is generally identified as the project impact zone around the area of disturbance. Disturbance factors resulting in habitat degradation include increased dust levels, invasive species establishment and spread, and herbicide drift. Another factor is foot and vehicle trampling and crushing from increased accessibility provided by ground-disturbing activities. The width of the impact zone varies depending on the type of ground-disturbing activity, but for purposes of this analysis, it is assumed to be 300 meters (984 feet) from the edge of ground disturbance. Within this impact zone, numerous impacts on plants can occur. This does not necessarily result in immediate plant mortality or loss of habitat, but it reduces rare plant success and viability over time. These impacts include alteration of light and availability of water; alteration of temperatures on plants at the microsite level; increased dust levels on leaf surfaces; alteration of soil properties, such as pH, salinity, nutrient availability, mycorrhizal, microbial communities, and organic matter; alterations of herbivory patterns; competition from invasive species; impacts from herbicide use to control invasive species; alteration of fire regimes; shifts in competitive advantage to more aggressive native plant species within the overall plant community; and habitat fragmentation. Little is known about the ecophysiology (the science of the interrelationships of organisms and their environment) of most special status plant species; because of this, exact environmental needs and how plants might respond to subtle alterations of their environments are generally unknown. These impacts can be assessed at a plant occurrence level, by quantifying plant occurrence changes over time. They can also be addressed at the larger scale of habitat degradation.

- Acres within both a 300-meter (984-foot) zone around ground-disturbing activities and within a 300-meter (984-foot) buffer of special status plant occurrences or suitable special status plant habitat
- Number of invasive species occurrences and the number of acres infested within 300 meters (984 feet) of special status plant occurrences
- Percent reduction in population numbers over time
- Percent reduction in reproductive capability over time, measured as percent reduction in both viable seed set and in new shoots from vegetative reproduction
- Reduction in area of occupied habitat over time

Pollinator Habitat Fragmentation and Loss. Habitat fragmentation occurs when contiguous habitat is broken into smaller blocks by surface-disturbing activities, and distances between suitable habitat patches increase. Because pollinators fly only limited distances, they are less likely to use small and isolated patches of habitat, and habitat fragmentation can effectively isolate pollinators from special status plant occurrences. Habitat fragmentation occurs concurrently with habitat loss. As suitable habitat for pollinators decreases in proximity to special status plants that depend on these pollinators for reproduction, plant reproductive success and genetic diversity decrease. This can result in reduced viability at the plant occurrence level and potentially at the species level for species with few occurrences.

- Acres of pollinator habitat lost within buffer zones around plant occurrences. Buffer width will vary depending on the individual plant species and its potential pollinators.

Habitat Restoration. Habitat restoration can result from vegetation management projects, restoration of hydrologic function, removal of invasive species, restoration of historic fire regimes, alteration of grazing management, or other methods. However, any habitat restoration

project for special status plants must be designed specifically for the individual plant species and its specific habitat and site conditions. Generalized habitat restoration projects that do not focus on special status plant needs can have negative impacts on these species.

- Acres of habitat improved for special status plants

Habitat Protection.

- Acres protected through stipulations, withdrawals, closures, or special designations (e.g., ACECs).

Assumptions

The following list presents basic assumptions related to special status plants that apply to the impacts assessment for Alternatives A through D in this EIS.

- The BLM and USFS are responsible for managing both habitat and occurrences of special status plants.
- Any special status plant habitat disturbance, unless specifically designed for a particular special status plant species under specific circumstances, would be detrimental to special status plants. This includes sagebrush habitat improvement projects, such as juniper removal, mastication, and prescribed fire which might have long-term positive impacts but would result in special status plant mortality and habitat degradation in the short term.
- Disruption of any component of a species habitat would be detrimental, with the degree of detriment dependent on the type, intensity, time of year, and extent of the disruption, as well as on the plant species affected. This can also include the disruption of natural disturbance patterns, to which special status plant species may be adapted.
- Different special status plant species grow in different types of habitats, so the relative risk of any given activity or project will vary for each plant species. See **Table 4.3**, Known Threatened, Endangered, and Sensitive Plant Species Occurrences within GRSG PPH, PGH, and Linkage/Connectivity Areas, and within a 300-meter Buffer of these GRSG Habitats, and **Table 4.4**, Habitats for Special Status Plant Species within the Planning Area, Grouped by Habitat Guilds, for a summary of planning area special status plant species and their habitats.
- The exact locations of future surface-disturbing activities cannot be predicted at the programmatic EIS level.
- Unsurveyed potentially suitable habitat for special status plant species occurs within and next to the identified GRSG PPH, PGH, and linkage/connectivity areas. Exact locations of all special status occurrences and acreage of habitat existing for each special status species are unknown.
- Significant plant communities identified by the Colorado Natural Heritage Program are present within the analysis area and may be impacted by GRSG management. Potential impacts on these significant plant communities are not analyzed in this document due to inadequate data from field offices.
- Special status plant surveys would be conducted at the appropriate time of year for plant identification before any project that could impact any special status plant species or its habitat. In instances where surveys cannot be performed, such as in years when annual

species do not appear due to annual climatic variability, the presence of special status plant species would be assumed in all potentially suitable habitats, and appropriate conservation measures and protections would be implemented. Section 7 consultations with USFWS would be conducted for any projects with the potential to impact any federally listed plant species. GRSG PPH and PGH areas overlap areas of designated critical habitat for two federally listed plant species, Parachute penstemon and DeBeque phacelia.

- The BLM/USFS would use the best available science, information, conservation assessments, and related directives as appropriate to guide special status plant management on BLM-administered and National Forest System lands.

- COAs and siting conditions would be applied to all projects located near special status plant occurrence sites inside and outside the planning area. NSOs would be applied to all federally listed plant occurrences inside and outside the planning area and to sensitive plant occurrences, to the degree possible.

- If management actions (e.g., grazing, energy development, and travel/recreation) are excluded from PPH and PGH, development would occur with increased concentration in non-sagebrush habitats (e.g., barrens, desert shrub, pinyon/juniper, mountain shrub, and spruce-fir), with potential adverse impacts on species that inhabit these habitat types.

- Federal oil and gas regulations prevent the BLM/USFS from applying new lease stipulations or additional lease stipulations to existing leases. However, federal regulations do allow the BLM/USFS to apply other protection measures in conjunction with planning and implementing oil and gas projects. These include applying stipulations consistent with the most recent LUP as terms and conditions for discretionary approvals (e.g., ROW actions) and applying COAs to augment protections related to lease activities. The latter include requirements for exclosure or temporary construction fencing, botany monitors during construction, implementation of dust abatement, site-specific reclamation, weed control with restrictions on herbicide use, and restoration of special status plant species through nursery propagation.

Direct and Indirect Impacts on Special Status Plant Species

Impacts from Travel Management on Special Status Plant Species

Travel management designates certain areas as closed to motorized vehicle use, open to OHV use, vehicle use limited to existing routes, vehicle use limited to existing routes with seasonal closures, and vehicle use limited to designated routes. The analyzed alternatives include variations from the existing travel management conditions to generally include greater limitations on motorized travel within GRSG habitat, permanent or seasonal road or area closures, limitations on new route construction and realignments, varying restrictions on upgrading existing routes, and restoration of undesignated routes.

Direct Mortality

Motorized vehicle use can result in direct mortality to special status plants due to crushing, uprooting, or gradual starvation of plant resources as plants try to recover from repeated vehicle damage. Travel management actions that stop or restrict motorized vehicle use could reduce the risk of direct mortality to special status plants in areas where these plants are present. Upgrading or realigning routes and constructing new routes could result in direct mortality if special status

plants were present. Restoring routes would have a low probability for direct mortality, but drill seeding closed routes could crush special status plants if they are present, with a slight risk of direct mortality.

Alternative A-Under the no action alternative, travel management would continue as described in the corresponding field office LUPs. Any direct mortality risks from motorized vehicles would remain unchanged. Because areas of unrestricted cross-country OHV use are permitted under this alternative, it would have the greatest risk of direct mortality to special status plants, particularly those species in habitats where unrestricted motorized use is allowed.

Alternative B-Under Alternative B, motorized travel would be restricted to existing roads, primitive roads, and trails. The need for permanent or seasonal closure of these existing routes would be evaluated. Constructing new routes or upgrading routes would be limited to areas where necessary for safe access to existing ROWs. For any new disturbance exceeding 3 percent for a given habitat area, mitigation would be required to offset loss of GRSG habitat. Undesignated routes would be restored using appropriate seed mixes, and the use of transplanted sagebrush would be considered. Because this alternative would reduce the area within GRSG habitat where direct mortality from motorized vehicles could occur, this alternative would likely have a reduced risk of direct mortality for special status plants within the PPH, PGH, and linkage/connectivity areas. This would be particularly true for those plants growing in sagebrush and pinyon/juniper habitats. However, it could divert motorized vehicle traffic to sites outside of GRSG habitat and increase the direct mortality risk to special status plant species growing in other habitats.

Alternative C-Alternative C is similar in design and potential direct mortality impacts as Alternative B; however, it would prohibit new road construction within 4 miles of active GRSG leks and would avoid new road construction in occupied GRSG habitat. All existing routes would be upgraded only when necessary for motorist safety. These additional restrictions could provide greater protections to special status plants in sagebrush habitats but could shift the potential mortality risk to species growing in other habitat types.

Alternative D-Alternative D is also similar to Alternative B, except that it has less stringent restrictions on new road construction and road upgrades and allows new disturbance to occur up to a 5 percent disturbance cap without mitigation. This alternative could have a greater risk of direct mortality on special status plants growing in sagebrush habitats, relative to Alternatives B and C.

Direct Habitat Loss

Constructing new roads or rerouting existing roads results in direct habitat loss whenever there is potential habitat for a special status species along the route. Cross-country vehicle use can also result in direct habitat loss where vehicles are repeatedly driven across plant habitat, resulting in vegetation loss. The potential for direct habitat loss is therefore contingent on the probability for new road construction or increased cross-country vehicle use resulting in vegetation loss.

Alternative A-Under Alternative A, travel management would continue as described in the corresponding field office LUPs. Direct habitat loss could occur from new road construction. Because areas of unrestricted cross-country OHV use are permitted under this alternative, it would have the greatest risk of direct habitat loss for special status plants. This would be particularly true for those species with habitats in areas where unrestricted motorized use is allowed.

Alternative B-Under Alternative B, motorized travel would be restricted to existing roads, primitive roads, and trails. The need for permanent or seasonal closure of these existing routes

would be evaluated. Constructing new routes or upgrading existing routes would be limited to areas where necessary for safe access to existing ROWs. For any new disturbance exceeding 3 percent for a given habitat area, mitigation would be required to offset loss of GRSG habitat. Undesignated routes would be restored using appropriate seed mixes, and the use of transplanted sagebrush would be considered. Because this alternative would reduce the area within GRSG habitat where direct habitat loss from motorized vehicles could occur, this alternative would likely have a reduced risk of direct mortality for special status plants within the PPH, PGH, and linkage/connectivity areas. This would be particularly true for those growing in sagebrush to pinyon/juniper habitats. However, it could divert motorized vehicle traffic to sites outside of GRSG habitats and increase the direct habitat loss risk for special status plant species growing in other habitat types.

Alternative C-Alternative C is similar in design and potential direct mortality impacts to Alternative B; however, it would prohibit new road construction within 4 miles of active GRSG leks and would avoid new road construction in occupied GRSG habitat. All existing routes would be upgraded only when necessary for motorist safety. These additional restrictions could provide greater protections to special status plants in sagebrush habitats, but they could shift the potential habitat loss risk to species growing in other habitat types.

Alternative D-Alternative D is also similar to Alternative B, except that it has less stringent restrictions on new road construction and road upgrades and allows new disturbance to occur up to a 5 percent disturbance cap without mitigation. This alternative could have a greater risk of direct habitat loss for special status plants growing in sagebrush habitats, relative to Alternatives B and C.

Habitat Degradation and Disruption to Species

Impacts of vehicles on established roads or trails can impact many ecological components of plant habitats. Increased dust levels from road traffic, particularly on dirt and gravel roads, can negatively impact plants by clogging openings in the leaves, impeding gas exchange, and reducing the ability of plants to take in carbon dioxide. Dust on the leaf surface can also effectively reduce light availability at the leaf surface. Light and carbon dioxide are both critical for plants to conduct photosynthesis, and reductions in either can reduce the quantity of carbohydrates plants can produce through photosynthesis, thereby reducing plant growth and seed production. Dust on leaf surfaces can also facilitate plant tissue uptake of toxic pollutants (Farmer 1993; Sharifi et al. 1997; Thompson et al. 1984).

However, the degree of impact from dust on leaf surfaces is not always measureable in some individual plant species and under some circumstances (Wijayratne et al. 2009). Dust can also affect snowmelt patterns and resulting hydrology and soil moisture availability, can alter soil pH and nutrient availability, and can result in plant community composition changes (Angold 1997; Auerbach et al. 1997; Field et al. 2010; Gieselman 2010; Johnston and Johnston 2004). Roads and their traffic provide both habitat and transport for noxious weeds and other invasive nonnative plants (Gelbard and Belnap 2003; Larson 2003; Parendes and Jones 2000; Schmidt 1989; Zaenepoel et al. 2006). These nonnative species can negatively impact special status plants, both directly through competition for resources and indirectly through alteration of soil microbial communities (Hierro et al. 2006; Klironomos 2002; Reinhart and Callaway 2006; Vogelsang and Bever 2009).

Herbicide treatments of noxious weeds can also result in negative impacts on or mortality of special status plants if they are collocated (BLM 2007). Impacts from cross-country vehicles

include those associated with vehicle use on established routes. But the degree of these indirect impacts would depend on the amount of vehicle traffic in any given area. Vehicles also provide access for recreation, such as camping, hunting, and hiking. This could have indirect impacts on special status plants farther away from roads. This could result in smashing, trampling, introducing nonnative species, and compacting soil from recreation near roads. This increase in recreation facilitated by roads could also increase the risk of wildfires from campfires or from sparks generated by vehicles or by camping or wood-cutting equipment. Road closures and subsequent seeding can have both positive and negative impacts on special status plants, depending on the type of vegetation establishing after closures. Use of aggressive nonnative grass species, or even aggressive native grass species, can have negative impacts on special status plants.

Alternative A-Disruption of special status plant species would differ in areas where motorized vehicles remain on established roads and trails and in areas where they are allowed to travel cross country. Potential impacts on particular special status plant species would be contingent on the proximity of roads and cross-country vehicles to plants, road size and amount of traffic, season of use, amount and type of recreation, and individual species and their specific habitat types and ecologies.

Alternative B-Under Alternative B, closing cross-country vehicle use areas within GRSG habitat would reduce the potential for indirect vehicle impacts on special status plants and their habitats within these areas. However, it could increase vehicle use on existing routes. Since habitat degradation and disruption of special status plant species can increase with increased intensity of nearby vehicles, potential impacts on special status plant occurrences near established routes, or outside of sagebrush habitats, could increase. The types of impacts described under the Alternative A would also occur under Alternative B; however, the distribution of these impacts could shift. Route closures under this alternative would be reseeded using appropriate seed mixes, and the use of sagebrush would be considered.

However, this alternative does not specify that only native species would be seeded. This leaves open the possibility that aggressive nonnative grass species could be used for restoration, and these would have a negative effect on special status plant habitats. Again, actual impacts on special status plants would depend on proximity of plants to motorized vehicles and on the intensity and season of vehicle use.

Alternative C-Under Alternative C, the types of potential impacts on special status plants are the same as for Alternatives A and B; however, this alternative proposes greater protections from roads within a 4-mile buffer around leks. This could provide greater protections for sagebrush habitat plant species but could also shift negative motorized vehicle impacts and cause them to increase in other habitat types. For restoration of closed routes, this alternative specifies that appropriate native seed mixes would be used, as well as transplanted sagebrush. This would reduce the risk of negative impacts on special status plants.

Alternative D-Under Alternative D, the types of potential impacts on special status plants are the same as for the other three alternatives. However, this alternative would allow for increased road construction and would result in roads being constructed to a higher standard. It would also leave open the possibility of seeding restored routes with nonnative species. Impacts on special status plants would be contingent on how near they are to roads and on road size and amount of traffic. Because of this, Alternative D could result in greater negative impacts on special status plants within sagebrush habitats but potentially fewer impacts on plants growing in other habitat types, relative to Alternatives B or C.

Pollinator Habitat Fragmentation and Loss

The importance of pollinator habitat impacts on special status plants varies considerably between individual plant species. For such species as DeBeque phacelia, which appears to be self-pollinated, impacts on pollinator habitat would have no effect. However, most special status plant species are pollinated by insects, including bees, wasps, ants, flies, butterflies, and beetles. For many special status plant species, the pollinator species are unknown (Winder 2012). Pollinators depend on both appropriate floral communities and on appropriate nesting habitat, and these habitat requirements are often naturally fragmented even in undisturbed sites. However, many pollinators show fidelity to specific habitats, and if these sites become isolated from contiguous habitat by disturbances such as roads, pollinators may be reluctant to cross these barriers to other habitats (Bhattacharya et al. 2002; Osborne and Williams 2001). Roads and vehicles can negatively impact pollinators by creating barriers, by removing habitat during road construction, and by direct mortality through collisions. Fragmentation of pollinator habitat can result in reduced cross-pollination between occurrences of special status plants, with the associated potential for loss of genetic diversity and the associated potential loss of species viability.

Alternative A-Under the No Action Alternative, negative impacts of roads and cross-country vehicles on pollinators would continue. Impacts from cross-country vehicles would likely be less than those from established roads, except in areas where cross-country traffic results in extensive vegetation loss.

Alternative B-Under this alternative, impacts are similar to Alternative A, but any negative impacts from cross-country traffic would be eliminated within GRSG habitat. Restrictions on new road development would also reduce the potential for negative impacts on pollinators within sagebrush habitats.

Alternative C-This alternative would have similar impacts on pollinators as Alternative B.

Alternative D-This alternative would have similar impacts on pollinators as under Alternatives B and C. However, it would have a somewhat greater risk of pollinator habitat fragmentation and loss due to more lax restrictions on new road construction.

Habitat Restoration

Habitat restoration for special status plants could result either from projects specifically designed for particular special status plant habitats or as an indirect effect of other management actions, such as road closures. However, a management action that might be beneficial for a general habitat type would not necessarily be beneficial to special status plant species, since these species usually have very specific habitat requirements.

Alternative A-There would be no special status plant habitat restoration in the context of travel management under this alternative.

Alternative B-There would be some potential for special status plant habitat restoration through the closure of routes within GRSG habitats. However, this restoration would be contingent on the proximity of the restoration site to special status plant habitat and on the particular plant species seeded in the restoration.

Alternative C-This alternative would have some potential for special status plant restoration, contingent on location and species seeded. However, this alternative would require native species

for seeding, which would make it somewhat more likely to restore special status plant habitat within sagebrush areas.

Alternative D-This alternative would have a slightly reduced potential for restoration of special status plant habitat relative to Alternative B since it places less emphasis on route closures and does not specifically state that only native species would be used for restoration seeding.

Impacts from Recreation Management on Special Status Plant Species

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species/Pollinator Habitat Fragmentation and Loss

While recreation management in general is a complex area with numerous potential impacts on special status plants, the current analysis addresses only recreation special use permitting and seasonal camping prohibitions within 4 miles of active GRSG leks. Permitted uses include SRPs and USFS recreational SUAs. These activities are typically larger organized recreational groups and include competitive and noncompetitive events and commercial outfitting services. SUPs can include specific COAs to protect special status plants when appropriate.

Recreational use, particularly by large groups, can result in direct mortality to plants from trampling, uprooting, smashing under tents or other recreation equipment, or other forms of direct damage. The risk of direct mortality generally increases as the size of the recreational group increases, but varies depending on the particular activity, its location, and the plant species potentially impacted. For example, a riparian species, such as Ute lady's tresses, would have a greater potential of impact from commercial river rafting than an upland species, and a prickly species, such as Colorado hookless cactus, would likely have a lower risk of being smashed under a tent than a softer textured species. Indirect impacts from these recreation activities can be similar to those described in more detail under travel management. This is because most recreation involves motorized vehicles to access sites, and for some activities, motorized vehicles are integral to the activity itself.

Alternative A-Under this alternative, SRPs and SUAs would continue to be issued on a case-by case basis. The potential for negative impacts on special status plants or their habitats would depend on the types and locations of the permitted activities and the degree to which protections for special status plants were addressed in each case.

Alternative B-Under this alternative, any SRPs or recreational SUAs issued within PPH would be required to have a neutral or positive effect on this habitat. This could reduce the potential for negative impacts on special status plants or their habitats within the PPH. Otherwise, the impacts would be identical to Alternative A.

Alternative C-This alternative is identical to Alternative B, except that it would also seasonally prohibit camping within 4 miles of active GRSG leks. Potential negative impacts on special status plants and their habitats would be slightly reduced for those species occurring within 4 miles of active leks, relative to the other alternatives.

Alternative D-This alternative would have potential negative impacts on special status plants and their habitats equivalent to those of Alternative B.

Impacts from Lands and Realty Management on Special Status Plant Species

This heading addresses utility ROW exclusion and avoidance areas, withdrawal of lands from mineral activity, and retention or disposal of public lands. Developing new ROWs or burial of existing overhead facilities result in ground disturbance, while restricting new ROWs to existing disturbances can reduce the total acreage of disturbance. Retaining lands under federal ownership provides greater protections for special status plants. Projects with potential impacts on federally listed plants require Section 7 consultation with USFWS when plants are located on federally owned lands or when the project involves accessing federal minerals. Similarly, sensitive plants growing on federal lands or on nonfederal surface overlying federal minerals receive protections based on agency policies and regulations. Because the State of Colorado has no protections for rare plants, special status plants not connected to federal lands or minerals have no protections within the state; therefore, disposal of federal lands with special status plant occurrences on them would result in loss of protections for these plants.

Direct Mortality/Habitat Loss/Habitat Degradation and Disruption to Species/Pollinator Habitat Fragmentation and Loss

Developing ROW exclusion and avoidance areas, relocating utility corridors outside of PPH, burying existing overhead facilities, and constructing new road, ditch, or other non-utility ROWs would have impacts similar to those addressed more fully under travel management and minerals management. Ground disturbance from utility line installation, particularly buried utilities, is similar to new road construction and pipeline construction from oil and gas development. LUPs, the ESA, and agency policies and regulations protect special status plant species when ground-disturbing activities occur on federal lands or in association with federal minerals. If federal lands are transferred to nonfederal ownership, these protections are lost, resulting in a much greater risk of mortality, habitat loss, habitat degradation, and disruption to species and pollinators.

Habitat Restoration/Habitat Protection

Restricting development of utility or non-utility ROWs in PPH would increase habitat protection for special status plant species in sagebrush habitats. However, this could shift potential negative impacts from sagebrush habitat plant species to those special status species occurring in other habitats. Reclamation of habitat immediately following utility installation would help to protect any nearby special status plants or habitat from noxious weed establishment and would be beneficial for these species, as appropriate native plant species are used. Retention of lands in federal ownership continues to provide legal protections for special status plants. Acquisition of new federal lands that have special status plants or habitat, as well as GRSG habitat, would be beneficial for these species.

Summary of Impacts by Alternative All of the alternatives could negatively impact special status plant species. The variation among alternatives would have more to do with which special status species and habitats would be more likely to receive negative impacts.

Alternative A-Under Alternative A, ROW development and land acquisition and disposal would continue, in accordance with existing LUPs, which would cause the greatest impacts on special status plant species.

Alternative B-Alternative B could provide slightly greater protections for special status plants in GRSG habitats. It would limit total disturbance of these areas to 3 percent, would place new ROWs within existing disturbance to the extent possible, would propose lands within GRSG

habitat for mineral withdrawal, would place greater restrictions on disposal of public land parcels to protect GRSG habitat, and would promote acquisition of new lands to enhance GRSG habitat.

Alternative C-Alternative C is similar to Alternative B, but with slightly tighter restrictions to limit new disturbance, protect GRSG habitats, and retain federal land ownerships. These restrictions could affect only those special status plant species growing within GRSG habitat.

Alternative D-Alternative D has similar potential impacts on special status plants as Alternatives B and C; however, it would provide slightly lower protections for those species in GRSG habitats. This is because it would allow up to 5 percent disturbance within these habitats, would not propose any lands for mineral withdrawal, and would place fewer restrictions on disposal of isolated federal parcels and less emphasis on land acquisition for conservation, enhancement, or restoration of GRSG habitat.

Impacts from Wind Energy Development on Special Status Plant Species

In general, wind energy development would require compliance with existing LUPs. Restrictions on wind energy development are specifically addressed only under Alternative C.

Direct Mortality/Habitat Loss/Habitat Degradation and Disruption to Species

Wind energy development would result in ground disturbance impacts similar to those described under the mineral development impact analysis sections of this document. Potential impacts include those from dust, noxious weeds, herbicide application, and alterations of native plant community dynamics described in detail under *Impacts from Management of Travel and Transportation on Special Status Plant Species*. In addition, wind energy could have additional impacts on pollinators if windmill blades were to impact pollinator flight paths or result in pollinator mortality.

Habitat Restoration/Habitat Protection

Wind energy development would provide no benefits in and of itself for special status plant species. Closure of special status plant habitats to wind energy development would protect these plants and their habitats from this disturbance.

Summary of Impacts by Alternative. Alternative A-Under Alternative A the existing LUPs do no specifically address wind energy. Any wind energy development would be permitted in accordance with ROW allocations currently in place.

Alternative B-Alternative B does not specifically address wind energy development; therefore, under this alternative any wind energy development would be managed under the provisions of existing LUPs, and potential impacts on special status plants are identical to those under Alternative A.

Alternative C-Under Alternative C, wind energy development would not be sited within occupied GRSG habitat. This alternative would provide greater protections for special status plant species in occupied GRSG habitat. It would have no additional benefit for special status plant species outside of occupied GRSG habitat. It could increase the potential for negative impacts on these other plants if it were to shift wind energy development from GRSG habitats to other special status plant habitats.

Alternative D-Alternative D does not specifically address wind energy development; therefore, under this alternative, any wind energy development would be managed under the provisions of existing LUPs. Potential impacts on special status plants are identical to those under Alternative A.

Impacts from Industrial Solar Energy Development on Special Status Plant Species

In general, solar energy development would require compliance with existing LUPs. Restrictions on wind energy development are specifically addressed only under Alternative C.

Direct Mortality/Habitat Loss/Habitat Degradation and Disruption to Species

Solar energy development would result in ground disturbance impacts similar to those described under the mineral development impact analysis sections of this document. Potential impacts include those from dust, noxious weeds, herbicide application, and alterations of native plant community dynamics described in detail under *Impacts from Management of Travel and Transportation on Special Status Plant Species*. Additionally, solar energy development would result in a foreseeably permanent loss of plant habitat as solar panels would block sunlight from reaching the ground and thereby would eliminate most plants.

Habitat Restoration/Habitat Protection

Solar energy development would provide no benefits in and of itself for special status plant species. Closure of special status plant habitats to solar energy development would protect these plants by and their habitats from this disturbance.

Summary of Impacts by Alternative

Alternative A-Under Alternative A the existing LUPs do no specifically address solar energy. Any solar energy development would be permitted in accordance with ROW allocations currently in place. Impacts on special status plants are expected to be minimal under this alternative due to the fact that there is very little development potential for solar energy in the decision area, and there are no solar energy zones identified in the Solar Energy Development Programmatic EIS (BLM 2012) in the decision area.

Alternative B-Alternative B does not specifically address solar energy development; therefore, under this alternative any solar energy development would be managed under the provisions of existing LUPs and potential impacts on special status plants are identical to those under Alternative A.

Alternative C-Under Alternative C, solar energy development would not be sited within occupied GRSG habitat. This alternative would provide greater protections for special status plant species in occupied GRSG habitat. It would have no additional benefit for special status plant species outside of occupied GRSG habitat. It could increase the potential for negative impacts on these other plants if it were to shift solar energy development from GRSG habitats to other special status plant habitat.

Alternative D-Alternative D does not specifically address solar energy development; therefore, under this alternative, any solar energy development would be managed under the provisions of existing LUPs. Potential impacts on special status plants are identical to those under Alternative A.

Impacts from Range Management on Special Status Plant Species

Livestock grazing on BLM lands is currently managed under the guidance of field office LUPs to meet livestock forage needs, while meeting or exceeding BLM Colorado Public Land Health Standards (BLM 1997). These standards also address special status, threatened, and endangered species and their habitats. Periodic land health assessments monitor range conditions and management success in meeting the BLM Colorado Public Land Health Standards.

Livestock grazing can significantly alter plant community composition and densities, depending on how it is managed. Different grazing regimes impact particular plant species and habitat types differently, with some species favored by particular regimes and other species responding negatively. Alternatives analyzed in this document are intended to favor plant communities desirable for GRSG at different stages of its life cycle. The potential impacts on special status plants from these proposed modifications of grazing regimes would be species specific and site specific, depending on species ecophysiology, species palatability to livestock, soil and moisture conditions. It would also depend on current plant community composition, including presence and densities of noxious weeds and other nonnative plant species, such as nonnative range grasses deemed desirable for livestock grazing. Also, Section 7 consultation has occurred and would continue to occur as needed regarding potential impacts of range management on federally listed plants (BioLogic 2012).

Direct Mortality

Direct mortality to special status plants resulting from range management can occur from livestock trampling or ingesting plants or by workers removing plants while installing range improvements, such as fences, stock ponds, wells, water pipelines, cattle guards, and corrals. The risk of trampling mortality increases greatly in areas where cattle congregate, such as near water sources and salting stations, along fence lines and trailing routes, and near corrals. Riparian areas are particularly vulnerable to livestock trampling since the presence of water, forage, and shade all draw animals to these areas, where use becomes concentrated and vegetation damage ensues (Fitch and Adams 1998). Trampling impacts are generally greater in sparsely vegetated soils when they are wet, as these areas lack dense plant rooting matrices to support the weight of livestock. Livestock hooves can punch deeply into these wet soils, which increases the risk of mortality to small rare plant species, such as DeBeque phacelia.

Direct Habitat Loss

Direct habitat loss is most likely to occur as a result of range improvements, such as stock ponds, corrals, salting stations, wells, and water lines. It also occurs in areas where livestock congregate, such as near water and salt sources, along fence lines and trailing routes, and in corral areas.

Habitat Degradation and Disruption to Species

The indirect impacts of livestock grazing on special status plant species can be overt and easily quantified, such as in degradation of riparian areas. Alternately, it can be subtle and more difficult to quantify, such as in alteration of soil nutrient availability due to trampling of microbiotic soil crusts, alterations of soil microbial community composition, or shifts in plant species competitive abilities within overall plant community dynamics. A common indirect impact of livestock grazing is the introduction and spread of noxious weeds and other nonnative plant species. Noxious weed seeds can attach themselves to animal fur, or in mud to animal hooves, and be spread to new sites. Trampled areas create disturbed sites ideal for weed establishment and proliferation. Potential impacts of weeds and of herbicides used to treat weeds on special status plants are described in more detail under *Impacts from Management of Travel and Transportation*

on Special Status Plant Species. Livestock grazing of special status plant species can negatively impact these plants even if grazing does not result in direct mortality. From some special status plant species, the risk of livestock herbivory is quite low, such as with Colorado hookless cactus or DeBeque phacelia, while the potential of herbivory is more likely for other species, such as Harrington's penstemon.

Nonfatal herbivory can reduce plant reproductive success since energy that might otherwise go to flowering and seed production must be used to replace plant tissue lost to herbivory (Hickman and Hartnett 2002). Livestock also trample and damage biological soil crusts, which can result in lost soil stability, alteration of soil permeability to water, changes in soil temperatures, reduced plant-available nutrients, reduced soil carbon with related impacts on soil microbial communities, and alteration of plant community composition (Belnap et al. 2001). Some of the soil nutrient loss resulting from biological soil crust impacts comes from reduced nitrogen fixation within the crusts themselves, while other nutrients are lost to wind erosion when the stabilizing capability of the crusts is lost (Neff et al. 2005). Grazing impacts on plants can also reduce mycorrhizal colonization of their roots. Most plant species depend on mycorrhizae to enhance nutrient availability to their roots, and certain fungi are dependent on their host plant for the carbon they require to survive. Because of this, grazing can indirectly impact this important component of the soil microbial community (Trent et al. 1988). Mycorrhizal losses can lead to a feedback loop, resulting in the decline of native plants and an increase of nonnative plants. This loss would be exacerbated where non-mycorrhizal noxious weeds are already established (Vogelsang and Bever 2009). Livestock grazing can also alter plant community composition through selective grazing. Ungulates graze more heavily on preferred plant species, causing these species to decrease and allowing less preferred or avoided species to increase (Augustine and McNaughton 1998; Cagney et al. 2010; Milchunas and Noy-Meir 2004). These shifts can be positive, negative, or neutral to special status plant species, depending on how the increasing or decreasing plant species interact with the special status plant species.

Species growing in barren sites with few other species may experience little of this effect, while species growing with other species desirable to livestock, such as in sagebrush communities, or in wetland or riparian areas could be more heavily impacted. Plant communities can also be altered intentionally by range management practices that include seeding of nonnative grasses, which withstand grazing pressure but also compete with native species and reduce plant community diversity. These include smooth brome (*Bromus inermis*), intermediate wheatgrass (*Thinopyrum intermedium*), crested wheatgrass (*Agropyron cristatum*), timothy (*Phleum pratense*), and orchardgrass (*Dactylis glomerata*). Aggressive native range species, such as western wheatgrass (*Pascopyrum smithii*), seeded near special status plant species can also have negative impacts if they encroach on the rare plant habitat and become a source of competition for resources.

Management of rangelands for sustained forage availability can also result in loss of species diversity, with a potential loss of rare plant species (Fuhlendorf et al. 2012). Fragmentation of rare plant habitat can result in declines of special status species, although how any single species might respond to livestock grazing generally cannot be predicted with the available data (Pueyo et al. 2008).

Pollinator Habitat Fragmentation and Loss

The interactions between range management and insect pollinators for special status plant species can be complex. The direct and indirect impacts of livestock grazing on plants, as described above, can have indirect impacts on insect pollinators, particularly bees. Trampling can also have

negative impacts on pollinator nesting sites, destroying active nests and causing soil compaction when can prevent new nest construction.

Modification of water sources, such as the construction of steep-sided stock ponds, can modify water availability for bees since they need to position themselves at the edge of shallow water to drink (Kearns and Inouye 1997). The need to create steep-sided watering areas to reduce mosquito populations and the risk of West Nile disease in GRSG can be at odds with the watering needs of bee pollinators. Because special status plants are often pollinated by generalist pollinators, who rely on a diversity of plant species, the overall plant community is important for retaining pollinators needed by special status plants. Livestock grazing can therefore affect pollinator availability for special status plants (Potts et al. 2003).

In areas with established noxious weeds and other invasive species, pollinators can become dependent on these otherwise undesirable species. In these instances, removal of noxious weeds to improve range quality can negatively impact special status plants by negatively impacting pollinators. These types of interactions between livestock and special status plants vary among the different special status plant species, depending on which pollinators they depend on and the existing site conditions. For self-pollinating species, such as DeBeque phacelia, pollinator impacts are unimportant.

Habitat Restoration

In very specific instances, livestock grazing can be useful in restoring habitat for special status plants. In areas where noxious weeds have invaded nearby or within special status plant occurrences, use of herbicide to treat the weeds may be precluded due to the probability of also killing the protected plants. Closely controlled, targeted, livestock grazing may be a viable tool for habitat restoration in these instances. Similarly, in areas where nonnative range grasses or highly competitive native grasses have been introduced into rare plant habitat, livestock grazing may be important in controlling or eliminating competition and habitat altering impacts of these introduced species. Carefully controlled livestock grazing at the appropriate time of year could be beneficial for particular special status plant species, such as Ute lady's tresses, if it reduces competition from other native plant species without harming the rare plants.

Habitat Protection

Areas occupied by special status plants, and where special status plant habitats are intact, are protected when they are closed to livestock grazing. Closure of these areas in order to protect GRSG habitat would therefore be beneficial to special status plants.

Summary of Impacts by Alternative

The current management focuses on sustainable management of range resources for both livestock grazing and for special status species. The analyzed alternatives vary somewhat in their details, but all have the same objectives: maintaining residual plant cover to reduce GRSG predation during nesting, avoiding GRSG habitat changes due to herbivory, avoiding direct impacts of herbivores on GRSG such as trampling, avoiding altering GRSG behavior due to the presence of herbivores, avoiding impacts on GRSG from structures associated with range management, and maintaining and developing agreements with partners consistent with these objectives.

Alternative A-Under Alternative A, range management would continue in accordance with existing LUPs. Periodic land health assessments would be performed to monitor range health

and potential grazing impacts on special status plants. Impacts on special status plants are the greatest under this alternative.

Alternative B-Alternative B would emphasize restoration of GRSG habitats, including upland sagebrush, wet meadow, and riparian areas, particularly in those sites with a high potential for successful restoration. This could include restoring areas currently dominated by nonnative range grasses and returning them to sagebrush habitat. This would provide greater benefit to special status plant habitats within these areas than Alternative A. However, it would authorize new water development for diversion from spring or seep sources when GRSG would benefit. This could have negative impacts on special status plants if occurrences or habitat are in the vicinity of these developments.

Alternative C-Alternative C is similar to Alternative B but would provide slightly more stringent habitat protections and would not authorize any new water diversion developments within GRSG habitat. Alternative C would also exclude livestock grazing in ADH, which would be expected to be benefit special status plant species whose habitat is coincident with grazing allotments. This would provide better protection for special status plants than Alternative B.

Alternative D-Alternative D is similar to Alternative B but would be slightly less restrictive of range management and range improvement developments. It would provide slightly less protection for special status plant habitats than Alternative B, but greater protections than Alternative A.

Impacts from Wild Horse Management on Special Status Plant Species

Management is targeted toward maintaining wild horse populations within established appropriate management level. Adjustments are made to the appropriate management level based on monitoring data, rate of herd increase, frequency of gathers, herd genetics, other management options, and competing uses.

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species/Pollinator Habitat Fragmentation and Loss

Potential direct and indirect negative impacts of wild horses on special status plants are generally similar to those of livestock grazing. There are likely differences in grazing patterns, congregation areas, and species-specific impacts relative to special status plant species. However, insufficient data exists to adequately analyze these differences; therefore, for purposes of this analysis, the potential negative impacts of wild horses are considered to be essentially the same as for livestock, but with a few exceptions. Overall, the wild horse appropriate management levels are lower in number than livestock numbers within grazing allotments. However, they are on the range year-round and their distributions are generally less controlled than the distributions of livestock. As a result, lesser impacts overall might be expected from wild horses than from livestock, but greater impacts per individual animal might be anticipated since they are on the range year-round.

Habitat Restoration/Habitat Protection

Similar to cattle and sheep, wild horses selectively feed on preferred plant species and avoid other species. Since they may graze more heavily on nonnative range grasses, such as smooth brome, intermediate wheatgrass, orchardgrass, timothy, and crested wheatgrass, they may have some benefit to special status plant species by keeping these exotic species in check. Because their

movements are mostly unregulated, wild horses probably have little or no potential for habitat restoration through targeted grazing of noxious weeds.

Summary of Impacts by Alternative

The overall goals of the analyzed alternatives are to avoid reductions in grass, forb, and shrub cover and to avoid increasing unpalatable forbs and invasive plants, such as cheatgrass.

Alternative A-Under Alternative A, management of wild horse herds would continue under the direction of existing LUPs. Impacts on special status plants are expected to be the greatest under this alternative.

Alternative B-Under Alternative B, wild horse management would be modified to emphasize protection of GRSG habitats. This alternative would provide slightly greater protections for special status plants occurring within GRSG habitats than would Alternative A.

Alternative C-Alternative C would be essentially identical to Alternative B, with the same level of protections for special status plants.

Alternative D-Alternative D would place greater emphasis on range management for GRSG and other uses than on wild horses. While it might provide a slight reduction in negative impacts from wild horses on special status plants than would Alternatives B and C, this could be offset by the relatively greater impacts from other range uses in lieu of wild horse use than would Alternatives B and C.

Impacts from Fluid Minerals Management on Special Status Plant Species

Fluid minerals management includes several types of ground-disturbing activities, including seismic exploration, construction of well and hydraulic fracturing facilities, cuttings disposal sites, roads, buried pipelines, and temporary surface pipelines. Temporary reclamation occurs on portions of the initial well pad disturbance area following drilling, with final reclamation on completed pipelines and at well pads following well closure. Reclaimed and temporarily reclaimed areas are reopened frequently as new wells are drilled on existing pads and new pipelines are installed along existing pipeline corridors.

Direct Mortality/Direct Habitat Loss

Directly mortality to special status plants occurs when plants are growing within the disturbance area for any of the roads, pads, pipelines, or associated facilities. In many instances, roads and facilities can be moved sufficiently to avoid direct mortality, but this is not always possible. Direct habitat loss often occurs even when direct mortality of plants is avoided, and it can have long-term impacts for the species. Mortality and habitat loss are greater risks for species with locally abundant occurrences within areas of high development potential for fluid minerals, such as Harrington's penstemon. Restrictions on fluid minerals development within GRSG habitat would reduce the risk of direct mortality for special status plants growing within these areas but would likely shift these impacts on other special status plant species and increase the risk of mortality and habitat loss for non-sagebrush habitat species.

Habitat Degradation and Disruption to Species/Pollinator Habitat Fragmentation and Loss

The types of potential negative impacts of fluid minerals management on special status plant and pollinator habitats are essentially the same as those described for roads under *Impacts from*

Management of Travel and Transportation on Special Status Plant Species. Impacts from fluid minerals management are additive to those of roads and cause an increased cumulative negative impact on special status plants. The focus on selectively protecting GRSG habitats would shift relative impact levels away from sagebrush habitat plant species and onto plant species growing in other habitat types.

Habitat Restoration

Habitat restoration COAs are attached to all drilling permits, with specific requirements regarding approved species for seeding, weed management requirements, and protections for any special status species or habitats near the developed areas. The potential to adequately restore habitat for special status plant species following disturbance varies across species and habitat types. Some species, such as Harrington's penstemon, have higher potential for habitat restoration, while others, such as DeBeque phacelia, have very specific soil requirements that cannot be restored after disturbance.

Habitat Protection

When all development from fluid minerals can be kept at least 300 meters (984 feet) from any special status plant or suitable habitat for these species, the habitat can generally be protected. However, there may be some indirect impacts that extend beyond this 300-meter buffer, such as dust, herbicide drift, and pollinator impacts.

Summary of Impacts by Alternative

All of the analyzed alternatives would provide basic protections and mitigations for special status plants under existing LUPs, agency regulations and policies, and ESA compliance. All of the action alternatives would shift development impacts away from GRSG habitats and into other habitats.

Alternative A-Under Alternative A, fluid minerals are managed in compliance with existing LUPs. Surveys for special status plants and noxious weeds are required before any ground-disturbing activity. Use of existing disturbance areas is encouraged whenever possible. Developments are sited away from special status plants to the extent possible, and all permits contain COAs requiring management of noxious weeds, restoration with native plant species, and other project-specific plant protections and mitigations as appropriate.

Alternative B-All of the protections listed under Alternative A would also be implemented under Alternative B. However, this alternative would provide greater protections from ground disturbance within GRSG habitats, so it would provide greater protections for special status plants within these areas.

Alternative C-Alternative C is very similar to Alternative B, but it would provide slightly greater protections within GRSG habitats, including efforts to close existing leases within these habitats, if possible.

Alternative D-Alternative D is also very similar to Alternative B, but it calls for more reduced limitations on disturbance within GRSG habitats than Alternative B.

Impacts from Solid Minerals-Coal Management on Special Status Plant Species

Coal management ground disturbance is generally larger in area for surface mining than for underground mining. Disturbed areas include mine sites, facilities locations, and access roads. Mines are generally open for a period during active mining, then closed and reclaimed.

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species/ Pollinator Habitat Fragmentation and Loss

The potential negative impacts on special status plants and their pollinators from coal management are similar to those for fluid minerals management and are also described more fully under *Impacts from Management of Travel and Transportation on Special Status Plant Species* and *Impacts from Fluid Minerals Management on Special Status Plant Species*.

Habitat Restoration/Habitat Protection

Habitat restoration and protection considerations are similar to those for fluid minerals management and are described in more detail under *Impacts from Fluid Minerals Management on Special Status Plant Species*.

Summary of Impacts by Alternative

All of the analyzed alternatives would provide basic protections and mitigations for special status plants under existing LUPs, agency regulations and policies, and ESA compliance. All of the action alternatives would shift development impacts away from GRSG habitats and into other habitats.

Alternative A-Under Alternative A, coal management occurs in compliance with existing LUPs. Surveys for special status plants and noxious weeds are required before any ground-disturbing activity. Use of existing disturbed areas is encouraged whenever possible. Developments are sited away from special status plants to the extent possible, and all permits contain COAs requiring management of noxious weeds, restoration with native plant species, and other project-specific plant protections and mitigations, as appropriate.

Alternative B-All of the protections listed under Alternative A would also be implemented under Alternative B. However, this alternative would place greater restrictions on surface-disturbing activities within GRSG habitats, and thus provide greater protections for special status plants occurring within these areas.

Alternative C-Alternative C would provide essentially the same protections as Alternative B.

Alternative D-Alternative D is very similar to Alternatives B and C, but it would have greater reduced limitations on allowable disturbance area within GRSG habitats than Alternatives B and C.

Impacts from Locatable Minerals Management on Special Status Plant Species

The types of ground disturbance from locatable minerals are similar to those from coal management, as described above.

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species/ Pollinator Habitat Fragmentation and Loss

Potential negative impacts on special status plants from locatable minerals are similar to those described for coal management. In-depth analysis of potential impacts are described more fully

under *Impacts from Management of Travel and Transportation on Special Status Plant Species* and *Impacts from Fluid Minerals Management on Special Status Plant Species*.

Habitat Restoration/Habitat Protection

Habitat restoration and protection considerations are similar to those for fluid minerals management and are described in more detail under *Impacts from Fluid Minerals Management on Special Status Plant Species*.

Summary of Impacts by Alternative

All of the analyzed alternatives would provide basic protections and mitigations for special status plants under existing LUPs, agency regulations and policies, and ESA compliance. All of the action alternatives would shift development impacts away from GRSG habitats and into other habitats.

Alternative A-Under Alternative A, locatable minerals are managed according to existing LUPs. Surveys for special status plants and noxious weeds are required before any ground-disturbing activity. Use of existing disturbance areas is encouraged whenever possible. Developments are sited away from special status plants to the extent possible, and all permits contain COAs, requiring management of noxious weeds, restoration with native plant species, and other project-specific plant protections and mitigations as appropriate.

Alternative B-All of the protections listed under Alternative A would also be implemented under Alternative B. However, this alternative would place greater restrictions on surface-disturbing activities within GRSG habitats, so it would provide greater protections for special status plants in these areas.

Alternative C-Alternative C would provide essentially to same protections as Alternative B.

Alternative D-Alternative D is very similar to Alternatives B and C, but it would have more reduced limitations on allowable disturbance area within GRSG habitats that would Alternatives B and C.

Impacts from Nonenergy Leasable Minerals Management on Special Status Plant Species

The types of ground disturbance from leasable minerals are similar to those from coal management, as described above.

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species/ Pollinator Habitat Fragmentation and Loss

Potential negative impacts on special status plants from leasable minerals are similar to those described for coal management. In depth analysis of potential impacts are described more fully under *Impacts from Management of Travel and Transportation on Special Status Plant Species* and *Impacts from Fluid Minerals Management on Special Status Plant Species*.

Habitat Restoration/Habitat Protection

Habitat restoration and protection considerations are similar to those for fluid minerals management and are described in more detail under *Impacts from Fluid Minerals Management on Special Status Plant Species*.

Summary of Impacts by Alternative

All of the alternatives would provide basic protections and mitigations for special status plants under existing LUPs, agency regulations and policies, and ESA compliance. All of the action alternatives would shift development impacts away from GRSG habitats and into other habitats.

Alternative A-Under Alternative A, leasable minerals are managed according to existing LUPs. Surveys for special status plants and noxious weeds are required before any ground-disturbing activity. Use of existing disturbed areas is encouraged whenever possible. Developments are sited away from special status plants to the extent possible, and all permits contain COAs, requiring management of noxious weeds, restoration with native plant species, and other project-specific plant protections and mitigations as appropriate.

Alternative B-All of the protections listed under Alternative A would also be implemented under Alternative B. However, this alternative would place greater restrictions on surface-disturbing activities within GRSG habitats, so it would provide greater protections for special status plants occurring within these areas.

Alternative C-Alternative C would provide essentially to same protections as Alternative B.

Alternative D-Alternative D is very similar to Alternatives B and C, but it would have more reduced limitations on allowable disturbance area within GRSG habitats than would Alternatives B and C.

Impacts from Salable Mineral Management on Special Status Plant Species

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species/ Pollinator Habitat Fragmentation and Loss

Potential negative impacts on special status plants from salable minerals are similar to those described for coal management. In-depth analysis of potential impacts are described more fully in under *Impacts from Management of Travel and Transportation on Special Status Plant Species* and *Impacts from Fluid Minerals Management on Special Status Plant Species*.

Habitat Restoration/Habitat Protection

Habitat restoration and protection considerations are similar to those for fluid minerals management and are described in more detail under *Impacts from Fluid Minerals Management on Special Status Plant Species*.

Summary of Impacts by Alternative

All of the analyzed alternatives would provide basic protections and mitigations for special status plants under existing LUPs, agency regulations and policies, and ESA compliance. All of the action alternatives would shift development impacts away from GRSG habitat and into other habitat.

Alternative A-Under Alternative A, salable minerals would be managed according to existing LUPs. Surveys for special status plants and noxious weeds are required before any ground-disturbing activity. Use of existing disturbed areas is encouraged whenever possible. Developments would be sited away from special status plants to the extent possible, and all permits would contain COAs, requiring management of noxious weeds, restoration with native plant species, and other project specific plant protections and mitigations as appropriate.

Alternative B-All of the protections listed under Alternative A would also be implemented under Alternative B; however, this alternative would place greater restrictions on surface-disturbing activities within GRSG habitats, so it would provide greater protections for special status plants in these areas.

Alternative C-Alternative C would provide essentially the same protections as Alternative B.

Alternative D-Alternative D is very similar to Alternatives B and C, but it would have more reduced limitations on allowable disturbance area within GRSG habitats than would Alternatives B and C.

Impacts from Fuels Management on Special Status Plant Species

Fuels management projects can be designed to reduce fuel loading with one or more of the following goals:

- Prevention of high intensity, high severity fires that might threaten developed areas
- Prevention of high severity fires, beyond the normal range of fire severity for a given habitat, which could threaten the survival of special status species
- Reestablishment of pre-settlement fire regimes
- Restoration of fire-adapted habitats impacted by past fire suppression

Fuels management can consist of mechanical fuel removal, prescribed burning, or wildland fire use (allowing natural wildfires to burn in specific areas for habitat improvement or fuels management). Different habitat types have evolved with different average fire return intervals and rotations, and individual plant species and communities respond differently to fire. Pre-European settlement fire regimes have been artificially altered in many habitat types, although some habitats have likely seen little alteration, such as barrens, rocky habitats, wetlands, and upper subalpine to alpine habitats. Causes of fire regime shifts in impacted habitats are as follows:

- Disrupting Native American burning, removing trees for railroad ties during railroad construction
- Removing trees near early settlements for building and mine construction and firewood
- Increasing accidental fire starts from human activities during the early settlement period
- Reducing range fires from heavy livestock grazing and resulting removal of fine fuels
- Actively suppressing fires after 1910
- Establishing invasive plant species (particularly cheatgrass), which alter fire regimes

Climate change also plays a part in shifting fire regimes.

Sagebrush communities are among those heavily impacted by these changes, particularly by the impacts of historic heavy livestock grazing, fire suppression, introduction of cheatgrass, and expansion of native pinyon/juniper woodland into sagebrush areas. For this analysis, mechanical fuels treatment impacts on special status plants are covered under GRSG habitat restoration. The fuels management section is focused primarily on fire impacts.

Direct Mortality

Direct mortality of special status plants due to fire can occur either from lethal surface flames or from lethal soil heating. Different plant species have differing abilities to survive fire (Brown and Smith 2000). Some species grow in habitats with natural fire breaks or with such low fuel loading that they effectively do not experience fire; therefore, these species have not adapted to survive fire. At the same time, they are also unlikely to suffer direct mortality from prescribed fire if there continue to be inadequate fuels to carry fire. Special status species in this category include Parachute penstemon, DeBeque phacelia, Dudley Bluffs twinpod, and boat-shaped bugseed (see **Table 4.4**, Habitats for Special Status Plant Species within the Planning Area, Grouped by Habitat Guilds).

However, if nonnative species, such as cheatgrass, invade these habitats, they may create enough fuel loading to carry lethal fire to the special status species. One species of particular concern in this context is Colorado hookless cactus, whose desert scrub habitat now has extensive cheatgrass establishment. Under these conditions, either prescribed fire or wildfire could result in mortality to the cactus. Grassland species are often well adapted to periodic fire, and many areas now dominated by sagebrush were dominated by grasses before intensive livestock grazing (Baker 2006). Special status plant species occurring within this habitat type may in general be well adapted to survive and resprout or germinate following fire. However, if woody species densities have increased sufficiently above the norm, fire in these systems could become lethal to special status plants. Fuels management activities, which strives for a 15 percent canopy cover of sagebrush, could be beneficial for special status plants in these habitats, as this could prevent higher severity wildfires with a higher likelihood of plant mortality. Special status plants growing within pinyon/juniper forests, such as Naturita milkvetch, may also have a higher risk of mortality with fire. Historic fire return intervals in western Colorado pinyon/juniper woodlands have been estimated at 400 years or longer, with a high severity stand-replacing fire regime (Floyd et al. 2004). Plants growing with these trees could experience high flame lengths and surface heating, as well as severe soil heating from burning root masses. This might be somewhat ameliorated by plants growing near rock outcrops with sparser vegetation.

Direct Habitat Loss

Direct habitat loss as a result of either prescribed fire or wildfire in sagebrush habitats is most likely to occur where cheatgrass is present. Cheatgrass is widespread throughout sagebrush and pinyon/juniper habitats and increases readily in response to fire. Once it becomes established, cheatgrass can markedly shorten fire return intervals and convert sagebrush, desert scrub, or pinyon/juniper habitats into weedy annual grasslands. This habitat conversion could result in loss of habitat for special status plants in sagebrush, desert scrub, or pinyon/juniper habitats. A similar type of habitat conversion and loss could also occur with other invasive plant species and fire. Restrictions on use of prescribed fire in less zones where less than 12 inches of precipitation falls and where cheatgrass is present could be beneficial to special status plants.

Habitat Degradation and Disruption to Species

As with direct habitat loss, the greatest potential for habitat degradation from fire would be from noxious weeds and other nonnative invasive plant species. Cheatgrass is the most problematic invasive, which responds rapidly to fire and is particularly competitive for soil moisture following fire (Melgoza et al. 1990). Other noxious weeds also respond positively to fire and can be problematic to special status plants. The impacts of noxious weeds and herbicide treatments

of noxious weeds on special status plants are described in more detail under *Impacts from Management of Travel and Transportation on Special Status Plant Species*.

Fire can also alter plant community composition, as both the species composition and the relative densities of different species shift immediately following fire. If this shifts the competitive edge to other species, it could be a negative effect on special status plants, although it would likely be a short-term negative effect in fire-adapted plant communities if invasive species were not present.

Pollinator Habitat Fragmentation and Loss

Low-severity fires often do not heat the soil sufficiently at great enough depths to impact ground-nesting species. However, under higher fuel loading conditions, below ground fire severity could be sufficient to cause mortality of ground-nesting pollinators. Fire could also remove nesting habitat for wood-nesting pollinators. Altering plant community composition could also temporarily or permanently remove flowers necessary to support pollinators. In many instances, particularly in fire-adapted habitats, flowering plants increase following low severity fires. However, if flowering plants are replaced by cheatgrass, this would result in a loss of pollinator habitat.

Habitat Restoration

For special status plants growing in fire-adapted habitats, where noxious weeds and other nonnative species are absent, return of fire to the habitat can be beneficial. Some rare plant species depend on periodic fire to remove competition from other plant species in order for them to survive on the landscape (Kaye et al. 2001). Fire-adapted species may have seeds whose germination is stimulated by fire, either through soil heating, smoke, or ash.

Habitat Protection

Many special status plant species occur in habitats where fire is not functionally present, such as barren areas, sand dunes, and rock outcrops. Species growing in desert scrub, sagebrush, and pinyon/juniper habitats are the most likely to experience negative impacts from fire; however, as described above, the positive or negative impacts of fire depend largely on whether invasive species have entered the habitat. Protection of special status plant habitats from fire is most important where invasive species are present. In areas with unnatural fuel loading resulting from fire suppression, use of prescribed fire could help protect special status plant habitats from lethal high severity wildfires. Each situation would need to be addressed individually, assessing the particular plant species present and the current habitat conditions, in order to protect special status plant habitat.

Summary of Impacts by Alternative

All of the analyzed alternatives address maintaining a minimum 15 percent canopy cover of sagebrush in GRSG habitat. Additionally, they place seasonal restrictions on fuels management projects designed to protect GRSG but which could shift implementation times to seasons that might intensify negative impacts on special status plants and their pollinators. In general, they are designed to protect and restore sagebrush habitats.

Alternative A-Under Alternative A, fuels management projects would occur under the guidance of existing LUPs. This alternative would result in the greatest level of impacts on special status plants.

Alternative B-This alternative would place a greater emphasis on not using fire to treat sagebrush in zones with less than 12 inches of precipitation, except as a last resort for fuel breaks or enhancement of land health. It would also place a greater emphasis on protecting and restoring sagebrush habitats and their native plant constituents. This would provide slightly more protections for special status plant species in sagebrush habitats than Alternative A.

Alternative C-Alternative C places slightly greater emphasis on promoting higher quality sagebrush habitats and on using fuels treatments only in interfaces with human developments and disturbances. This alternative would provide slightly more protections for special status plants in sagebrush habitats than Alternative B.

Alternative D-Alternative D would allow areas of lower sagebrush canopy cover and a greater overall percentage of disturbed areas within sagebrush habitats. As a result, it would provide slightly lower protections for special status plants in sagebrush habitats than Alternative B.

Impacts from Fire Operations Management on Special Status Plant Species

Fire operations must balance protection of natural resources with protection of human lives and structures. Firefighter safety must take the highest priority in wildfires, followed by structure protection. However, resource advisors are also involved in fire operations to facilitate protection of natural resources, including special status plants, from unnecessary harm during fire line construction and other firefighting activities. Where human lives or structures are not at risk, firefighting strategies may be modified to support resource protection needs.

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species/ Pollinator Habitat Fragmentation and Loss

Potential impacts of fire on special status plants and their habitats are described above under *Impacts from Fuels Management on Special Status Plant Species*. For special status plant species in sagebrush habitats, fire may be positive, negative, or neutral, depending on the individual species and the existing habitat conditions. As with fuels treatments, wildfire can have negative impacts on these species under particular circumstances.

Habitat Restoration/Habitat Protection

As described above under *Impacts from Fuels Management on Special Status Plant Species*, some special status plant species have evolved with fire and could benefit from wildfire burning through their habitat. Also, allowing wildfires to burn nearby areas could remove fuels and prevent potentially lethal wildfires in the future. These situations would be species and site specific.

Summary of Impacts by Alternative All of the analyzed alternatives except Alternative A emphasize suppression of wildfires to prevent burning of GRSG habitats.

Alternative A-Under Alternative A, fire suppression would continue under the guidance of existing LUPs. Protection of GRSG habitats from wildfires is not specifically addressed under this alternative.

Alternative B-Under Alternative B, suppression of fire would be prioritized in PPH, after protection of life and property. This alternative would provide slightly reduced protections for special status plants than Alternative A since it would lower their priority in wildfire suppression decisions.

Alternative C-Alternative C is essentially identical to Alternative B.

Alternative D-Alternative D would allow consideration of other resource values in conjunction with GRSG habitat when deciding wildfire suppression priorities. This alternative would provide slightly greater protections for special status plant species than Alternatives B or C and approximately the same protections as Alternative A.

Impacts from Emergency Stabilization and Rehabilitation on Special Status Plant Species

Following wildfires, a burned area emergency response team evaluates resource impacts from the fire and assesses the need for ESR. When deemed necessary for resource protection, burned areas may be seeded soon after the fire.

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species/ Pollinator Habitat Fragmentation and Loss

As described above under *Impacts from Fuels Management on Special Status Plant Species*, many plant communities have evolved with periodic wildfire, and many plant species have adapted to survive fires. Some even require periodic fire within their habitats in order to proliferate. Introducing seed from off-site sources following wildfire can interfere with the natural response of these communities to fire. Plant species genetically adapt, to varying degrees, to local site conditions, and introducing seed from other sites can genetically dilute these site-specific adaptations, even though the seed is of native species (Leger 2008). Also, native plant seed is available only in limited quantities and from a limited number of species. Post-fire seeding resorts to using nonnative species seed when native species seeds are unavailable. This can lead to the negative impacts of nonnative species, which is described in more detail under *Impacts from Management of Travel and Transportation on Special Status Plant Species* and *Impacts from Range Management on Special Status Plant Species*.

Introduction of seeds from off-site sources also introduces competition for often limited soil moisture, and seeded species are often chosen for their aggressiveness and rapid establishment to stabilize soils. This means that the introduced seeds may outcompete seeds remaining in the soil seed bank following the fire, negatively impacting the native plants. When native seed is unavailable for post-fire seeding, sterile hybrid cereal grains are often used, with the intention of preventing weed establishment. This may be effective initially, but these cereal grains also create competition with native seeds remaining in the soil seed bank and can outcompete the native germinants. When the sterile cereal grain later dies out, it can leave bare patches, which are ideal for weed establishment. In this manner they may ultimately facilitate cheatgrass establishment, even if they inhibit cheatgrass during the first year post-burn. Commercially produced seed also carries the risk of having weed seed contaminants, and sowing this seed in burned areas can introduce new invasive plant species.

Habitat Restoration/Habitat Protection

In severely degraded habitats, or following fires of much greater severity than would occur under the historic fire regimes, seeding native species that would naturally occur on the site may be beneficial. They may reduce the risk of noxious weeds and other invasive plant species that might otherwise encroach on special status plants and habitats. Post-fire seeding can also reduce surface erosion and sedimentation of streams, preventing negative impacts on riparian species, such as Ute ladies'-tresses orchid and western prairie fringed orchid.

Summary of Impacts by Alternative. All of the alternatives emphasize post-fire seeding in GRSG habitats.

Alternative A-Under Alternative A, post-fire restoration would plant native seed mixes, including grasses and forbs, as well as container stock of sagebrush where appropriate.

Alternative B-Under Alternative B, use of native seed would be emphasized, but use of nonnative seed would be allowed if it were to meet GRSG habitat conservation objectives. Because this alternative would allow greater freedom to use nonnative seed, it would provide lesser protections for special status plants in GRSG habitats than would Alternative A.

Alternative C-Alternative C is similar to Alternative A, but it would require livestock grazing exclusion from burned areas until woody and herbaceous plants have achieved GRSG habitat objectives. This would provide slightly greater protections for special status plants growing in GRSG habitats than would Alternative B.

Alternative D-Alternative D would provide greater freedom to use nonnative seed for post-fire seeding than would Alternative B. This alternative would provide the least protection for special status plants.

Impacts from Habitat Restoration on Special Status Plant Species

Different species have different habitat requirements, have adapted to different natural disturbance regimes, and have varying capabilities to survive different types of habitats. This means that efforts to improve sagebrush habitats for GRSG can have impacts on special status plant species, ranging from positive to neutral to negative. This would depend on the individual plant species, the particular habitat characteristics, the type of habitat restoration activity implemented, and the time of year in which the activity is implemented.

These impacts can also range from temporary, to long term, to permanent. Common types of sagebrush habitat restoration are as follows:

- Cutting junipers, with subsequent mastication, pile burning, lopping and scattering branches, or removing woody material
- Sagebrush mowing
- Prescribed broadcast burning
- Seeding with plant species desirable for GRSG, which may or may not be native to the restoration site
- Herbicide treatment of cheatgrass and other noxious weeds

Direct Mortality

The potential for direct mortality of special status plant species as a result of GRSG habitat restoration would be an issue only for those species occurring in the habitats targeted for restoration. These would be primarily species growing in sagebrush or pinyon/juniper habitat types, they could also include species growing in barren areas within these habitat zones, if they were impacted by equipment access, herbicide drift, addition of woody debris from mastication or lop and scatter, or pile burning on top of special status plant occurrences.

Vegetation treatments, such as hydro-axing (a hydro-axe is a powerful mulching attachment which turns unwanted vegetation, including trees up to 6 inches in diameter, and transform the debris into mulch in a very short time) of junipers, can also increase fuel loading, and subsequent wildfires in these areas could become lethal to plants in areas that normally would not have sufficient fuels to carry lethal fire into particular special status plant sites. Direct mortality can also occur as a result of smashing, trampling, or uprooting by equipment or personnel involved in habitat improvement vegetation treatments. Herbicides used to treat noxious weeds can also kill special status plants, and impacts from herbicides can affect plants up to half a mile from the application site, depending on the herbicide used and the environmental conditions at the time of application (BLM 2007). Plants may be able to recover if only a portion suffer mortality. However, if an entire occurrence, including the soil seed bank, suffers mortality, the species may be extirpated from the site, even if the habitat later returns to a desirable condition. The ability of any given plant species to recolonize a site following complete mortality and subsequent habitat recovery would depend on proximity to another seed source and an adequate vector to move seeds to the original occurrence site. This scenario cannot be predicted.

Direct Habitat Loss

Any direct habitat loss for special status plants resulting from GRSG habitat improvement is more likely to be short term than long term or permanent. However, if aggressive plant species not naturally occurring with a special status plant species are seeded or if they expand into the site as a result of habitat improvement, this could alter the habitat such that the special status species can no longer survive there. In such an instance, habitat loss would result.

Habitat Degradation and Disruption to Species

Altering plant species composition within or next to special status plants can have negative impacts on these plants. GRSG habitat restoration focuses on restoring or increasing plant species deemed beneficial to GRSG. In most instances, these species will also be beneficial for special status plants growing within sagebrush habitats. However, aggressive plant species that are not normally present with special status plant species may degrade the habitat and disrupt plants, either through direct competition for resources or through alteration of soil microbial communities. Special status plant species occurring within sagebrush or pinyon/juniper habitats are the ones most likely to be affected, but species growing in relatively barren habitats within these larger vegetation zones could also be impacted. These barren areas could be at increased risk of invasion by cheatgrass or other weeds since such vegetation treatments as juniper removal and prescribed burning can establish and spread invasive species, particularly cheatgrass.

Pollinator Habitat Fragmentation and Loss

Pollinators of special status plant species frequently depend on flowers of other plant species for survival since rare plants do not necessarily flower every year, may be small in numbers, and may have occurrences widely spaced from each other; therefore, reductions in other flowering plant species or in their flower production rates can have negative impacts on these species. Ground-disturbing activities that reduce or destroy pollinator nesting habitat can also reduce pollinator numbers. Many bees and wasps nest either in the ground or in wood. GRSG habitat improvements could impact both nesting habitat and flowering plant species, although these impacts are more likely to be short term than long term or permanent. There may be a lag time between habitat recovery and pollinator recovery.

Habitat Restoration

Restoration of GRSG habitat could also restore habitat for special status plant species that grow within sagebrush habitats. This would be most likely to occur for such species as Harrington's penstemon, which grows in relatively generalized sagebrush habitat, and less likely for species occurring in special habitat microsites within the generalized sagebrush vegetation type. Habitat restoration could result from removing noxious weeds and other nonnative species, removing encroaching young juniper trees, seeding appropriate native plant species, and planting sagebrush. However, there is also a high probability of mortality and temporary degradation of habitat from habitat improvement before habitat is effectively restored.

Habitat Protection

Habitat could be protected indirectly as a result of habitat restoration in areas next to special status plants and their habitat. Removing noxious weeds and other invasive species through GRSG habitat restoration could prevent spread of these species into rare plant habitats.

Summary of Impacts by Alternative

None of the alternatives specifically address restoration parameters of direct importance to special status plant species. In general, the greater the alternative emphasis on using native plant species for habitat restoration, the more likely restoration is to benefit special status plants in the long term. However, all GRSG habitat restoration could negatively impact certain special status plant species, at least in the short term.

Alternative A-Under Alternative A, sagebrush habitat improvement would continue to occur, following guidance in applicable LUPs. The focus would be on restoring and increasing plant species deemed valuable for GRSG and for livestock forage. This alternative would have the fewest restrictions on habitat restoration and could have slightly greater negative impacts on special status plant species.

Alternative B-Alternative B places more restrictions on restoration within GRSG habitats, with a greater emphasis on restoring plant species that are beneficial to GRSG. However, these restrictions do not address protections for special status plant species.

Alternative C-Alternative C would require the use of only native plant species for habitat restoration and would require planting sagebrush in restoration areas. This alternative would provide the greatest protection for special status plant species.

Alternative D-This alternative would have a higher disturbance threshold for requiring GRSG habitat restoration. This would provide less protection for special status plants, in that it would have a higher tolerance for invasive species. On the other hand, the reduced emphasis on habitat restoration could result in reduced negative impacts from GRSG habitat restoration on special status plants. Overall, the impacts from this alternative would likely be somewhat lower than Alternative A and slightly greater than Alternatives B or C.

Impacts from ACEC/Zoological Area Management on Special Status Plant Species

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species/ Pollinator Habitat Fragmentation and Loss

Designation of special status plant habitats as ACECs provides beneficial protections to the plants by prohibiting activities that could have detrimental impacts.

Alternative-Alternative A would recognize all of the existing ACEC designations but would not add any new ACEC designations. Because no new ACECs would be designated under this alternative, special status plant occurrences outside of the existing ACECs would not receive any ACEC protections from negative impacts.

Alternative B-Alternative B would recognize all of the existing ACEC designations but would not add any new ACEC designations. Because no new ACECs would be designated under this alternative, special status plant occurrences outside of the existing ACECs would not receive any ACEC protections from negative impacts. This alternative would have the same impacts on special status plants as Alternative A.

Alternative C-Alternative C would recognize all of the existing ACECs and would also designate all PPH as an ACEC. This alternative would prevent negative impacts from ground-disturbing activities on special status plant occurrences and their habitats within PPH. It would provide identical protections as Alternatives A, B, and D for those special status plants growing outside of the PPH areas and those growing within existing ACECs.

Alternative D-Alternative D would recognize all of the existing ACEC designations but would not add any new ACEC designations. Because no new ACECs would be designated under this alternative, special status plant occurrences outside of the existing ACECs would not receive any ACEC protections from negative impacts. This alternative would have the same impacts on special status plants as Alternatives A and B.

Summary of Impacts on Special Status Plant Species

There are currently 37 special status plant species within the planning area potentially impacted by management actions within the planning area. These species occur in many different microhabitat types and have adapted to different types of disturbances. Any given type of management action could positively affect some species and negatively affect others, while having no effect on other species. None of the analyzed alternatives specifically address special status plant species. Any definitive protections for these species would come from existing LUPs, agency regulations and policies, and ESA compliance. Specific protections for individual occurrences would be decided at the project level.

Alternative A would rely on existing LUPs, without emphasizing GRSG habitat protections. This alternative would not specifically increase protections of sagebrush habitats, which might result in greater development pressures near special status plants growing in sagebrush habitats. On the other hand, it might result in lower development pressures near special status plants in other habitats and fewer negative impacts on those species.

Alternative B provides a greater level of protection for sagebrush habitats than Alternatives A or D and would reduce development pressures near special status plants growing in sagebrush habitats. However, it would increase development pressures and associated potential negative impacts for special status plants in other habitat types.

Alternative C would provide the most protection for sagebrush habitats, and the least development pressures near special status plants in sagebrush habitats. It would also result in the greatest shift of development pressures to other habitat types, with greater potential negative impacts on these other special status plant species.

Alternative D would provide more protection for sagebrush habitats than Alternative A but less protection than Alternatives B or C. It would provide intermediate protections between those of Alternative A and Alternative B for sagebrush habitats and for special status plants growing in these habitats. Conversely, its potential negative impacts on special status plants growing in other habitat types would also be intermediate between Alternative A and Alternative B.

Table 4.3. Known Threatened, Endangered, and Sensitive Plant Species Occurrences within GRSG PPH, PGH, andLinkage/Connectivity Areas, and within a 300-meter Buffer of these GRSG Habitats

Species Common Name	Species Scientific Name	Field Offices*	Species Status **	Number of Occurrences			Number of Occurrences in 300-meter Buffer		
				In PGH	In PPH	In Linkage/ Connectivity Areas	In PGH	In PPH	In Linkage/ Connectivity Areas
Boat-shaped bugseed	*Corispermum navicula*	KFO	S	0	1	0	0	1	0
Cathedral Bluff dwarf gentian	*Gentianella tortuosa*	WRFO	S	0	8	0	1	1	0
Cathedral Bluffs meadowrue	*Thalictrum heliophilum*	GJFO, WRFO	S	1	10	1	16	15	0
Clay hill buckwheat	*Eriogonum viridulum*	LSFO	S	1	0	0	0	0	0
Colorado feverfew	*Parthenium ligulatum*	LSFO, WRFO	S	3	0	0	3	0	0
Colorado hookless cactus	*Sclerocactus glaucus*	GJFO	FT	84	1	0	5	0	0
DeBeque phacelia	*Phacelia submutica*	GJFO	FT	5	0	0	60	0	0
Debris milkvetch	*Astragalus detritalis*	LSFO, WRFO	S	26	3	0	4	0	0
Duchesne milkvetch	*Astragalus duchesnensis*	LSFO, WRFO	S	3	0	0	0	0	0
Dudley Bluffs twinpod	*Physaria obcordata*	WRFO	FT	0	0	0	1	0	0
Ephedra buckwheat	*Eriogonum ephedroides*	WRFO	S	6	0	0	3	0	0
Flaming Gorge evening primrose	*Oenothera acutissima*	LSFO, WRFO	S	3	9	0	0	0	0
Fragile rockbrake	*Cryptogramma stelleri*	KFO	S	0	0	0	1	0	0
Gibbens' beardtongue	*Penstemon gibbensii*	LSFO	S	11	0	0	0	0	0
Graham's beardtongue	*Penstemon grahamii*	WRFO	FP	1	0	0	8	0	0
Hairy Townsend daisy	*Townsendia strigosa*	LSFO	S	1	0	0	0	0	0
Harrington's penstemon	*Penstemon harringtonii*	CRVFO, KFO	S	58	54	0	23	25	0

Species Common Name	Species Scientific Name	Field Offices*	Species Status **	Number of Occurrences			Number of Occurrences in 300-meter Buffer		
				In PGH	In PPH	In Linkage/ Connectivity Areas	In PGH	In PPH	In Linkage/ Connectivity Areas
Narrow-stem gilia	*Alciella stenothyrsa*	WRFO	S	0	0	0	1	0	0
Naturita milkvetch	*Astragalus naturitensis*	GJFO	S	10	0	0	1	0	0
North Park phacelia	*Phacelia formosula*	KFO	FE	0	85	0	0	0	0
Osterhout milkvetch	*Astragalus osterhoutii*	KFO	FE	36	24	0	7	4	0
Pale blue-eyed grass	*Sisyrinchium pallidum*	KFO	S	0	1	0	0	0	0
Parachute penstemon	*Penstemon debilis*	CRVFO	FT	2	0	0	0	0	0
Penland beardtongue	*Penstemon penlandii*	KFO	FE	5	6	0	0	0	0
Piceance bladderpod	*Lesquerella parviflora*	GJFO, WRFO	S	18	24	21	26	27	1
Roan Cliffs blazingstar	*Mentzelia rhizomata*	CRVFO	S	2	0	0	2	0	0
Rock tansy	*Sphaeromeria capitata*	LSFO	S	0	1	0	0	0	0
Rollins cryptantha	*Cryptantha rollinsii*	WRFO	S	3	2	0	3	0	0
Singlestem buckwheat	*Eriogonum acaule*	LSFO	S	1	0	0	0	0	0
Tufted cryptantha	*Cryptantha caespitosa*	LSFO	S	2	0	0	1	0	0
Uinta Basin springparsley	*Cymopterus duchesnensis*	LSFO	S	3	0	0	0	0	0
Woodside buckwheat	*Eriogonum tumulosum*	LSFO	S	1	0	0	2	0	0
Total				**286**	**229**	**22**	**168**	**73**	**1**

**FE = federally endangered, FT = federally threatened, FC = candidate for federal listing, FP = proposed for federal listing, S = BLM sensitive

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Table 4.4. Habitats for Special Status Plant Species within the Planning Area, Grouped by Habitat Guilds

Common Name	Scientific Name	Status	Offices	Habitat Type
Green River Shale Formation				
Narrow-stem gilia	*Alciella stenothyrsa*	S	WRFO, GJFO	Grassland, sagebrush, mountain mahogany or pinyon/juniper; silty to gravelly loam soils of the Green River Formation, 6,200 to 8,600 feet
Rollins cryptantha	*Cryptantha rollinsii*	S	WRFO	White shale slopes of the Green River Formation, in pinyon/juniper or cold desert shrub communities. 5,300 to 5,800 feet
Ephedra buckwheat	*Eriogonum ephedroides*	S	LSFO, WRFO	Shale and clay flats of slopes in saltbush, sage and pinyon/juniper habitats, 4,900 to 6,900 feet
Cathedral Bluff dwarf gentian	*Gentianella tortuosa*	S	WRFO	Barren shale knolls and slopes of the Green River Formation, 8,500 to 10,800 feet
Piceance bladderpod	*Lesquerella parviflora*	S	CRVFO, GJFO, WRFO	Shale outcrops of the Green River Formation, on ledges and slopes of canyons in open areas 6,200 to 8,600 feet
Roan Cliffs blazingstar	*Mentzelia rhizomata*	S	CRVFO, GJFO	Steep talus slopes of the Parachute Creek Member of the Green River Shale Formation in Garfield County and in wash bottoms with eroded shale 5,800 to 9,000 feet
Colorado feverfew	*Parthenium ligulatum*	S	LSFO, WRFO	Barren shale knolls, 5,400 to 6,500 feet
Parachute penstemon	*Penstemon debilis*	FT	CRVFO, GJFO	Steep talus slopes of the Parachute Creek Member of the Green River Shale Formation in Garfield County and in wash bottoms with eroded shale, 6,000 to 9,000 feet
Graham's beardtongue	*Penstemon grahamii*	FP	WRFO	Talus slopes and knolls of the Green River Formation in sparsely vegetated desert scrub and pinyon/juniper, 5,800 to 6,000 feet
White River beardtongue	*Penstemon scariosus var. albifluvis*	FC	WRFO	Sparsely vegetated shale slopes of the Green River Formation Desert in shrub and pinyon/juniper communities, 5,000 to 7,200 feet
Dudly Bluffs bladderpod	*Physaria congesta*	FT	WRFO	Barren, white shale outcrops of the Green River and Uinta Formations, 6,000 to 6,700 feet
Dudley Bluffs twinpod	*Physaria obcordata*	FT	WRFO, CRVFO	Barren white outcrops and steep slopes of the Parachute Creek Member of the Green River Formation, 5,900 to 7,500 feet
Cathedral Bluffs meadowrue	*Thalictrum heliophilum*	S	CRVFO, GJFO, WRFO	Dry shale barren communities in Garfield, Mesa, and Rio Blanco Counties in northwestern Colorado, 6,200 to 8,800 feet
Wasatch Formation				
DeBeque milkvetch	*Astragalus debequaeus*	S	CRVFO, GJFO	Varicolored, fine textured, seleniferous or saline soils of Wasatch Formation - Atwell Gulch Member, 5,100 to 6,400 feet

Common Name	Scientific Name	Status	Offices	Habitat Type
DeBeque phacelia	*Phacelia submutica*	FT	CRVFO, GJFO	Sparsely vegetated areas in high clay content soils on low-angle to steep slopes of the Atwell Gulch and Shire Members, Wasatch Formation. Soils often have large cracks or alligator-skin to popcorn surface texture because of the high shrink-swell potential of the clays, 4,700 to 6,200 feet
Juniper				
Naturita milkvetch	*Astragalus naturitensis*	S	CRVFO, GJFO	Sandstone mesas, ledges, crevices, and slopes in pinyon/juniper woodlands, 5,000 to 7,000 feet
Sagebrush to Juniper, in Barren to Gravelly Soils				
Debris milkvetch	*Astragalus detritalis*	S	LSFO, WRFO	Pinyon/juniper and mixed desert shrub, often on rocky soils ranging from sandy clays to sandy loams; also alluvial terraces with cobbles, 5,400 to 7,200 feet
Duchesne milkvetch	*Astragalus duchesnensis*	S	LSFO, WRFO	Pinyon/juniper woodland and desert shrub, around sandstone or shale outcrops, 4,600 to 6,400 feet
Tufted cryptantha	*Cryptantha caespitosa*	S	LSFO, WRFO	Sparsely vegetated shale knolls, with pinyon/juniper or sagebrush; usually with other cushion plants, 5,500 to 8,100 feet
Uinta Basin springparsley	*Cymopterus duchesnensis*	S	LSFO	Cold desert shrub, sagebrush, and juniper communities, in sandy clay and clay soils derived from shales, 4,700 to 6,800 feet
Singlestem buckwheat	*Eriogonum acaule*	S	LSFO	Barren hillsides in fine particle soils, 5,680 to 6,820 feet
Woodside buckwheat	*Eriogonum tumulosum*	S	LSFO	Mixed desert shrub and pinyon/juniper woodlands, on rocky outcrops, sedimentary gravels, or clays, 5,800 to 6,300 feet
Clay hill buckwheat	*Eriogonum viridulum*	S	LSFO	Sandy or silty flats or clay slopes and hills, in saltbush or sagebrush communities, or pinyon/juniper woodlands, 4,620 to 7,260 feet
Hairy Townsend daisy	*Townsendia strigosa*	S	LSFO	Shaley, sandy, or alkaline clay substrates in desert shrub, sagebrush, or pinyon/juniper habitats, 4,950 to 6,600 feet
Sagebrush, on Basalt Parent Material Soils				
Harrington's penstemon	*Penstemon harringtonii*	S	CRVFO, KFO	Open sagebrush or sagebrush sites with encroaching pinyon/juniper. Soils are typically rocky loams and rocky clay loams derived from coarse calcareous parent materials (basalt) 6,200 to 9,200 feet.
Desert Scrub				
Colorado hookless cactus	*Sclerocactus glaucus*	FT	CRVFO, GJFO	Rocky hills, mesa slopes, and alluvial benches in salt desert shrub communities, often with well-formed microbiotic crusts. Can occur in dense cheatgrass, 4,500 - 6,600 feet
Rock tansy	*Sphaeromeria capitata*	S	LSFO	Dry, rocky hills, and desert flats in silty soil, 7,500 to 7,900 feet
Browns Park Formation				

Common Name	Scientific Name	Status	Offices	Habitat Type
Gibbens' beardtongue	*Penstemon gibbensii*	S	LSFO	Sparsely vegetated shale or sandy-clay slopes of the Browns Park Formation. Surrounding vegetation is pinyon/juniper woodland, sagebrush, or greasewood-saltbush, 5,500 to 7,700 feet
Niobrara and Pierre Shales				
Osterhout milkvetch	*Astragalus osterhoutii*	FE	KFO	Selenium-rich clay soils, derived mostly from Niobrara and Pierre shale, on relatively flat areas and barren knolls within Grand County. **Occurs only within the planning area**, 7,500 to 7,700 feet
Penland beardtongue	*Penstemon penlandii*	FE	KFO	Selenium-rich clay soils, derived mostly from Niobrara and Pierre shale, on relatively flat areas and barren knolls within Grand County. **Occurs only within the planning area,** 7,500 to 7,700 feet
Cold North Park Dunes				
Boat-shaped bugseed	*Corispermum navicula*	S	KFO	Known only from the cold climate dunes in Northern Colorado. **Known only within the planning area.**
Coalmont Formation - North Park				
North Park phacelia	*Phacelia formosula*	FE	KFO	Barren exposures where the Coalmont Formation forms outcrops of sandy soil or ledges. Grows most abundantly on steep, sparsely vegetated and erodible slopes (such as on the sides of deep ravines), within central Jackson County and northwest Larimer County, **almost exclusively within the planning area.**
Riparian and Wet Meadows				
Flaming Gorge evening primrose	*Oenothera acutissima*	S	LSFO, WRFO	Seasonally wet areas in meadows and depressions or along arroyos in mixed conifer forest to sagebrush, on sandy gravelly, or rocky soils 5,300 to 8,500 feet
Western prairie fringed orchid	*Platanthera praeclara*	FT	KFO, Routt National Forest	Found in Minnesota, Iowa, Missouri, Nebraska, North Dakota, and Manitoba, Canada. Associated with sedge meadows, primarily within the tallgrass prairie biome, and generally in fire- and grazing-adapted grassland communities.
Pale blue-eyed grass	*Sisyrinchium pallidum*	S	KFO	Found in northwest Jackson County and northwest Larimer County. Prefers fens, wet meadows, and stream edges.
Ute ladies'-tresses orchid	*Spiranthes diluvialis*	FT	CRVFO, KFO, LSFO, WRFO	Sub-irrigated alluvial soils along streams and in open meadows in floodplains, 4,500 to 7,200 feet
Calcareous Cliff Crevices and Rock Ledges in Coniferous Forest				
Fragile rockbrake	*Cryptogramma stelleri*	S	KFO	Occurs in cool, moist, sheltered calcareous cliff crevices and rock ledges, typically in coniferous forest or other boreal habitats. Has a wide distribution but low abundance within occurrences.

4.5. Lands and Realty

4.5.1. General Description

This section analyzes potential impacts on BLM-administered and National Forest System lands and realty program from proposed management actions of other resources and resource uses. Existing conditions are described in **Section 3.4**, Lands and Realty. The lands and realty program includes land use authorizations (i.e., ROWs, leases, permits, and easements) and land tenure adjustments (i.e., purchases, sales, exchanges, donations, and withdrawals).

USFS Forest Plan prescriptions are similar to BLM exclusion and avoidance areas. Prescriptions can restrict or prohibit certain uses in a planning area. The USFS also grants special use authorizations (ROWs, permits, easements, and leases), while the BLM grants ROWs on their respective agency lands. Lastly, the USFS completes land ownership adjustments (purchase, exchange, donation, and ROW acquisition), while the BLM conducts land tenure adjustments (withdrawals, disposals, and acquisitions).

4.5.2. Methodology and Assumptions

General Impacts on Lands and Realty

Lands and realty are considered a resource use rather than a biological resource. Impacts on lands and realty generally are a result of management actions prescribed for other resources, including restrictions or limitations on land use authorizations. The discussion of the impacts on lands and realty in each alternative is limited to the impacts on permitted or authorized uses. These include restrictions, costs, and issuance or denial of land use authorizations and consideration of land tenure adjustments. Management actions of other resources were assessed to determine restrictions or limitations on lands use authorizations (including ROWs) and land tenure.

Indicators of impacts on lands and realty and the measurements used to describe the impacts (where available or appropriate) are described below:

- Ability to accommodate preferred routes for ROWs

Size (in acres) and location of ROW exclusion areas and limitations or prohibitions on surface disturbance.

- Ability to accommodate preferred routes or locations for all ROWs, including access routes, pipeline, communications sites, and transmission and distribution power lines

Size (in acres) and location of ROW exclusion areas and limitations or prohibitions on surface disturbance.

- Cost of developing and designing ROWs

Size (in acres) and location of ROW exclusion areas and limitations or prohibitions on surface disturbance.

- Demand for ROW authorizations

Requests for new ROW authorizations.

- Ability to process land tenure adjustments necessary for more effective management

Size (in acres) and locations of lands identified as priority for land tenure adjustments.

Assumptions

The analysis is based on the following assumptions:

- Existing ROWs and communications sites would be managed to protect valid existing rights.
- Upon renewal, assignment, or amendment of existing ROWs, additional mitigation or modification of stipulations may be included.
- ROW holders may continue their authorized use as long as they are in compliance with the terms and conditions of their grant.
- The BLM and USFS would continue to process land tenure adjustments and to grant land use authorizations on a case-by-case basis.
- The demand for communication facilities and ROWs would increase over the life of this plan.
- Maintaining and upgrading existing utilities and other ROWs is preferred before constructing new facilities.
- Demand for access through land use authorizations may increase as rural development occurs on dispersed private parcels.
- Renewable energy would continue to be a possible interest in the area and could increase in the future, based on site suitability; applications for development would be considered as they are proposed, on a case-by-case basis.

4.5.3. Direct and Indirect Impacts on Lands and Realty

Implementing management for the following resources or resource uses would have negligible or no impact on land use authorizations or land tenure and therefore are not discussed in detail: recreation management, range management, riparian areas, livestock grazing, wild horse management, fuels and fire management, and ACECs.

Impacts from Travel Management on Lands and Realty

Impacts on the Ability to Accommodate Preferred Routes for ROWs and Preferred Routes or Locations for all Rows and the Cost of Development and Design of ROWs

Impacts on the lands and realty program would result from transportation and travel limitations described in the action alternatives. These include limits on upgrades to existing routes, limits on new route construction, and limits on realignments of existing routes. As a result of limits on construction and realignments, constraints would be placed on new authorizations.

In some areas, there is a high concentration of intermixed private and public land, corridors, and oil and gas development. In such areas, there would be restrictions on the ability to upgrade or construct new routes.

Seasonal restrictions on travel could impact site accessibility, impact the ability to construct and maintain ROWs, and increase project costs.

There are the fewest restrictions on travel under Alternative A and thus the least impact on lands and realty. Also, this alternative would not impact the lands and realty program on both BLM-administered and National Forest System lands.

For valid exist rights, Alternative B would require new routes to be constructed to the minimum standard, with a disturbance cap of 3 percent. If the cap were exceeded, mitigation would be required. This could result in greater impacts than under Alternative A due to the potential for increased costs associated with mitigation and restrictions and the potential for increased difficulty in accessing public and private land.

Alternative C would have the greatest impact on the lands and realty program. This alternative limits road construction in ADH and prohibits road construction within a 4-mile buffer from leks. In addition, all construction in GRSG habitat would require mitigation. Alternative C has the greatest number of acres with restrictions on construction and activity. It has the most potential for increased cost of construction of ROWs and increased difficulty to access public and private land.

Alternative D requires mitigation if a 5 percent disturbance cap in Colorado MZs is exceeded. It requires that constructing new routes and upgrading existing routes not adversely affect GRSG populations. The impact on the lands and realty program due to increased cost of construction, potential mitigation costs, and difficulty to access public and private land is greater under Alternative D than Alternative A, but less than under Alternatives B and C.

Impacts from Lands and Realty Management on Lands and Realty

Impacts on the Ability to Accommodate Preferred Routes for ROW s and Preferred Routes or Locations for all ROWs and on the Cost of Developing and Designing ROWs

Impacts as a result of management actions for the lands and realty program are limitations on placement of ROWs due to acres identified as ROW exclusion areas. Additionally, increased costs associated with construction could result from identifying areas as ROW avoidance and requirements for mitigating projects constructed in GRSG habitat. For linear ROWs (e.g., pipelines and transmission lines) this could increase the length of these projects, thus increasing project costs. Costs also would be incurred as a result of requirements for mitigation in areas with limits on surface disturbance.

In some areas, there is a high concentration of intermixed private and public land, corridors, oil and gas development, and existing authorizations. In these areas, restrictions on the ability to permit ROWs and land tenure adjustments would have a greater impact than in areas with lesser degrees of intermixed ownership, ROW corridors, oil and gas development, and existing authorizations. Despite these restrictions, the existing ROW corridor and ROW network would provide opportunities for the collocation of compatible ROWS.

Table 2.2, Comparative Summary of Alternatives, shows the acres of ROW exclusion and avoidance areas in the decision area for each alternative, which are described in detail in **Table 2.3**, Description of Alternatives A and B, and **Table 2.4**, Description of Alternatives B, C, and D.

Under Alternative A, 25,600 acres would continue to be managed as ROW exclusion areas and 127,600 acres would continue to be managed as ROW avoidance area within ADH. This alternative includes the fewest restrictions on locations of ROW corridors and ROWs and the fewest restrictions for construction. There is no disturbance cap for construction of new ROWs. Alternative A would have the least impact on the lands and realty program.

Under Alternative B, all PPH would be managed as exclusion areas for new BLM ROWs or USFS special use permits (SUPs), totaling 930,500 acres. Limits associated with valid existing rights would be placed on authorization of new ROWs or SUPs in PPH, including a 3 percent disturbance cap. Alternative B would result in a larger impact on the lands and realty program than Alternative A.

Under Alternative C, ADH would be managed as exclusion areas for new BLM ROWs or USFS SUPs, totaling 1,761,500 acres. Within ADH, limits associated with valid existing rights would be placed on construction and maintenance, including a 3 percent disturbance cap. Alternative C would have the greatest impacts on the lands and realty program, placing exclusion restrictions on over 1.7 million acres.

Under Alternative D, there would be no additional acres managed as ROW exclusion areas. However, PPH would be managed as avoidance area (930,500 acres), and limits would be placed on the authorization of ROWs or SUPs in PPH, including a 5-percent disturbance cap. Additionally, under Alternative D, there would be 881,000 acres managed as exclusion area for large transmission lines (greater than 230 kilovolts), and 68,000 acres managed as avoidance area for large transmission lines (greater than 230 kilovolts). Alternative D would have greater impacts on the lands and realty program than Alternative A but fewer impacts than Alternatives B and C.

Ability to Process Land Tenure Adjustments Necessary for More Effective Management

Management actions that prioritize GRSG habitat for acquisition and limit disposal of these lands would assist the BLM and USFS in prioritizing future land tenure adjustments. However, these same actions could reduce the BLM and USFS's flexibility for consolidating public lands for effective management of other resources. Although there may be an increased emphasis to consolidate parcels within GRSG habitat across all alternatives it is not possible to identify the locations or number of acres impacted by these decisions at this time.

Under Alternative A, approximately 700 acres of PPH and 1,100 acres of PGH are identified for disposal in the decision area (all in the CRVFO). GRSG habitat is not considered under this alternative when identifying lands for acquisition.

Alternative B emphasizes retaining public ownership of PPH, with exceptions to allow flexibility if a change in ownership would allow for more effective management of GRSG habitat. This alternative would provide for identification and prioritization of acres for acquisition, based on the presence of GRSG habitat. However, some flexibility for consolidating public lands for effective management of other resources would be lost.

Alternative C would have more restrictions than Alternatives A, B, and D on the ability to complete land tenure adjustments in GRSG habitat because no disposals would be allowed in

PPH and no exceptions would be provided. Flexibility for consolidating public lands for effective management of other resources would be the least under this alternative.

Compared to the other action alternatives, Alternative D allows the most flexibility in acres available for acquisition, disposal, or exchange because there is no management action proposed to retain public ownership of PPH.

Impacts from Fluid Minerals Management on Lands and Realty

Impacts on the Cost of Developing and Designing ROWs and Demand for ROW Authorizations

Impacts on the lands and realty program from managing fluid minerals include a reduction in availability of locations for ROW corridors and locations for ROWs. Impacts also include the increased cost of designing and developing ROWs, due to restrictions on surface disturbance associated with no leasing or stipulations on leases.

Although land use authorizations (ROWs) are not necessary for surface occupancy of leased federal lands, ROWs are often required for developments that cross lease lines, for access roads, and for other infrastructure (e.g., pipelines and centralized facilities). In areas closed to leasing, the need for ROWs to access leases would be eliminated. In areas open to leasing, where surface occupancy restrictions would result in decreased development, overall demand for ROWs would also be decreased. In those cases, the demand would continue but may result in increased length and cost of construction of ROWs, due to the requirement to find alternative routes or sites for infrastructure to support development..

The decision area contains 2,473,000 acres of federal minerals, approximately half of which (1,296,000 acres) are currently unleased.

Under Alternative A, 100,200 acres would continue to be closed to leasing within the decision area. Additionally, there would continue to be 298,000 acres with NSO stipulations and 976,200 acres with CSU stipulations. Alternative A has the fewest acres closed to leasing and contains the fewest restrictions on surface occupancy. This alternative would have the smallest impact on the lands and realty program and future lands and realty program actions would occur under current management.

Under Alternative B, PPH would be closed to future leasing for fluid minerals, affecting approximately 519,300 acres of unleased federal minerals in PPH with the potential for development. An exception would allow the BLM/USFS to prepare a comprehensive leasing plan for areas of “checkerboard” or other mixed federal-private surface and federal mineral estates. This could allow leasing of selected areas that can be accessed from outside the PPH. Exploration using minimally disruptive methods would also be allowed. Additionally, leased acres within PPH would be managed for NSO, affecting 617,500 acres. Stipulations would be applied to development in the vicinity of GRSG leks, including a 4-mile buffer and limits on locations and number of disturbances in PPH. Surface disturbance would be limited to 3 percent of PPH. Alternative B would result in greater impacts on the lands and realty program than under Alternative A. Alternative B would result in a decreased need for ROWs in areas unavailable for leasing but surface restrictions would result in greater costs to design and construct infrastructure. Under Alternative C, all unleased GRSG habitat would be closed to leasing (1,296,000 acres of ADH), unless it could be demonstrated that a plan for the area would be beneficial to GRSG populations. Additional restrictions would apply to ADH, including a 3 percent limit on surface disturbance. Alternative C would remove the most acres from leasing and has the most restrictions

on surface occupancy for fluid minerals activity, thus reducing the need for ROWs in areas unavailable for leasing and increasing the costs to design and construct ROWs.

Under Alternative D, PPH areas would be NSO areas for fluid mineral leasing (519,276). In PPH, if the entire lease is within the 4-mile lek perimeter, permitted disturbances (as defined in **Appendix F**, Disturbance Cap Management) would be limited to 5 percent in any Colorado MZ; additional effective mitigation would offset the resulting loss of GRSG habitat. In certain cases, the BLM/USFS Authorized Officer may authorize disturbance in excess of the 5 percent disturbance cap without requiring additional mitigation. This would be the situation where the BLM/USFS, with available data, would conclude that:

- GRSG populations in the applicable Colorado MZ are healthy and stable at objective levels or that they are increasing and;
- The development would not adversely affect GRSG populations due to habitat loss or disruptive activities.

In many cases, this exception would require project proponents to fund studies to secure the data-based documentation requirement. Alternative D would have greater impacts on the lands and realty program than Alternative A but fewer impacts than Alternatives B and C.

Impacts from Solid Minerals (Coal, Locatable, Nonenergy, and Salable Minerals) Management on Lands and Realty

Impacts on the Cost of Developing and Designing ROWs and Demand for ROW Authorizations

Although land use authorizations (ROWs) are not necessary for solid mineral mining, they are often required for developments that cross lease lines, for access roads, and for other infrastructure. In areas closed to mining, the need for ROWs to access mines would be eliminated. In areas where mining is restricted, the costs for development of infrastructure associated with these mines could increase.

Under Alternative A, the BLM/USFS would not impose new restrictions or prohibitions on lands and realty. Therefore, there would be no new impacts on the lands and minerals program under this alternative.

Under Alternatives B and C, the BLM would prohibit new surface coal mines in PPH, would propose PPH for mineral withdrawal, would close PPH to nonenergy mineral leasing, and would close PPH to mineral material sales. These measures would reduce demand for ROWs necessary for developments that cross lease lines, for access roads, and for other infrastructure. Alternatives B and C would also require mitigation measures and restrictions for mineral activity, which could increase the cost of developing and designing associated ROWs.

Alternative D includes measures for protecting GRSG habitat from impacts associated with mineral activity. However, this alternative contains more flexibility to continue mineral operations. Thus, the impact of Alternative D on the lands and realty program is greater than Alternative A but less than Alternatives B and C.

4.5.4. Summary of Impacts on Lands and Realty

Under Alternative A, the five BLM field offices and the USFS use a combination of stipulations on ROWs. These stipulations would be used to manage lands and realty to avoid or minimize adverse impacts on other resources or resource uses, including GRSG. Under Alternative A, approximately 6.5 percent of GRSG habitat is protected by ROW exclusion or avoidance, which is the fewest restrictions on development. Alternative A has the fewest impacts on the lands and realty program.

Alternative B would limit development and surface disturbance in PPH through ROW exclusion or avoidance on approximately 95 percent of GRSG habitat. Because of this, fewer acres would be available for land use authorizations, which would have a far greater impact on the lands and realty program than would Alternative A.

Alternative C would limit development and surface disturbance through ROW exclusion on 100 percent of GRSG habitat and would have the greatest impact on the lands and realty program. No BLM-administered or National Forest System lands within GRSG habitat would be available for land use authorizations without restrictions.

Alternative D would limit development and surface disturbance in areas capable of supporting sagebrush from identifying ROW avoidance areas on approximately 53 percent of GRSG habitat. This alternative would have greater impacts on the lands and realty program than Alternative A but fewer impacts than Alternatives B and C.

4.6. Vegetation (Forests, Rangelands, Riparian and Wetlands, and Noxious Weeds)

4.6.1. General Description

This section discusses impacts on vegetation, forests, rangelands, riparian and wetlands and noxious weeds from proposed management actions of other resources and resource uses. Existing conditions concerning vegetation are described in **Section 3.5**, Vegetation (Forest, Rangelands, Riparian and Wetlands, and Noxious Weeds).

4.6.2. Methodology and Assumptions

General Impacts on Vegetation

Indicators of impacts on vegetation and the measurements used to describe the impacts (where available or appropriate) are described below:

- Change in Vegetative Cover

Complete removal of vegetation, or a reduction in composition, frequency, or canopy cover of vegetation associated with the ecological site.

- Change in Soil and Water Properties

Vegetation removal within the riparian or wetland area; the inability to meet BLM Colorado Public Land Health Standards; surface disturbances that increase soil compaction, reduce water availability within the rooting zone, or alter the native plant community; declining vegetative production within the riparian or wetland area; the site no longer meets the site potential based on ecological site conditions (i.e., vegetation type, diversity, density, and vigor).

- Change in Vegetative Composition

Indicators include composition, frequency, age-class structure, presences/abundance of noxious weeds, and cover.

- Preservation of Vegetation

Acres of intact vegetation preserved.

Assumptions

- Upland vegetation resources would be managed to meet BLM Colorado Public Land Health Standard #3.
- Methods and projects that help restore watersheds, desirable vegetation communities, or wildlife habitats (including surface disturbance associated with these efforts) would benefit upland and riparian vegetation resources over the long term.
- Noxious and invasive weeds would continue to be introduced and spread by ongoing vehicle traffic in and out of the public lands, as the result of recreation, wildlife and livestock grazing, and surface-disturbing activities. Weeds and pests would be controlled in coordination with the appropriate county weed and pest control districts and with owners of adjacent property, complying with the state's plan for weed eradication and control.
- The BLM/USFS would implement standard operating procedures, BMPs, and mitigation measures described in LUPs, EISs, and environmental assessments to protect upland and riparian vegetation resources.
- Riparian/wetland resources would be managed to meet BLM Colorado Public Land Health Standard #2.
- The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors: proximity to drainages and wetlands, location within the watershed, time and degree of disturbance, reclamation potential of the affected area, existing vegetation, precipitation, and mitigating actions applied to the disturbance.
- Climatic fluctuations would continue to influence the health and productivity of PPH and vegetation annually.
- Increased level of roads, ROWs, and other development will negatively affect habitat quality.
- Maximum allowed disturbance under each alternative will be reached at some point in the future.

Implementing management actions for the following resources would have negligible or no impact on vegetation management and are therefore not discussed in detail: mineral split estate, and ACECs.

4.6.3. Direct and Indirect Impacts on Vegetation

Impacts from Travel Management on Vegetation

Changes in Vegetative Cover

Riparian areas and wetland concerns resulting from motorized uses include road encroachment, increased dust deposits on plants, and invasive species introduction. In recent years, cross-country travel throughout public lands has resulted in several user-created trails that directly impact riparian vegetation. Travel management actions would result in indirect beneficial impacts on riparian vegetation due to improved watershed conditions. As route density decreases, improvements to upland vegetation would increase infiltration, reduce channelized runoff reaching riparian areas, and provide upland forage, thereby reducing utilization pressures in riparian areas.

Changes in Soil and Water Properties

Roads and travel within wetlands and riparian areas can result in rutted and compacted soils and a lowering of the water table, affecting the wetland ecosystem of plant and animal communities that depend on the soil and water. Removing vegetation and litter decreases the soil's nutrient cycling and soil moisture. Compaction reduces the soil's ability to store water and can lower the water table and cause the loss of wetlands. Compacting or altering banks can ultimately increase bank erosion, lowering the water table and drying out the wetland zone. Indirect impacts on riparian vegetation (such as sedimentation) would continue to occur as the result of trails draining into riparian areas. Restricting use to existing routes would result in continued impacts on riparian vegetation because most existing roads and trails are user created and are already impacting riparian areas. TLs could also help restrict travel during snowmelt, when soils are more likely to be saturated and easily rutted and compacted, altering runoff characteristics and potentially increasing the sediment load delivery to a wetland or riparian zone.

Summary of Impacts by Alternative

Alternative A would result in the largest amount of potential surface disturbances, including direct impacts on wetland vegetation from cross-country travel.

The action alternatives, B, C, and D, eliminate cross-country travel, which would decrease the creation of new routes that cross or travel in wetland or riparian areas. Alternatives B, C, and D also would require the development of travel management plans, including the designation of routes for administrative use only where appropriate. These alternatives would restore and seed closed routes identified in the travel management plans. Reducing the road density improves watershed health, indirectly benefitting the riparian areas.

Although direct impacts from planned routes on wetland vegetation are generally limited to unavoidable crossings, Alternatives B and C could further reduce the potential for direct or indirect impacts within GRSG habitat. New route construction would be limited to realignments or would be made to increase motorist safety, which could reduce surface disturbances in or affecting wetlands.

Alternative D would still allow new routes where they would not adversely impact GRSG, which could result in more indirect impacts on wetland vegetation than Alternatives A and B. Where valid existing rights exist, however, new road construction could still occur under Alternatives B, C, and D if no road exists. Alternative C would require a 4-mile buffer around leks, which

could result in a road alignment that has greater direct or indirect impacts on wetland vegetation than under Alternatives A, B, and D.

Although direct impacts from planned routes on wetland vegetation are generally limited to unavoidable crossings, Alternatives B and C could further reduce the potential for direct or indirect impacts within GRSG habitat. New route construction would be limited to realignments or would be made to increase motorist safety, which could reduce surface disturbances in rangeland areas. Alternative D would still allow new routes where they would not adversely impact GRSG, which could result in more indirect impacts on upland vegetation than Alternatives A and B. Where valid existing rights exist, however, new road could still be constructed under Alternatives B, C, and D if no road exists. Alternative C would require a 4-mile buffer around leks, which could result in a road alignment that has greater direct or indirect impacts on upland vegetation than under Alternatives A, B, and D.

Impacts from Recreation Management on Vegetation

Changes in Vegetative Cover

Direct impacts on riparian and wetland vegetation communities are generally avoided in planned actions. Carefully designed and developed trails and sites can help direct users to more sustainable areas, thereby reducing impacts (compared to user-created ones). Mitigation measures could reduce the impacts on riparian vegetation on a project-specific basis (such as a boardwalk in a wetland area); however, visitor impacts often extend beyond the designed trail network and developed facilities. The increasing numbers of recreationists, especially along river corridors, can result in campsites and trails being located in the riparian area, removing the native vegetation, and introducing invasive species.

Changes in Soil and Water Properties

Recreation and visitor travel within wetlands and riparian areas can result in rutted and compacted soils and a lowered water table. This could affect the wetland ecosystem of plant and animal communities that depend on the soil and water. Removing vegetation and litter decreases the soil's nutrient cycling and soil moisture. Compaction reduces the soil's ability to store water and can lower the water table and cause the loss of wetland conditions. Compacting or altering banks can ultimately increase bank erosion, lowering the water table and drying out the wetland zone.

Concentrating use at developed sites can result in less impact on the river's adjacent riparian vegetation. Anglers accessing streams can create multiple trails to the river along steep unstable slopes. These trails increase erosion and decrease the vegetation along the stream banks. Routes within small riparian areas have resulted in braided stream channels, streambank damage, and weed introduction.

Summary of Impacts by Alternative

Recreation authorized under SRPs can result in direct and indirect negative impacts on wetland vegetation, typically through surface disturbance associated with motorized/mechanized travel and large group activities, such as hiking, biking, and camping. Alternatives B, C, and D would provide some level of indirect protection by limiting potential surface disturbance in PPH associated with SRPs and by limiting the type and timing of use under the SRP. Alternative C, in buffering leks by 4 miles, could displace recreationists to wetland/riparian areas (or areas tributary to them), increasing direct and indirect adverse impacts.

Impacts from Lands and Realty Management on Vegetation

Loss of Vegetation Cover

Construction and maintenance of ROWs, pipelines, power lines, and communication sites may result in direct loss of vegetation, fragmentation, degradation, and conversion to other habitat types. Ground disturbance during construction directly removes vegetation. Certain ROWs, such as roads and communication facilities, may lead to permanent loss of vegetation. Other ROWs, such as pipelines or buried power lines, may lead to a more short-term loss of vegetation if the area is reclaimed after construction. In many cases, the reclamation results in a change in species composition and structure.

ROWs may also reduce the patch size of vegetation communities (fragmentation). This would decrease the acres of large undisturbed vegetation and increase the number of smaller patches and edge habitats.

Ground-disturbing activities may degrade plant communities by providing a niche for the invasion of noxious weeds and other undesirable species. Increased vehicular travel required for access would provide new vectors for the transport of noxious weeds into uninfested areas. If left unchecked, noxious weeds often outcompete native species and form large contiguous patches that reduce overall vegetation diversity.

The BLM classifies lands as open, avoidance, or exclusion areas for the permitting of land use authorizations (ROWs). **Table 2.2**, Comparative Summary of Alternatives, shows the acres of ROW exclusion and avoidance areas in the decision area for each alternative, which are described in detail in **Table 2.3**, Description of Alternatives A and B, and **Table 2.4**, Description of Alternatives B, C, and D. Excluding, limiting, or collocating ROWs in GRSG habitats would protect sagebrush and riparian communities. Conversely, if ROW disturbances are moved into other habitat types, such as pinyon-juniper woodlands or mesic mountain shrublands, there may be a disproportionate loss of these vegetation communities.

Alternative A-This alternative would place the fewest restrictions on the development of new ROWs. Some protections would be provided for special designations, such as WSAs and ACECs, for threatened and endangered species, and for riparian areas. There would be no disturbance cap for construction of new ROWs. Possible loss of vegetation or decreases in patch size would be greatest under this alternative.

Alternative B-Under Alternative B, PPH would be managed as an exclusion area, and PGH would be managed as an avoidance area for new BLM ROWs or USFS SUPs. All new ROW authorizations would be designed to minimize the need for new ground disturbance by collocating new authorizations within existing ones and by using a minimum standard requirement, where valid existing rights require new authorizations. Additionally, a 3 percent disturbance cap would be placed on PPH. This alternative would result in less loss and fragmentation of sagebrush and riparian habitat (PPH), compared to Alternative A; however, it could result in greater loss of non-GRSG habitat as ROW actions may be displaced to adjacent areas.

Alternative C-This alternative is similar to Alternative B, except that ADH would be managed as a ROW exclusion area, and the 3 percent disturbance cap would apply to ADH, not just PPH. This alternative would result in the least amount of disturbance and loss of vegetation within GRSG habitat; however, it could displace the most new ROWs into non-sagebrush or riparian

habitat, creating a disproportionate loss of mesic mountain shrubs (oakbrush and serviceberry) and forest or woodland vegetation.

Alternative D-This alternative would make PPH and PGH a ROW avoidance area. A 5 percent disturbance cap would apply to PPH only. This alternative would be less restrictive than Alternatives B or C. It would issue new ROW permits only if they would not adversely affect GRSG populations, except where these limitations would make accessing valid existing rights impracticable. This alternative would result in less loss of GRSG habitat than Alternative A but more than Alternatives B or C. This alternative may result in less impact on non-sagebrush vegetation types through displacement of activities.

Preservation of Vegetation

Acquisition and disposal of public lands are tools to achieve management objectives, such as improving management efficiency or providing more contiguous federal ownership patterns. Select lands with high resource values, such as occupied habitat for special status species, significant cultural resources, riparian areas, and important wildlife habitat, may be identified for retention or acquisition to protect these resources.

Alternative A-Existing LUPs within the planning area identify certain lands for retention, such as WSAs, ACECs, and the Roan Plateau. Acquisitions of private land inholdings and other lands with important resource values are encouraged or allowed. Few acres are specifically identified for disposal, but most plans consider disposal to achieve management objectives. Alternative A would allow for the most flexibility in conducting land tenure adjustments. Resource values such as habitat for GRSG and other special status species would be considered in evaluating the benefits of proposed land exchanges.

Alternative B-Under this alternative, PPH would be retained in public ownership. The exception is where there is mixed ownership and a land exchange would allow for more contiguous federal ownership patterns within PPH. Retention of additional acres of public land would generally be beneficial for preserving vegetation. Alternative B would also encourage consolidation of GRSG habitats, which would improve protection and preservation for sagebrush and riparian vegetation, compared to Alternative A.

Alternative C-This alternative is similar to Alternative B, without the exception to allow disposals in PPH to consolidate ownership. Impacts on vegetation are the same as or similar to Alternative B.

Alternative D-Alternative D is similar to Alternative B, except that disposal of isolated tracts of public land that would not alter GRSG populations would be allowed. Impacts on vegetation resources are the same as or similar to Alternative B.

Public lands that are withdrawn from mineral entry to protect high resource values or to protect another land use activity, such as a military training range. Lands not withdrawn from locatable mineral entry are open to mining claim location and subject to associated surface-disturbing activates. Locatable minerals include gypsum, gold, copper, and limestone. Locatable mineral development is governed under the General Mining Law of 1872. The scale of locatable mineral development can vary tremendously, and associated disturbances can last for many years. BLM approval is not needed for locatable mineral exploration if proposed actions disturb no more than 5 acres of land per year. For exploration involving more than more than that and for actual mining operations regardless of acreage, the mining claimant must submit a plan of operations for

approval by the BLM before mining can begin. Withdrawing areas from mineral development would be beneficial to vegetation, preventing impacts from surface disturbances in these areas.

Alternative A-Few lands are proposed for withdrawal under existing LUPs, except in the WRFO, where substantial acreage is withdrawn from mineral entry. In all offices, if WSAs are designated as wilderness by Congress, s all mineral leasing would cease, however valid existing rights would remain. Alternative A would petition to withdraw fewer acres from consideration for mineral entry than Alternatives B and C and would potentially result in greater loss of vegetation.

Alternatives B and C-Under Alternatives B and C, PPH would be proposed for mineral withdrawal. This action would prohibit surface disturbances associated with locatable mineral development on all PPH. In addition, these alternatives would not approve withdrawal proposals not associated with mineral activity unless the land management would be consistent with GRSG conservation measures. This action would prevent other activities not compatible with GRSG conservation. These alternatives would protect more acres of vegetation than Alternative A.

Alternative D-Under this alternative, PPH would not be withdrawn from mineral entry, and other withdrawal proposals would be considered on a case-by-case basis. Impacts on vegetation are the same as or similar to Alternative A.

Impacts from Wind Energy and Industrial Solar Development on Vegetation

Change in Vegetative Cover and Change in Soil and Water Properties

Development of solar and wind projects would remove vegetation in the short term, and solar projects would likely have long-term impacts on vegetation. For all projects, revegetation planning would be required. Wind and solar resource production is permitted via ROWs through the BLM's lands and realty program.

Construction and maintenance of wind or solar projects may result in the direct loss of vegetation, fragmentation, or conversion to other habitat types. Access roads and facility construction would remove vegetation and potentially introduce weed seeds. Solar facilities would result in habitat conversion as woody species would be removed before the solar panels were installed. The Solar Energy Programmatic EIS (BLM 2012 describes site preparation as including grading and site clearing if it is not possible to leave natural contours in place.

Anticipated threats to riparian areas would be from leaks or spills from maintenance and construction. Impacts would depend on proximity to water. No immediate threats exist as there are no wind or solar facilities nor have any been proposed within the planning area. Potential for commercial wind and solar projects in the planning area is minimal as no areas of high potential have been identified.

As stated under *Impacts from Lands and Realty Management on Vegetation*, the BLM classifies lands as open, avoidance, or exclusion areas for the permitting of land use authorizations (ROWs). **Table 2.2**, Comparative Summary of Alternatives, shows the acres of ROW exclusion and avoidance areas in the decision area for each alternative, which are described in detail in **Table 2.3**, Description of Alternatives A and B, and **Table 2.4**, Description of Alternatives B, C, and D. Excluding, limiting, or collocating ROWs in GRSG habitats would protect sagebrush and riparian communities. Conversely, if ROW disturbances are moved into other habitat types, such as pinyon-juniper woodlands or mesic mountain shrublands, there may be a disproportionate loss of these vegetation communities.

Alternative A-PPH and PGH restrictions do not apply. Wind and solar projects could be permitted if proposed. Project design approval could be limited by ROW exclusion and avoidance stipulations, and standard vegetation BMPs would apply. Wind and solar projects could result in vegetation loss and fragmentation, which would be greatest under Alternative A. This alternative places the fewest restrictions on wind and solar development, and projects would not be limited by a disturbance cap. While impacts on riparian areas from wind and solar projects are expected to be minimal, Alternative A presents the greatest risk to riparian areas as it is the least restrictive.

Alternative B-While no specific limitation exists for wind and solar development, approval would be limited by disturbance limits, and PGH would be ROW or SUA avoidance areas. ROW guidance would limit opportunities for wind and solar development, thus limiting any loss or fragmentation of vegetation. Fewer acres of vegetation would be fragmented or lost under this alternative than under Alternative A. Additionally, a 3 percent disturbance cap would be placed on PPH. This alternative would result in less loss and fragmentation of sagebrush and riparian habitat (PPH) compared to Alternative A, but it may result in a loss of non-GRSG habitat as ROW actions may be displaced to adjacent areas.

Alternative C-Wind and solar development would not be approved in occupied GRSG habitat, so there would be no loss or fragmentation of vegetation there. A 3 percent disturbance cap would apply to ADH. This alternative would result in the least amount of disturbance and loss of vegetation within GRSG habitat but may result in the most displacement of new ROWs into non-sagebrush or riparian habitat. This would create a disproportionate loss of mesic mountain shrubs (i.e., oakbrush and serviceberry) and forest or woodland vegetation.

Alternative D-This is similar to Alternative B, with a 5 percent disturbance cap placed on GRSG habitat.

Impacts from Range Management on Vegetation

Most of the GRSG habitat in northwest Colorado is used for livestock grazing. Range management does have the potential to negatively impact vegetative communities if management is not adequate. Impacts include reduced reproduction, vigor, and residual cover used to stabilize soils and provide GRSG with nesting cover. In extreme circumstances there is a risk of changes of vegetative composition, which can inhibit the ability of rangelands to meet BLM Colorado Public Land Health Standards. Impacts on sagebrush habitats specifically, can be found in *Impacts from Range Management on Greater Sage-Grouse*.

Changes in Vegetative Cover

Livestock grazing in riparian areas can also have negative impacts on riparian health. Livestock often congregate in riparian areas for both water and forage. Heavy use in riparian areas can decrease the density of obligate riparian vegetation that is required to stabilize stream banks during high water flow. Livestock grazing can be compatible with riparian areas when capability, function, and potential of the site are folded in with the grazing management plan.

Management actions described in each of the alternatives for range management would aid in improving or maintaining upland and riparian vegetation health within GRSG habitat. These actions primarily revolve around prioritizing completion of land health assessments in GRSG habitat, working on integrated ranch plans to improve GRSG habitat at a landscape level, managing GRSG habitat so vegetation composition is consistent with ecological site descriptions, planning livestock management to meet seasonal GRSG needs, managing riparian areas for

proper functioning condition) or Forest Plan standards and guidelines, and limiting development of new range improvements, except in instances where the range improvement would enhance GRSG habitat.

Alternative A-Alternative A is the least restrictive of all the alternatives. Livestock grazing is managed according to each field office's LUP or the Routt National Forest Plan. General grazing management is geared toward meeting BLM Colorado Public Land Health Standards, but there are no specific management actions specifically for GRSG habitat; however, if BLM Colorado Public Land Health Standards are being met, vegetation composition, vigor, and seed production is adequate for maintaining healthy vegetative communities. Management for riparian areas is based on riparian proper functioning condition or Forest Plan standards and guidelines, but again, there are no specific management actions for GRSG habitat.

Alternative B-Alternative B has moderate restrictions on grazing management within GRSG habitat. Management primarily focuses on completing integrated ranch planning to aid in improving GRSG habitat at a landscape level, completing land health assessments on ADH, creating livestock grazing objectives that aim at keeping vegetation composition consistent with ecological site descriptions, and managing livestock use to meet seasonal needs of GRSG. New range improvements would be authorized only when they would improve or enhance GRSG habitat. This alternative is more restrictive than Alternatives A and D but less restrictive than Alternative C. Alternative B also has the greatest restrictions on diverting water from seeps and springs. This management objective will improve riparian health by keeping water in the waterways and maintaining a water table conducive to producing healthy riparian vegetation for soil stability and water quality.

Alternative C-Alternative C has the greatest restrictions on livestock grazing, which would result in the greatest benefit to vegetation. In Alternative B, ADH would be managed as grazing exclusion areas. This would provide the greatest opportunity for improved vegetative growth, vigor, and seed production, while providing the most protection for riparian areas. Restricting grazing in ADH also reduces the probability of new weed invasions into vegetative communities.

Alternative D-Alternative D is less restrictive than Alternatives B and C but is more restrictive than Alternative A. Management objectives are primarily targeted at vegetative communities within ADH to be consistent with ecological site descriptions, similar to Alternative B and C; however, there is increased flexibility for managing public lands for other values the BLM/USFS find important. This extra flexibility will increase the likelihood of disturbing vegetative communities, but overall impacts on vegetative communities will be minimal.

Impacts of Wild Horse Management on Vegetation

Changes in Vegetative Cover

Wild horse management within the GRSG planning area generally focuses on maintaining wild horse populations within appropriate management levels. HMAs within GRSG habitat will receive first priority for wild horse gathers to maintain appropriate management levels. Maintaining HMAs within the prescribed appropriate management level will prevent overgrazing, which would benefit plant health, vigor, and seed production. Vegetation management in the HMAs would be geared toward maintaining vegetation composition that is consistent with ecological site descriptions and habitat requirements of the GRSG.

Alternative A-Alternative A would maintain the current management of HMAs as they are designated in field office LUPs. Priority for gathers would not be given to HMAs with GRSG habitat, which increases the potential for horse populations to grow in excess of appropriate management levels. Horse populations that exceed appropriate management levels would lead to increased use on vegetation within the HMA. Excess use by grazing horses could lead to decreased plant cover, composition, and vigor and in extreme circumstances could lead to changes in vegetation composition not consistent with the ecological site description.

Alternative B-Alternative B has the strictest measures on managing horses within the HMAs. Changes in vegetative cover would be maintained and or enhanced in areas where the current cover is less than described in the ecological site description. There would be potential indirect impacts on vegetative cover in HMAs that do not have GRSG habitat (e.g., Little Bookcliffs) because they would not be as high of a priority for gathers and there is an increased potential for horse populations to exceed the appropriate management level. Sand Wash Basin HMA would be the highest priority for removal, followed by Piceance/East Douglas HMA and North Piceance and West Douglas Herd Areas. These two herd areas currently have wild horse populations but are not designated for wild horse management. To the degree that the ADH management would give priority to gathering these areas, there would be less opportunity for wild horses to overgraze and cause decreased plant cover, composition, or vigor due to overpopulation.

Alternative C-Alternative C is the same as Alternative B.

Alternative D-Alternative D is similar to Alternatives A and B but gives more flexibility, depending on other management objectives of the BLM/USFS. Plant community health would still be aimed at meeting ecological site descriptions, which are beneficial to plant community health. Maintaining appropriate management levels and prioritizing gathers in HMAs within GRSG habitat would aid in maintaining health plant communities.

Impacts from Fluid Minerals Management on Vegetation

The development and maintenance of fluid minerals production facilities often impacts vegetation. Loss of vegetation through the direct disturbance of drilling and production pads, roads, compressor stations, and other structures has occurred throughout the affected area.

Unleased Fluid Minerals

Change in Vegetative Cover

For areas within PPH that are not currently leased, vegetation loss, weed establishment, and increased human activity from fluid mineral development would not occur, resulting in no negative impacts on plant communities. Activities related to geophysical exploration are temporary, with very minor surface disturbances. The continuation of these activities would not result in adverse impacts on plant communities, particularly within the larger landscape. Closing all occupied GRSG habitat to fluid mineral leasing would expand the amount of vegetation that would not be subject to direct removal or weed invasion. Impacts under Alternative C are similar to those described under Alternative B but over the larger areas of GRSG habitat.

Because Alternative A would allow the most development and/or surface disturbing activities, it would be expected to cause the most changes in vegetative cover when compared to the action alternatives. Alternative C would place the most restrictions on development of resources and land uses, and would therefore be expected to have the smallest impact on changes in vegetative

cover. Alternative B would be expected to have greater impacts on changes in vegetative cover than Alternative C, and fewer impacts than Alternative D.

Change in Vegetative Composition

The development and maintenance of fluid minerals production facilities results in direct impacts on vegetation through removal and indirect impacts from increased vectors for weed invasion. Loss of vegetation through the direct disturbance related to drilling and production pads, roads, compressor stations, and other structures has impacted numerous vegetation communities throughout the affected area. Fluid mineral disturbances have also provided vectors for noxious weeds; weeds have invaded not only areas within and next to disturbances but have also resulted in weed presence in otherwise intact and healthy plant communities. The restrictions and, in some cases, elimination of new facilities associated with fluid minerals would be beneficial to plant communities.

Because Alternative A would allow the most development and/or surface disturbing activities, it would be expected to cause the most changes in vegetative composition through compaction and increased risk of introduction of invasive species when compared to the action alternatives.

Alternative B would be expected to have greater impacts on changes in vegetative composition than Alternative C, and fewer impacts than Alternative D.

Alternative C would place the most restrictions on development of resources and land uses, and would therefore be expected to have the smallest impact on changes in vegetative composition.

Alternative D would be expected to result in greater changes to vegetative composition than Alternatives B and C, but would be expected to result in fewer changes to vegetative composition than Alternative A.

Leased Fluid Minerals

Change in Vegetative Cover

For areas within PPH that are currently leased, some level of fluid minerals development and associated impacts on plant communities would occur within PPH, albeit at diminished levels. For PPH, the implementation of NSO requirements would result in no losses of vegetation from fluid mineral development. Where exceptions to this would apply, the 3 percent per section disturbance cap within PPH would effectively reduce related impacts, though they would continue to occur.

Alternative A-Under this alternative, the development of leased minerals would be under the guidance of applicable existing LUPs, which allow for more development than any of the action alternatives. This could result in the most changes in vegetative cover.

Alternative B-The emphasis on master development plans over the permitting of wells on a project-by-project basis via applications for permits to drill would result in more orderly development where it continues to occur within PPH. Under this scenario, it would be easier to work with fluid minerals development companies and to plan coordinated reclamation activities across a lease. This would better facilitate long-term planning and assessment of plant community health. The increase in reclamation bonding would better ensure that long-term impacts on vegetation would be minimized or eliminated through increased efforts to ensure that reclamation is successful.

Alternative C-This alternative would increase the area subject to the 3 percent per section disturbance cap to new wells permitted via applications for permits to drill on all occupied habitat. This would further reduce the areas subject to vegetation loss and disturbance.

Alternative D-Whereas Alternatives B and C specify disturbances at 3 percent per section (with the understanding that not all sections are equal in size), this alternative would be more restrictive in allowing for fluid minerals-related disturbances by using the 5 percent per MZ cap, with resulting decreases in the potential for vegetation loss or disturbance.

Impacts from Solid Minerals–Coal Management on Vegetation

Change in Vegetative Cover and changes in Vegetative Composition

For areas within PPH that are currently leased, some level of coal development and associated impacts on plant communities would occur within PPH, albeit at diminished levels. Impacts from coal management on changes in vegetative cover and changes to vegetative composition would be similar to those described under *Impacts from Fluid Minerals Management on Vegetation*.

Alternative A-Under this alternative, coal development would be under the guidance of applicable existing LUPs, which allow for more development of coal than any of the action alternatives. This could result in the greatest level of adverse changes in vegetative cover.

Alternative B-Surface mining coal removes large areas of vegetation, from the initial removal of material to the final release of bond for reclamation; this is a process that can last for many years. Since reclamation plans generally call for the restoration of the herbaceous component of the native plant community, shrubs and trees must colonize naturally. This would result in a much greater interval of return of a truly intact plant community. Minimizing surface-disturbing activities within all occupied GRSG habitat would have a beneficial effect on native vegetation communities. Closing PPH to all surface coal mining would eliminate the potential for vegetation impacts from this activity.

Subsurface coal mining generally has no impact on livestock operations on public lands. Associated surface facilities are typically located on private lands. In the case of longwall mining, subsidence does occur, which can result in falling cliff faces and altered stream courses, but livestock operation impacts are negligible. The standards applied to subsurface operations in PPH under this alternative would have no impacts on vegetation on public lands.

Alternative C-Impacts from this alternative are the same as for Alternative B.

Alternative D-Existing coal leases already impact vegetation where operations are occurring. Where operations would move into new areas within those leases, the application of PDFs would not appreciably change the impact that surface or subsurface coal operations have on plant communities. Impacts from new surface and underground leases are similar to both Alternative B and C, except the surface disturbance from all coal mining and related activities would be limited to 5 percent.

Impacts from Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on Vegetation

Impacts from these programs on vegetation are the same as the impacts described under *Impacts from Fluid Minerals Management on Vegetation*.

Impacts from Fuels Management on Vegetation

Change in Vegetative Cover and Change in Vegetative Composition

In most of the planning area, fuel conditions have changed from historic conditions because of management practices and the spread of nonnative species. Fire exclusion, in the form of fire suppression, has greatly affected fuel conditions. This management practice results in increased fuel loadings because fires are more infrequent than historic fire-return intervals. Sagebrush within this habitat is also transitioning to an older age class that is more decadent, with high fuels loading that can support large severe wildfires. These increased fuel loadings are leading to higher severity fires that require more post-fire rehabilitation.

The main structural change in what were historically sagebrush shrublands is the encroachment of pinyon and juniper, other conifers, and other woody shrubs into the sagebrush. Over time the encroachment will increase the fuels loading, causing an upward shift in fire behavior. This increases the resistance to control, decreasing the effectiveness of firefighting efforts. Additionally some of the GRSG habitat is next to timbered slopes of Douglas fir and subalpine fir. These timber stands are generally in poor health, with mortality from bark beetle and other insects and disease. There is high fire potential in these stands, which are often next to sage brush within GRSG habitat.

Fuels management has both short- and long-term impacts on vegetation. In the short term, vegetation will be lost, but in the long term, fuels management would improve vegetative health, composition, and productivity. Additionally, in the long term, fuels treatments would prevent uncharacteristically large or intense wildfires that could damage large expanses of vegetation. If fuels treatments are unsuccessful, habitat may be converted to exotic annuals and other weedy species. Assuming all fuels projects would be designed and managed to meet BLM Colorado Public Land Health Standards, negative impacts on uplands and riparian areas would not be anticipated. Fuels treatments in riparian areas would primarily be to remove tamarisk, Russian olive trees, and noxious weeds or to protect cottonwood galleries.

Alternative A-PPH and PGH restrictions do not apply. Fuels projects could be implemented without disturbance limits. Project design would be limited by ESA and National Historic Preservation Act compliance. Habitat improvement and restoration projects would be implemented for livestock, wildlife, and fuels reduction. Since Alternative A would have the fewest restrictions for fuels treatments, the greatest number of acres would be available to for treatment. While Alternative A may result in the largest amount of short-term vegetation loss, long-term impacts include increases in vegetation composition and health.

Alternative B-Fuels projects could not reduce sagebrush canopy cover below 15 percent, with the exception of fuels breaks. In PPH, seasonal restrictions would apply to fuels treatments, and prescribed fire would be excluded in sagebrush habitat where there is less than 12 inches of annual precipitation. Treatments would be to rest areas from livestock grazing for two full growing seasons. Fuels treatments would use native plant seeds, with exceptions for availability and probability of success when nonnative seeds will meet GRSG objectives. Restrictions in Alternative B would reduce the opportunity for fuels treatments and limit treatment objectives, which would lead to fewer acres treated. Under this alternative, treatments would be limited to those that benefit GRSG or the identified GRSG objectives. Restrictions would also limit the number of acres treated and potentially the effectiveness of the treatments. Fewer acres would be treated under Alternative B than Alternative A.

Alternative C-The impacts are similar to Alternative B.

Alternative D-The impacts are similar to Alternatives B and C. This alternative would allow for more acres treated than Alternatives B and C but would not treat as many acres as Alternative A.

Impacts from Fire Operations on Vegetation

Change in Vegetative Cover and Change in Vegetative Composition

The BLM/USFS management practices include the control of wildfires in some areas, the use of fire either through prescribed burning or the management of wildfires in order to meet land management goals, and the treatment of vegetation so that fires are more controllable in areas where values at risk are higher. Wildland fire management on BLM-administered and National Forest System lands is guided by a fire management plan that considers the three elements mentioned above, as well as firefighter and public safety and cost effectiveness.

Fire is an inherent component of ecosystems and historically has had an important role in promoting plant succession and the development of plant community characteristics. Control of fires and other land use practices during the last century has changed plant communities by altering the frequency, size, and severity of wildfires.

Indicators of wildland fire ecology and management is summarized through fire regime and condition class classifications. Fire regimes are used as part of the FRCC discussion to describe fire frequency (average number of years between fires) and fire severity (effect of the fire on the dominant overstory vegetation-low, mixed, or stand replacement). These regimes represent fire intervals prior to Euro-American settlement and are calculated and classified by analyzing natural vegetation, known fire cycles, and fire history data. Condition class indicates the degree of departure from the historic fire regime (Hann and Bunnell 2001 [Table 3.35]). While the fire regime of a particular area is not likely to change except in the very long term, the condition class can be changed through fire management and other vegetation management actions. Extreme departure from the historic fire regime results in changes to one or more of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g., insect and disease mortality, grazing, and drought).

Depending on size, location, severity, intensity, and vegetation, wildfire would have short-term impacts on vegetation, resulting in vegetation removal and soil disturbance from suppression actions. Fire can also lead to the proliferation of cheatgrass in lower precipitation zones and subsequent habitat degradation. In the long-term, wildfire can be beneficial, resulting in a mixed serial stage, greater vegetative diversity, and habitat restoration.

Changes in Soil and Water Properties

In riparian areas the loss of vegetation can increase sediment (due to erosion), water temperature, and algae levels (due to the removal of canopy cover in riparian areas) until vegetation stabilizes the uplands and banks. Fires would be suppressed in cottonwood galleries to preserve stands.

Alternative A-PGH restrictions do not apply. Fire suppression would be guided by individual field office's fire management plans. A greater acreage of sagebrush may be burned in Alternative A since it is the least restrictive on wildland fire management. As a result, a greater loss of vegetation could occur under Alternative A. This could increase sediment loads, water

temperatures in riparian areas, and algae levels in areas that have been burned and experienced heavy vegetation loss.

Alternative B-Fire in PPH and PGH would be suppressed to conserve habitat. Fewer acres of sagebrush habitat would be converted to an early seral stage than under Alternative A. However, there could also be a greater potential for catastrophic fire as a result of fire suppression and exclusion. As a result of habitat restrictions, more fires would be suppressed in the surrounding vegetative communities to protect sagebrush, and less habitat would be lost to fire. However, increased fire suppression could also contribute to larger catastrophic fires due to increases in fuel loading in areas outside of PPH. Changes in soil and water properties would be more likely to occur outside of PPH under this alternative.

Alternative C-In PPH, fires would be suppressed to conserve GRSG habitat. Impacts would be the same as Alternative B.

Alternative D-Alternative D would also prioritize suppression in PPH and PGH, but suppression activities would also take into account all resource values managed by the BLM/USFS. Changes in soil and water properties would be more likely to occur under this alternative outside of PPH and PGH, than under the other action alternatives.

Impacts from Emergency Stabilization and Rehabilitation on Vegetation

Change in Vegetative Cover and Change in Vegetative Composition

ESR in burned areas is a stop gap measure to manage post-fire threats to human life and safety and to preclude further damages to critical natural and cultural resources as a result of wildfire damages. ESR is planned actions performed by burned area emergency response teams within 1 year of wildfire containment to stabilize and prevent unacceptable degradation of natural and cultural resources, to minimize threats to life or property from the impacts of a fire, or to repair, replace, or construct physical improvements to prevent degradation of land or resources. Burned area rehabilitation is undertaken within 3 years of wildfire containment to repair or improve fire-damaged lands unlikely to recover naturally to management approved conditions, or to repair or replace minor facilities damaged by fire (US Department of the Interior 2004).

Following a wildfire, ESR stabilizes and prevents unacceptable degradation of natural and cultural resources. Post-wildfire ESR assists in stabilizing soils, replenishing the seed bank, and addressing weed threats. These activities are typically designed to restore the vegetative cover and to assist post-fire recovery. Post wildfire cheatgrass conversion is one of the biggest challenges across the planning area. If successful, ESR will reduce erosion, aid in reducing cheatgrass invasion, and maintain appropriate fire return intervals. ESR benefits both upland and riparian vegetative communities.

Alternative A-PPH and PGH restrictions do not apply. ESR would be guided by individual field office's fire management plans and LUPs. A greater acreage of sagebrush may be burned under this alternative and thus require ESR. More sagebrush may be removed by fire and replaced by early seral species.

Alternative B-In PPH and PGH, fires would be suppressed to conserve habitat. Fewer acres of sagebrush habitat would be converted to an early seral stage than under Alternative A, thus fewer acres may require ESR. The emphasis on native seed and reestablishment of species-appropriate sagebrush seed would improve habitat quality. In the absence of fire or fuels treatments, this

alternative may result in more decadent sagebrush stands with depleted understories. However, the risk of catastrophic fire as a result of fire suppression or exclusion could lead to larger ESR projects for Alternatives B, C, and D.

Alternative C-In PPH, fires would be suppressed to conserve habitat. Depending on individual field office's fire management plans, fewer acres would require full suppression under Alternative C than Alternative B, thus a greater number of acres may require ESR. In comparison to Alternative B, fewer acres of decadent sagebrush would be expected. ESR guidance would be the same for both PPH and PGH and would require livestock exclusion from the treated areas. Under Alternative C, a greater emphasis would be placed on developing sources for native seed, potentially increasing ESR costs due to native seed costs.

Alternative D-This is the same as Alternative C, but the reestablishment of sagebrush would not be required if GRSG habitat objectives were being met.

Impacts from Habitat Restoration on Vegetation

Sagebrush ecosystem restoration could both protect and disturb special designation area resources. Sagebrush restoration activities that would protect the natural character include reclamation of roads, trails, and other disturbed areas, dust abatement on roads and disturbed surfaces, native grass and plant seeding, removal of perennial grass seeded areas, transplanting sage brush, burial of power lines, prevention or treatment of invasive species, clustered and unitized development on mineral leases, and reduction of wildfire threats.

Change in Vegetative Composition

A concern of habitat restoration is the invasion of undesirable plant species from soil disturbance. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds. Cheatgrass invasion is also a threat to some treatment areas. Invasive nonnative plants are increasing in some areas. Not only can invasive species outcompete most native plants when moisture is limited, they can also change site-specific fire ecology and result in the loss of critical shrub communities.

Change in Soil and Water Properties and Change in Vegetative Cover

Habitat restoration projects typically have multiple objectives: increasing forage for wildlife and livestock, reducing nonnative or weedy species, reducing pinyon/juniper invasion, reducing canopy coverage of woody species, replenishing seed banks, and creating a mosaic of vegetative age classes. In riparian areas, restoration projects may include stabilizing banks, removing invasive or exotic species, restoring native vegetation, and excluding livestock or big game use. While these projects typically result in short-term vegetation removal, much like fuels projects, they are typically designed to improve habitat and result in a more diverse, vigorous, healthy plant community. Once treated, no further disturbance may be desired during the life of the project, and treatment areas could become wildfire suppression areas.

Alternative A-Sagebrush ecosystem restoration could both protect and disturb special designation area resources. Sagebrush restoration activities that would protect the natural character include reclamation of roads, trails, and other disturbed areas, dust abatement on roads and disturbed surfaces, native grass and plant seeding, removal of perennial grass seeded areas, transplanting sage brush, burial of power lines, prevention/treatment of invasive species, clustered and unitized development on mineral leases, and reduction of wildfire threats.

Alternative B-In PPH, restoration projects that benefit GRSG would be prioritized. Fewer acres of sagebrush habitat would be converted to an early seral stage than Alternative A. Treatments would be rested from livestock grazing for two full growing seasons. Treatments would use native plant seeds, with exceptions for availability and probability of success when nonnative seeds will meet GRSG objectives. Restrictions would reduce the opportunity for restoration projects and limit treatment objectives, resulting in fewer acres treated, than under Alternative A. Treatments would be implemented only for the benefit of GRSG or the identified GRSG objectives. Restrictions would also limit the amount of acres treated and potentially the effectiveness of the treatments.

Alternative C-Impacts are similar to Alternative B but would include rehabilitating exotic seedings to recover sagebrush. Prohibitions would be placed on treatments to increase forage for livestock and big game within occupied habitat. Compared to Alternative B, more acres of vegetation may be removed in the short-term under Alternative C.

Alternative D-This is similar to Alternatives B and C, but more acres may be targeted for habitat restoration, depending on site-specific circumstances. Treatments that maintained 12 percent canopy cover of Wyoming sagebrush or 15 percent canopy cover of mountain sagebrush would not count against the total 30 percent anthropogenic disturbance cap. More vegetation may be removed than under Alternatives B and C.

4.6.4. Summary of Impacts on Vegetation

Alternative A provides the least amount of protection for vegetative communities in the planning area. Alternative A puts very few restrictions on development, which could result in the most modification of the landscape and consequently the most impacts on vegetation.

Alternative B provides a greater level of protection for vegetation than Alternative A, but it would provide a lower level of protection than Alternative C. Under Alternative B, reestablishment of sagebrush and desirable understory plant cover would be the highest priority for restoration in ADH. Impacts on vegetation under Alternative B would be expected to provide a higher level of protection for vegetation than Alternative A through restrictions on surface-disturbing activities. However, Alternative B would provide less flexibility in implementing vegetation treatments that are outside of PPH.

Alternative C would provide the most protection for vegetation. The most restrictions would be placed on surface-disturbing activities and development. Under Alternative C, treatments in occupied GRSG habitats would be avoided. Other areas outside of GRSG habitat would be a lower priority for restoration under Alternative C.

Alternative D would provide more protection through restrictions on surface-disturbing activities for vegetation than Alternative A but would provide less protection than Alternatives B and C. More flexibility for development is built into Alternative D for other resources. Alternative D would allow treatments in GRSG habitat which maintain a minimum level of cover. This would allow treatments in GRSG habitat that would benefit other species that depend on sagebrush habitats.

4.7. Wildland Fire Ecology and Management

4.7.1. General Description

This section analyzes potential impacts on the fuels and fire operations programs within wildland fire management from the management actions of other resources and their use. Current conditions for wildland fire management are described in **Chapter 3** (see **Table 3.25**, Fire Regime Condition Classes, for a description of FRCC).

4.7.2. Methodology and Assumptions

General Impacts on Wildland Fire Ecology and Management

Indicators of impacts on wildland fire ecology and management and the measurements used to describe the impacts (where available or appropriate) are described below:

Fuels

- Increase Project Cost

Cost per acre

Increased costs reduce project size and type of treatment to be applied within a given location. Activities outside of fuels treatments that alter vegetation would be beneficial.

- Increased Planning Time

Management actions that inhibit the use of treatments to prevent wildland fires through the NEPA process

Increased planning time would increase the cost and reduce the amount of area that could be treated.

- Decrease in Project Size

Management actions that inhibit the use of fuel treatments to prevent wildland fires; the average size of the projects

Fewer acres will be treated.

- Project Locations Shifted to Non-GRSG Habitats

Management actions that inhibit the use of fuel treatments to prevent wildland fires

More even-aged stands of sagebrush; more uniform fuel loading in the sagebrush

- An Upward Shift in FRCC

Condition class change

Increased departure from historical fire return intervals may increase the potential for a large fire as the condition class increases.

- Altered Project Design with Reduced Effectiveness

Condition class change; cost per acre and acres disturbed within the cap

Any management action that limits acres or the type of treatment will inherently alter the design and method of treatment.

- Increased Project Requests

Work requests

Increased funding for off-site mitigation work may be tied to hazardous fuels objectives; increased workload in specific areas that may deter or distract work in non-GRSG habitat

Fire Operations

- Increased Fire Suppression Cost

Cost per acre increase for management actions that require a level of action to preserve habitat will require the commitment of initial resources and additional resources to ensure that the expected level is met.

The commitment of resources may restrict the ability for a fire management unit to order additional resources for other suppression efforts.

- Reduced Fire Management Tactics

Human-caused disturbances

Reduced anthropogenic disturbances will cause a reduction in access for engines and other firefighting equipment and the ability to use a change in vegetation to manage a wildland fire.

- Reduced Flexibility in Response to Wildland Fire

In areas that allow fire to be managed for multiple objectives (resources benefits), there would be fewer acres available; decreased tools (retardant, heavy equipment, and access) allowed to manage the fire

Prioritization of suppression to conserve PPH and PGH; firefighter effectiveness would decrease due to reduced options to manage.

- Upward Shift in FRCC

Condition class change

Limiting disturbances, focusing vegetation treatments on one benefit, and prioritizing suppression to conserve PPH and PGH reduces the ability to keep vegetation on a more natural fire return interval.

- Reduced Potential for Human-Caused Ignitions

Number of human-caused wildland fire occurrences

Fewer travel routes open for use, fewer ROWs, and a decrease in development in GRSG habitat will decrease human interaction and potentially reduce the human-caused wildland fires.

- Downward Shift in FRCC Class

Acres in FRCCs 2 and 3 being reduced to FRCCs 1 and 2

Native grasses that control invasive brome species to prevent post-fire conversion to a different vegetative community will keep the FRCC in a state of nature that is consistent with the regular fire return interval.

Assumptions

The following list presents the basic assumptions related to wildland fire ecology and management that apply to the impacts assessment for Alternatives A through D in this EIS.

- All FRCCs will increase in departure if vegetation treatment actions are not taken and wildfires continue to be aggressively suppressed.
- Areas that receive vegetation treatments reduce the FRCC or maintain it at the desired level.
- Demand for fuels treatments would likely increase over the life of this plan.
- A direct relationship exists between fuel loading and potential fire intensity, severity, frequency, and size.
- Cost per acre of prescribed fire is less than mechanical treatments.
- Decreasing the size of a prescribed fire increases the cost per acre (economies of scale).
- There is an increased demand on suppression resources managing wildland fires to protect values at risk.
- Fewer options are available to manage wildland fires decreases firefighter effectiveness.

Implementing management actions for the following resources would have negligible or no impact on wildland fire ecology and management and are therefore not discussed in detail: wild horse management, solid minerals (coal), and ACECs.

4.7.3. Direct and Indirect Impacts on Wildland Fire Ecology and Management

Impacts from Travel Management on Wildland Fire Ecology and Management

Reduce Potential for Human-caused Fires

Limiting motorized travel to existing roads, primitive roads, and trails at a minimum would reduce the potential for human-caused fires. There are well documented occurrences of motorized travel causing wildfires during off-road use. During dry times of the year, cured grass comes in contact with vehicles' mufflers or catalytic converters and starts wildfires. The extent of the reduction in human-caused ignitions depends on the degree of off-road cross-county travel. Higher elevation sites are less likely to have vegetation in a cured state that is susceptible to wildfires from cross-country motorized travel. Weather conditions (temperature and relative humidity) at higher elevations are also not as conducive for wildfires.

Seasonal closures in GRSG habitat would have varying degrees of impacts on the human-caused wildfires. Generally, the less human use an open area has the less potential for human-caused fires. Winter habitat closures would have almost no effect since fire danger is generally low at that time of year. Seasonal closures in nesting/early brood-rearing habitat could slightly decrease human-caused wildfire risk in PPH because closures could last until July 15. The wildland fire management program would benefit by limiting human activities that cause fires activities from this seasonal closure in June and the first half of July when fire danger is higher.

Constructing new routes and upgrading existing routes would be limited to within anthropogenic caps. Reducing routes may decrease the amount of human activity in any of the MZs, which would result in slightly reduced potential for human-caused fires. However, the activity and the potential human-caused wildfire would be displaced to another location.

Reduced Fire Management Tactics

Complete decommissioning of roads limits access for fire management personnel and equipment when they are responding to wildfires. Roads that are reseeded and planted with sage brush would no longer be a viable option for indirect fire line. As fires become large the most viable tactic can be backing off to the nearest road and burning out from the edge of the road, thus removing the fuel between the road and the main fire.

If an area has a high road density, decommissioning some roads would have less impact than decommissioning all the roads accessing an area. Closing roads to only administrative access would have little to no impact on fire resources. Many stands of sagebrush allow for off-road cross-county use of wildland fire engines to access and suppress wildfires. The terrain, vegetation density, and vegetation height all affect whether cross-county access to wildfires is feasible.

Even if roads into an area are completely decommissioned so that they are no longer available for motorized travel, other options are available to access and suppress wildfire. These options include aircraft, access by foot, and heavy equipment to reopen roads. There may or may not be an increase in response time due to the availability of road access. Fire personnel delivered by aircraft may actually arrive before ground forces, even in areas where roads exist, due to the higher speed of aircraft. The more aircraft is relied on in the response to wildfire, the greater the fire suppression cost. The exact response to any future wildfire depends on such factors as the fire danger, values at risk, and ignition potential.

Downward Shift of Fire Regime Condition Class

Limiting off-road motorized travel can benefit the fire management program by reducing the vectors that can spread noxious weeds, especially cheatgrass, thus altering FRCC. Nonnative cheatgrass can severely alter fire regimes, dramatically increasing fire frequency and severity and expanding the extent of wildfires. Lower elevation sites are the more susceptible to cheatgrass conversion due to lack of rainfall, which can decrease the ability of native grasses to compete.

Motor vehicles not only spread cheatgrass seeds but also disturb soils that allow cheatgrass to become established. A reduction in the number of routes would also reduce the amount of cheatgrass seeds spread. Decommissioning roads can also be beneficial in reducing cheatgrass by seeding areas with natives. Cheatgrass has a very short growing season; it cures and is available as fuel to carry wildfire much earlier than native vegetation. The extent that changes in travel management would cause a downward shift in FRCC depends largely on how vulnerable the

management area is to cheatgrass infestation, the current extent of cheatgrass, and the degree to which travel management factors spread cheatgrass.

Summary of Impacts by Alternative

Travel management occurs under all of the alternatives; however, only under Alternatives B, C, and D would there be limits on new routes and decommissioning of roads in primary GRSG habitat. Anthropogenic disturbance caps in Colorado MZs vary by alternative. The impacts on wildland fire management will be discussed in greater detail later in the analysis.

Alternative A-Current LUPs in GJFO and CRVFO allow for off-road vehicle use in PPH, which slightly increases human-caused fire potential. Currently, the LSFO manages an area associated with the Sand Wash SRMA that is within PPH. There is no cap for anthropogenic disturbance associated with these plans. Decommissioning roads and using native seed or transplanting sage brush is not an action in these plans.

Alternative B-Designating motorized use to existing roads, primitive road, and trails in this alternative will reduce the potential of human-caused fires and the spread of cheatgrass from cross-country vehicle travel. Seasonal closure of roads in PPH could also reduce human activity, thus reducing the potential for human-caused fires. Decommissioning roads in PPH under this alternative may limit tactical options during the response to wildfire, but this could reduce the potential spread of cheatgrass.

Alternative C-This alternative is similar to Alternative B in scope of impacts on wildland fire management for motorized use on designated roads and a seasonal closure. The most restrictions on route construction could further limit the potential for human-caused fires and changes in FRCC caused by the spread of cheatgrass. The requirement to decommission roads affects fire management actions in all of the alternatives and could impact fire management tactics of future wildfires.

Alternative D-This is similar to Alternative B for the impacts on wildland fire management from motorized use on designated roads and decommissioned roads. This alternative would reduce the vectors for spreading noxious weeds, including cheatgrass, that alter fire regimes. There may also be a reduction in human-caused fire potential because of the travel restrictions and route limitations. There would be fewer opportunities to use roads and trails for burnout operations, which would hinder fire management tactics. All of these impacts together would have a minor effect on fire management when looking at the wildland fire program in northwest Colorado as a whole.

Impacts from Recreation Management on Wildland Fire Ecology and Management

Reduce Human-caused Fires

The reduction in SRPs may slightly reduce the human-caused fire risk. Very few human wildfire ignitions are a direct result of activities associated with SRPs, which usually are highly regulated during the permit process. This reduces the risk that permitted activities could cause a wildfire. However, the general rule applies that the more human activity, the higher potential there is for human-caused ignitions.

Alternative A-Currently in the analysis area there is very little restriction on the issuing of SRPs within PPH. There is very slight potential for the human activities associated with SRPs in this PPH causing wildfires.

Alternative B-This alterative would limit the issuing of SRPs in PPH unless the SRP has neutral or beneficial impacts on the habitat. This should limit SRPs that are being issued, thereby reducing human activities in these areas and very slightly reducing human-caused wildfires.

Alternative C-This alternative would have the greatest impact on reducing human-caused wildfires associated with recreation because it would prohibit camping within 4 miles of active GRSG leks. This could limit wildfires ignited from unattended or abandoned campfires. However, more than likely, it would just displace camping to another area and not reduce the overall human-caused fire potential.

Alternative D-This alternative's impacts are similar in extent to Alternative B by slightly reducing human-caused wildfire potential.

Impacts from Lands and Realty Management on Wildland Fire Ecology and Management

Reduction in the Potential for Human-caused Fires and Reduction in Fire Management Costs

Activities associated with ROWs could increase human-caused fires on the landscape. These include construction and maintenance associated with ROWs where human-caused wildfires can start from such activities as welding, smoking, and driving. Managing ROW exclusion or avoidance areas could lessen the extent of these impacts on existing ROWs instead of creating additional ROWs.

ROWs often create a value at risk on the landscape that may need protecting during a future wildfire. With more values at risk on the landscape, it generally holds true that suppression costs are greater because resources are protecting these values from the future wildfire. These increased costs usually come in the form of additional firefighting resources needed to protect the values at risk. ROWs also limit the opportunities of managing fires for multiple objectives and capitalizing on the resource benefits attributed to the wildfire. Over time, by not capitalizing on the benefits of wildfire on the landscape, the landscape becomes more susceptible to larger and more severe wildfires, which may have a detrimental effect on the resources and are very costly to suppress.

Depending on the alternative, the impacts of ROW avoidance and exclusion has less potential for having to protect ROWs from wildfires. Restrictions in Alternatives B, C, and D would limit new ROW construction, thus lowering the frequency of ROWs intersecting with wildfires. Collocated ROWs on existing ROWs reduces the net gain of ROW corridors that would need protection from wildfire. Resources used in the protection of ROWs from a wildfire do not vary too much from a single ROW or a cluster of multiple ROWs in the same corridor. The potential may exist that the overall net decrease in ROWs on the landscape would be minimal because they would just shift location to outside GRSG habitat.

Burying power lines would also reduce the potential of fires. Power lines could create ignitions by downed lines, birds and debris coming in contact with the lines, and trees falling on the lines. Burying lines would eliminate some of the needed resources to protect them during a wildfire. Buried lines may create new safety issues using ground-disturbing suppression resources, such as bulldozers and graders.

Summary of Impacts by Alternative

Alternative A-Currently in the analysis area there are very few ROW avoidance or exclusion areas that exist in association with any type of GRSG habitat. Under this alternative, ROWs would be allowed to be constructed, and while collocation does occur, this alternative has the least emphasis on collocation of ROWs; thus, it would produce higher suppression costs with more ROWs spread over the landscape. This increases the likelihood of ROWs intersecting future wildfires. The opportunities to bury power lines would not occur, thus any reduction of aboveground power lines from starting wildfires would not occur.

Alternative B-This alternative would make both PGH ROWs exclusion and PPH ROW avoidance areas. This would benefit the wildland fire program by reducing the number of ROWs on the landscape that would need protecting in a wildfire. This would help reduce wildfire suppression costs. An existing ROW corridor may have more individual ROWs within its footprint, but these would not be spread out, where the chance of intersecting with future wildfires is more likely. This would also slightly reduce the human-caused fire potential associated with ROWs. The potential of burying power lines also exists under this alternative. The anthropogenic cap would be at 3 percent, further limiting new ROWs unless offsetting mitigation occurs.

Alternative C-This alternative may have the most benefit to the wildland fire program by reducing the infrastructure associated with ROWs that needs to be protected during a wildfire. The reduction of ROW activities associated with igniting human-caused wildfires would decrease. This is due to ADH being exclusion area for ROWs. The potential exists that this may not reduce ROWs overall because ROWs would just shift outside of ADH. The anthropogenic cap would be at 3 percent, further limiting new ROWs unless offsetting mitigation occurs.

Alternative D-This alternative would have slightly less effect than Alternative B reducing human-caused wildfire potential and suppression costs associated with protecting ROWs from future wildfire. This is due to PPH, PGH, and linkage/connectivity habitat only being managed as avoidance areas. The anthropogenic cap would be at 5 percent, further limiting new ROWs unless offsetting mitigation occurs. However, this would not be to the extent of Alternatives B and C.

Impacts from Wind Energy Development on Wildland Fire Ecology and Management

Increased Planning, Increased Project Cost, Increased Fire Suppression Costs, Reduced Fire Management Tactics, and Reduced Flexibility in Response to Wildland Fires

In general, moving wind energy development to locations outside of ADH may increase the surface fuel loading as a result of the vegetation clearing needed for development. Areas outside of the GRSG habitat can range from mixed conifer forests, to pinion and juniper woodlands, to mixed mountain brush vegetation. These communities in general have a heavier fuel load than the predominant GRSG sagebrush vegetation community. This would put the values at risk to wildland fire in a heavier fuel loading. If a fire were to occur, it may have a greater impact on the structures than if they were placed in a lighter fuels type. The level of planning and the size of the project treatment are directly tied to the size and type of the fuels and the value at risk. The larger the fuel type, the greater the distance that needs to be cleared as a result of the flame length and the radiant heat associated with the fuel.

The value at risks would identify the level of vulnerability or susceptibility to damage if wildland fire were to occur next to it. The greater the fuel loading, the more planning is required to cover any vegetative treatment around any value at risk. There is either increased line construction or mechanical improvements around a value prior to any implementation of a prescribed fire operation. Or, if the value is too great or if not all of the risks may be mitigated, then the likelihood of the treatment being all mechanical is greatly increased. Increased mechanical and decreased prescribed fire in general means that the cost per acre will increase due to equipment operational costs. Any increase in cost per treatment would decrease the size of the treatment, compared to using prescribed fire. Generally the fuels that are treated through the development of wind energy may fragment the fuels, although the intersection of the access routes to the structures would reduce the continuity of the fuels. The breakup in continuity may give an opportunity for managing a potential incident.

Alternative A-There is no impact on the management of wildland fire and fuels treatments in this alternative.

Alternative B-Same as Alternative A.

Alternative C-This alternative has the greatest impact on wildland fire management by causing the need for increased planning, increased project and fire suppression costs, the use of reduced fire management tactics, and reduced flexibility in responding to wildland fires.

Alternative D-Same as Alternatives A and B.

Impacts from Solar Energy Development on Wildland Fire Ecology and Management

Impacts are similar to the impacts of wind energy on wildland fire ecology and management.

Impacts from Range Management on Wildland Fire Ecology and Management

Potential to Alter Fuel Loadings Increasing Fire Size and Fire Management Costs

Several actions associated with range management may influence the wildland fire program by affecting the amount of herbaceous fuels available to carry a wildfire. Overall, the actions to incorporate GRSG objectives into range management would not significantly change range impacts on wildfire, except for the action in Alternative C to retire grazing in all GRSG habitats. Grazing removes varying amounts of herbaceous material or fine fuels that can carry wildfires. On most BLM-administered and National Forest System lands in northwestern Colorado, the main driver of fire is woody vegetation, while fine fuel is a component of fire spread. Most lands managed in the planning area have some sort of woody species key component of fire spread for any given vegetation type. Grazing or the lack thereof has the largest impact in grasslands, which are areas without woody vegetation; minimal lands in the planning area are grasslands. Therefore, the extent to which grazing practices are changed would only have a very minimal effect on fuel loading, fire size, and fire suppression costs.

Upward Shift in Fire Regime Condition Class

Allowing only treatments that meet GRSG objectives would reduce the total acres of treatments in the planning area. The pre- fire suppression fire return intervals in sagebrush varies from 20 to 70 years, depending on the species of sagebrush and the site. Due to fire suppression, fire regimes

in the planning area have been altered. Vegetation that his missed a fire cycle or two is decadent, with a large dead component that can increase fire intensity. Range treatments in the past have created early seral vegetation that is less likely to support large wildfires and maintain FRCC. Reducing vegetation treatments that mimic the natural fire effects increases the FRCC of these landscapes, leaving them more prone to large intense wildfires. When vegetation treatment or fire scars are scattered across the landscape, there is a higher likelihood that, when a wildfire does occur, it would intersect these disturbances, limiting fire size. Landscapes that do not have these disturbances are more prone to fires burning more acres than historical wildfires did. As the overall age class of vegetation on the landscape increases, it creates an upward shift in FRCC.

While the treatments would still occur that meet GRSG objectives, they would more likely be mechanical, which are much more expensive than using prescribed fire as a treatment method. This is due to the necessity of GRSG treatments to have to retain minimum percent cover of sagebrush. This is more easily ensured when using mechanical treatment versus prescribed fire treatment. If treatments are more expensive, fewer acres can be treated with the same amount of funds. Total disturbance caps in some alternatives could limit treatment in a particular zone over the life of this plan if those caps are reached. However, total disturbance caps do not include treatment where the minimum sagebrush cover standards are met for GRSG objectives.

Downward Shift in Fire Regime Condition Class

Several actions associated range management could benefit the wildland fire program by reducing FRCC. These include actions that reduce the potential of spreading invasive species, such as cheatgrass, and actions that treat invasive species.

Summary of Impacts by Alternative

Alternative A-Currently in the analysis area, there is very little restriction on treatments in GRSG habitat. Treatments for range objectives could continue to reduce the potential for large wildfires and improve FRCC. Grazing would continue at current utilization, providing some reduction in fine fuels that spread wildfire. This reduction is hard to quantify, especially in areas where other woody species are present.

Alternative B-This alterative would limit range vegetation treatments PPH unless the treatment conserves, enhances, or restores GRSG habitat. This may limit the total amount of treatment allowed on the landscape, potentially increasing FRCC. Monitoring invasive species and treating noxious weeds under this alternative could decrease FRCC. The potential exists to evaluate retirement of grazing allotments; this would have minimal effect on fuel loads due to the presence of woody species that are the primary causes of wildfires in most of the planning area.

Alternative C-This alternative would have the greatest impact on the wildland fire management program by retiring all grazing allotments across ADH. This is would increase the fine fuels and could increase fire size, depending on the vegetation and other site-specific factors. Similar to Alternative B, only range vegetation treatments that are shown to have a demonstrated benefit to GRSG would be allowed. The big difference is that this limitation on treatment would be applied to ADH. This would further limit treatment and shift the landscape to a higher FRCC. Fewer treatments result in a landscape more prone to higher intensity and larger wildfires.

Alternative D-This alternative would have impacts similar to Alternative B. Treatments for range management would be allowed provided there were specific objectives to safeguard a percentage of sagebrush canopy intact for GRSG habitat. . This may offer more flexibility in

vegetation treatments than Alternatives B and C but could still reduce the number of acres treated from the current level. As long as these GRSG objectives were met, the 30 percent cap under this objective would not include vegetation treatments. This alternative would also look to treat noxious weeds that can improve FRCC. Grazing allotment would not be retired under this alternative; instead, they would be placed in reserve as grass banks that could be used if other allotments could not be used due to wildfires.

Impacts from Fluid Minerals Management on Wildland Fire Ecology and Management

Altered Project Design and Reduce Effectiveness

In areas with high potential for fluid mineral development, restrictions on development disturbance would generate a greater need for off-site mitigations than in lower potential areas. These mitigation actions may range from rehabilitating existing anthropogenic disturbances to creating additional habitat by removing other vegetation to allow for less competition for sagebrush. The vegetation treatments used to create or improve sagebrush areas is where the impact on wildland fire management would occur. The placement of the mitigation vegetation treatments would be directed toward areas where habitat improvements are necessary and may not take into consideration other values at risk. If the percent of sagebrush canopy cover by species were not met, then the action would result as a disturbance toward the total disturbance level. This would reduce the ability to treat vegetation surrounding infrastructure and other values.

Alternative A-Few restrictions on surface disturbance would allow for increased development without a need for off-site mitigations. This allows for fuels project design and location to be placed in the best location to reduce the potential loss of GRSG habitat and reduce wildland fire threat to infrastructure, thereby increasing the potential effectiveness of the project treatments. Increased development may increase surface fuels adjacent to development, requiring specific mitigations during site-specific NEPA analysis to address the management of the fuels during development.

Alternative B- Alternative B would place a 3-percent anthropogenic surface disturbance cap in Colorado MZs in PPH. This would increase the need for off-site mitigations to offset the anthropogenic disturbances generated through development, when compared to Alternative A. The measures that treat vegetation within the area impacted to improve habitat influencing the PPH within the MZ would be expected to increase. Alternative B would also be expected to reduce the possible sizes and locations of fuels project vegetation treatments, which could potentially reduce the effectiveness of the projects treatment in reducing the potential wildland fire threat to GRSG habitat.

Alternative C-This alternative proposes the most restrictions on surface-disturbing activities over the largest area (ADH). . These restrictions would increase the need for off-site mitigation to offset the disturbances generated though development, compared to Alternative B, which would apply the cap to ADH. Under Alternative C there may be a greater need for off-site mitigation to compensate if the disturbance caps were exceeded.

Alternative D-This alternative proposes a moderate level of restrictions to surface-disturbing activities, as compared to Alternatives B and C. The disturbance cap would be managed at 5 percent in ecological sites that support sagebrush in PPH (see **Figure 2-1**, Ecological Sites Supporting Sagebrush in Preliminary Priority Habitat). The need for mitigation to offset the

disturbances created through development would remain, but to a lesser degree than Alternatives B and C. -percent

Increased Project Requests

As development occurs, the need for off-site mitigation to improve, restore, or create suitable GRSG habitat will increase as the level of disturbance approaches the anthropogenic limit. The increase in off-site mitigation could create opportunities to reduce fuel loading on the landscape. It would do this by helping to develop, plan, and place the proposed treatments where they would benefit wildland fire management. This combined effort to reduce the fuel loading and improve habitat will increase the amount of vegetation treatments possible and will reduce the impact on the overall disturbance limit of 30 percent.

Summary of Impacts by Alternative

Alternative A-This alternative does not require the use of this type of mitigation work.

Alternative B-This alternative provides more direction and limitation to the level of disturbance to 3 percent within PPH. This will cause an increase within this habitat type but may curb or move development outside of PPH, where the anthropogenic limit is not a factor.

Alternative C-This alternative provides the greatest opportunity for off-site mitigation work as the anthropogenic limit is 3 percent for ADH. This is a greater restriction on development within these habitat types and may move some development outside of GRSG habitat in general until the limits are mitigated.

Alternative D-This alternative is less beneficial than Alternative C but more beneficial than Alternatives A and B. In this alternative, the anthropogenic limit is 5 percent, and the disturbance generated through the off-site mitigation does not apply to the overall disturbance limit of 30 percent.

Impacts from Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on Wildland Fire Ecology and Management

Impacts are expected to be the same as those described under *Impacts from Management of Fluid Minerals on Fuels Management*.

Impacts from Fuels Management on Wildland Fire Ecology and Management

Upward Shift in Fire Regime Condition Class

Allowing only treatments that meet GRSG objectives will reduce the total acres of treatments in the planning area. The pre-fire suppression fire return intervals in sagebrush vary from 20 to 70 years, depending on the species of sagebrush and the site. Due to fire suppression, fire regimes in the planning area have been altered. Vegetation that his missed a fire cycle or two is decadent, with a large dead component that can increase fire intensity. Range treatment in the past has created early seral vegetation, which is less likely to support large wildfires and that maintain FRCC. Reducing vegetation treatments that mimic the natural fire effects increases the FRCC of these landscapes, leaving them more prone to large intense wildfire. When vegetation treatment or fire scars are scattered across the landscape, there is a higher likelihood of a wildfire intersecting these disturbances and limiting fire size. Landscapes that do not have these disturbances are

more prone to fires burning more acres than historical wildfires did. As the overall age class of vegetation the landscape increases, it creates an upward shift in FRCC.

While the treatments that meet GRSG objectives will still occur, they will more likely be mechanical treatments that are much more expensive than using prescribed fire as a treatment method. This is due to the necessity of GRSG treatments to retain minimum percent cover of sagebrush. It is more easily ensured when using mechanical treatment versus prescribed fire. If treatments are more expensive, fewer acres can be treated, budget being a limiting factor. Total disturbance caps in some alternatives can limit treatment in a particular zone over the life of this plan if those caps are reached.

Increased Planning Time, Decreases in Project Size, Altered Project Design with Reduced Effectiveness, Increased Project Cost

Limiting the size of treatments greatly reduces the effectiveness of the treatment's intent: to reduce the risk of large wildland fire from burning across a landscape and potentially impacting other values at risk. A limit on all general disturbances within any given area will eventually limit the ability to plan landscape projects and apply the associated treatments. In order to facilitate a set limit, there will be a need to do more extensive planning on each project and treatment to maximize a rotation, where the landscape may be treated in coordination with development, and maintaining the required percentages of sagebrush canopy cover. In order to protect GRSG habitat, aggressive suppression actions will be required to limit the size and extent of wildland fire. Aggressive suppression actions would dictate an increase in suppression resources such as engines, dozers, aircraft, and personnel which would increase the cost of wildland fire.

Off-site mitigation to improve the habitat will also require more planning to ensure that the mitigation does not impact the ability to complete a fuels treatment. This may be beneficial if the project were able to coincide with a fuels project treatment area. Without outside contributors to projects and the need to stay within an acreage limit for allowed disturbance, the ability to use wildland fire, whether it is a planned ignition or natural, is greatly reduced. Discouraging the use of wildland fire to treat sagebrush would move the preferred treatment from fire to mechanical. Mechanical treatment would also require an increase in planning and implementation, which would increase the cost. Any increase in cost for planning would reduce funds available for implementation. Reduced funds generally mean that treatment size is reduced.

Fuels treatments in GRSG habitat would require further implementation-level planning as described in **Appendix O** GRSG Wildland Fire & Invasive Species Assessment.

Summary of Impacts by Alternative

Alternative A-This alternative has the fewest restrictions to the ability to conduct hazardous fuel treatments.

Alternative B-This alternative is more restrictive than Alternative A in that the treatments are only to benefit or conserve habitat that is to be applied to PPH.

Alternative C-This alternative is more restrictive then Alternatives A and B in that the treatments must be for the benefit and conservation of ADH.

Alternative D-This is the most restrictive alternative in that treatments applied would be to improve or conserve ADH. Alternative D has additional stipulations that apply to the definition of disturbance and requirements to move areas out of disturbance to suitable GRSG habitat.

Impacts from Fire Operations on Wildland Fire Ecology and Management

Upward Shift in Fire Regime's Condition Class, Reduced Flexibility to Respond to Wildfires

Prioritization of wildland fire responses is based on values at risk and the ability to successfully complete any specific operation. Human life and safety will always take precedence for the wildland firefighting crews to respond to. Other things considered are improvements that, if damaged or destroyed, would have a great impact on not only the local area but also nationally, and areas that would directly impact human activities.

GRSG is a value at risk, not unlike municipal watersheds or a watershed that feeds an endangered fish habitat or a culturally significant site. With many equally competing values at risk to wildland fire, an implementation plan must stipulate how to prioritize wildland firefighting crews' efforts. See **Appendix O** GRSG Wildland Fire & Invasive Species Assessment.

The ability to use wildland fire, whether planned or naturally ignited, removes one tool to manage a fire for firefighter safety: to benefit resources and return the vegetative community to a normal fire return interval. The use of such tactics is not only based on values at risk but also the firefighting resources available to perform this and other tactics successfully and in a timely manner.

Increased Suppression Cost

The use of fire to mimic a mosaic pattern and to return the natural state of the vegetative community is a tool in resource management outside of wildland fire management. The ability to use fire to manage a wildland fire may have far-reaching impacts on the responding firefighting crews' ability to keep the wildland fire small, as well as for other resources to take advantage of a situation to help reduce vegetation cover, type, and composition. To suppress every fire takes firefighting resources, and values at risk outside of life and property also dictate what methods may be used. The use of heavy equipment in sagebrush is a successful method for constructing extensive fire lines in a comparatively short period.

The aerial application of retardant is also a good method for slowing the spread of the fire, but it must be followed up with equipment or crews to completely remove the fuels from the fire's path. These resources come at a financial cost. Transporting heavy equipment, training the operators, maintaining the equipment, and supplying the fuel are all costs associated with the equipment if agency owned. If it is contracted equipment, these are taken in as a factor when calculating the hourly operating cost. The same is taken into account for applying retardant. Both require firefighters to ensure that the fire does not cross the line. The equipment line must be rehabilitated to correct the vegetation damage done during suppression. Holding on to resources to reduce the threat of a fire escaping the control lines is an additional cost. Holding on to crews to mop-up (extinguishing or removing burning material near control lines, felling snags, and trenching logs to prevent rolling after an area is burned, to make a fire safe, or to reduce residual smoke) black next to unburned islands is a cost above what is the normal procedure for cleanup.

All of this is a suppression cost and can add up quickly, extending the cost well beyond that of a similar fire using other methods of suppression.

Summary of Impacts by Alternative

Alternative A-This alternative provides the least restrictions to wildland fire management.

Alternative B-This is more restrictive than Alternative A in the limitation of using fire and prioritizing suppression in and near GRSG PPH and PGH.

Alternative C-This has the same impacts as Alternative B.

Alternative D-This alternative is more restrictive than Alternative A but less restrictive than Alternatives B and C. The prioritization of fire suppression in and near PPH and PGH is taken into consideration and given a preference, in conjunction with all other resource values based on site-specific circumstances.

Impacts from Emergency Stabilization and Rehabilitation on Wildland Fire Ecology and Management

Potential to Increase Emergency Stabilization and Rehabilitation Costs

Across ADH, fire rehabilitation would prioritize the use of native seed under Alternatives B, C, and D. Historically native seeds are often more expensive than nonnative seed used in fire rehabilitation. This prioritization of ADH among all fire rehabilitation may limit funding and resources for ESR on wildfires outside of GRSG habitat. Depending on the severity and extent of the fire season nationwide, certain seed availability and prices can change. In years where lots of acres burn nationwide, the potential exists that some lower priority post-wildfire projects may not receive ESR funds. Also in these years the seeds needed for ESR, especially seed in high demand, may not be available. If native seed is available, the demand may be so high that seed prices will rise farther, limiting the total acres of rehabilitation on BLM-administered and National Forest System land. There may only be a short-term effect on seed prices once the market adjusts to the demand.

Downward Shift in Fire Regime Condition Class

Post wildfire rehabilitation is vital to reduce post-fire potential of noxious weed invasion, including cheatgrass. Post-fire cheatgrass infestation can alter fire regimes dramatically by increasing the fire return intervals to every 2 to 5 years. Post-wildfire cheatgrass conversion is one of the biggest challenges in wildfire rehabilitation across the Great Basin, not just in Northwest Colorado. The ESR actions in these Alternatives will help reduce the potential for cheatgrass invasion, thus maintaining FRCC. This not only includes seeding but those management actions that help areas achieve and maintain desired conditions of ESR projects to benefit GRSG.

Summary of Impacts by Alternative

Alternative A-Currently, there is variability in the degree, extent, and seed type of wildfire rehabilitation within GRSG habitat. Under this alternative, the current way of a case by case determination of ESR after wildfire would continue. Some post-wildfire temporary land management changes do occur to improve the probability of seedling establishment.

Alternative B-This alternative has the use of preferred native seed the priority for use in ESR project in ADH. Additionally, Alternative B may require the temporary or long-term changes in grazing, wild horse management, or travel management to ensure that the desired conditions of ESR projects meet GRSG objectives. This would, overall, improve the success of seeding to protect post-burn areas from cheatgrass infestations, thus maintaining or improving FRCC.

Alternative C-This alternative would have the greatest impact on the potential success of post-fire ESR by even further limiting grazing until the conditions meet GRSG habitat objectives. The priority to use native seed is the same as under Alternative B. This would prevent cheatgrass infestation to improve FRCC.

Alternative D-This alternative has impacts similar to Alternative B in prioritizing use of native seed during ESR on GRSG habitats. Alternative D also looks to design post-fire land management to ensure persistence of seeded species or pre-burn natives. However, these post-burn changes in land management practices do not go to the extent that they do in Alternative C to ensure rehabilitation success. FRCC again would benefit from the emphasis on ESR to prevent conversion to cheatgrass and other invasive plant species.

Impacts from Habitat Restoration on Wildland Fire Ecology and Management

Downward Shift in Fire Regime Condition Class

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

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

Much like ESR, restoration project areas will have greater potential for success in seeding by changing the post-treatment land management use. This may include long-term or temporary changes in livestock grazing, wild horse management, and travel management. This could reduce cheatgrass introduction and spread in these project areas, benefiting FRCC. Evaluating ecological site descriptions in relation to native herbaceous plant potential will also help protect against invasive plants

Upward Shift in Fire Regime Condition Class

Alternative C avoids the use of sagebrush treatments to increase the livestock or big game forage. While this is already the case in other actions analyzed in this EIS, limitation on treatment could limit creation of early seral stages on the landscape, making it more prone to large fires.

Summary of Impacts by Alternative

Alternative A-Currently in the analysis area there are multiple efforts based on a variety of resources and resource uses to restore Colorado MZs. The combined effect of these projects on the wildland fire management is usually a reduction of FRCC. There is also the ability of the fuels program to match funds or other resources to jointly work on these types of projects that, in part, achieve hazardous fuels reduction. Much of this habitat type work is focused on big game winter range and is jointly funded with external partners, such as the CPW Habitat Partnership Program, Rocky Mountain Elk Foundation, and Mule Deer Foundation. These joint funded projects allow the fuel program within the wildland fire program to treat more acres.

Alternative B-This alterative prioritizes restoration projects on 1,744,108 acres of ADH in the planning area on environmental variables that are most likely to benefit GRSG. By limiting the objectives of restoration projects to this focus, there may be less total treatment of vegetation across the landscape. While some vegetation to improve GRSG habitat may benefit FRCC, some may have little to no effect, depending on design and treatment method. Once restoration has occurred, there is likely to be a higher emphasis for suppression of future wildfires in that area, creating further demand for fire suppression resources.

Alternative C-This alternative is similar to Alternative B prioritizing restoration projects to those most likely to benefit GRSG; therefore, the impacts are similar. There are additional actions in this alternative limiting treatment designed to increase livestock or big game forage. This may exclude some treatment that could restore FRCC.

Alternative D-This alternative has impacts similar to Alternatives B and C; however, there would be more flexibility to have treatments, as long as they meet the percent canopy cover objectives for sagebrush.

Additionally, flexibility is built into this alternative to consider all resource values managed by the BLM/USFS in conjunction with GRSG objectives. This includes exemptions, as site-specific circumstances warrant. This may grant the ability to design restoration treatments that are more effective in reducing fire potential and hazardous fuels than Alternatives B and C. Besides Alternative A, this alternative has the greatest potential to build some hazardous fuel objectives into restoration project design to benefit the wildland fire program. It would accomplish this by reducing large fire potential and improving FRCC, in conjunction with meeting GRSG objectives.

4.7.4. Summary of Impacts on Wildland Fire Ecology and Management

Alternative A-Overall, this alternative provides the least level of restriction and impacts on wildland fire management. The current spectrum of fire management opportunities would still be available for use.

Alternative B-This alternative is moderately restrictive in that there are some actions that would be in PPH, but the remaining habitat areas have few restrictions to wildland fire management.

Alternative C-This alternative is the most restrictive to wildland fire management, as all of the restrictions apply to ADH, and there is no flexibility to use opportunities during the course of managing a wildland fire or in the development of a vegetation treatment.

Alternative D-This alternative is more restrictive than Alternative B as it is applied to AHD and not just PPH. However, this alternative is less restrictive to wildland fire management than Alternative C in that the level of impacts are the same, but allows for increased flexibility of how wildland fires and fuels are managed.

4.8. Minerals (Leasable)

This section describes impacts on leasable minerals including oil and gas, oil shale, and coal. Impacts on nonenergy leasable minerals are the same as those described for salable minerals (see **Section 4.10**, Minerals – Salable).

4.8.1. Fluid Leasable Minerals

Decisions for fluid leasable minerals also apply to oil shale (see **Chapter 2**). As such, impacts described in this section are also applicable to those resources; no separate discussion for oil shale is included.

General Description

A total of 2.8 million acres of federal mineral estate underlie federal, state, and private lands within the decision area. Of this total area, 1.7 million acres are associated with BLM-administered and Routt National Forest surface lands. Current federal oil and gas leases comprise 653,700 acres, or 26 percent of the total federal mineral estate in the planning area. Unleased federal mineral estate within areas of high potential for oil and gas comprises 521,600 acres, or 21 percent, of the total federal mineral estate within the planning area.

Table 3.39, Acres of Federal Mineral Estate by PPH and PGH-Fluid Leasable Minerals, summarizes this information for the planning area.

Methodology and Assumptions

General Impacts on Fluid Leasable Minerals

Indicators of impacts on fluid leasable minerals and the measurements used to describe the impacts (where available or appropriate) are described below:

- Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases

Specific Measure: Closure of Federal Mineral Estate Lands to Leasing

Amount of federal minerals available versus closed to leasing (fewer new leases)

Indirect impacts include loss of production of oil and gas for the public use and generation of sale revenues, federal royalties from production, and tax revenues

- Reduced Access to New and Existing Oil and Gas Leases

Specific Measure: NSO Stipulations on All or Parts of New Leases

Fewer leases (large or contiguous small leases with no nearby private land), fewer potential downhole targets reachable (fewer applications for permits to drill per lease)

Indirect impacts include reduced production of oil and gas for the public use and for the generation of lease sale revenues, federal royalties from production, and tax revenues; possible adverse impact on lessee of higher cost of accessing portion of lease from nearby private land

Specific Measure: ROW Exclusions on Lands Needed for Road and Utility Access

Fewer new leases, fewer wells on lands where pads permissible but ROW access across adjacent lands not permissible (ROW exclusion area)

Indirect impacts include reduced production of oil and gas for the public use and for the generation of lease sale revenues, federal royalties from production, and tax revenues; possible

adverse impact on lessee of higher cost of accessing portion of lease via more circuitous route for access road, pipelines, electric utility lines

Specific Measure: Restrictions on Amount, or Location of Surface-Disturbing Activities (Well Pads, Access Roads, Pipelines, Power Lines) on New or Existing Leases

Fewer potential downhole targets reachable (fewer applications for permits to drill per lease or per section)

Indirect impacts include reduced production of oil and gas for public use and for the generation of lease sale revenues, federal royalties from production, and tax revenues; adverse financial impact on lessee of reduced revenues from lease in relation to sale price (mostly an issue for existing leases); adverse financial impact on lessee of accessing a portion of mineral estate from nearby private land

- Increased Costs and Decreased Efficiency of Oil and Gas Development

Specific Measures (Examples): Seasonal Closures, Undergrounding of Electric Distribution Lines, Noise Abatement, Visual Screening, Higher Reclamation Costs, Specialized Fencing)

Reduced development in otherwise permissible areas (fewer leases, fewer applications for permits to drill per lease or section), particularly in areas of more marginal production potential and during periods of low market prices of oil and gas

Indirect impacts include reduced production of oil and gas for public use and for the generation of lease sale revenues, federal royalties from production, and tax revenues; adverse financial impact on lessee (especially for restrictions on existing leases)

For all of these types of impacts, it is impossible to state with certainty in this EIS the degree to which they would result in the adverse impacts noted above. Only the following would allow a definitive estimate of the impacts on fluid mineral production: planning for specific lease sales, the outcomes of those lease sales, and the number of potential downhole targets accessible within each lease as identified during project-specific NEPA analysis.

For example, leases only partially within GRSG habitat and smaller leases interspersed with private lands may be mostly developable from allowable surface locations on BLM-administered lands, National Forest System lands, or nearby private lands. In contrast, leases mostly or entirely within GRSG habitat and larger leases or contiguous smaller leases with no intervening private lands may be mostly undevelopable in terms of reachable downhole targets and increased cost of operations. These considerations, along with potential advances in technology, changes in economics (e.g., wellhead prices for oil and natural gas), and geopolitical factors are likely to profoundly affect how each alternative analyzed in this EIS impacts oil and gas leasing and development for the foreseeable future.

Assumptions

The following list presents basic assumptions related to oil and gas leasing and development that apply to the impacts assessment for Alternatives A through D.

- Fluid minerals are not evenly distributed across the landscape
- Oil and gas operations are sensitive to costs, especially when prices are depressed

- Operators need predictable continuity of operations before acquiring or developing a lease
- The ability to drill or construct roads/pipelines on private lands to access federal minerals subject to landowner approval is not guaranteed
- Development techniques are highly technical and not uniformly applicable
- Seasonal closures on multi-well pads may make full development over many years infeasible
- Periodic cessation in production normally not feasible because of the cost and because it may damage the formation
- Clustering more wells on fewer pads increases size of each pad but reduces total disturbance
- Maximum lateral reach of normal directional wells is 0.5-mile
- Maximum lateral reach of horizontal wells is 1 mile
- Practicability of pipelines instead of trucks for hauling liquids depends on distance and the number of wells
- Interim reclamation reduces pad size by about 50 percent
- Original pad footprint subject to periodic redisturbance unless pad fully drilled out
- Minimum of 5 years needed for restoration of self-sustaining native grass/forb cover on pad, pipeline, and roadway reclamation
- Minimum of 10 years needed for successful establishment or colonization by sagebrush on pad, pipeline, and roadway reclamation

Implementing management actions for the following resources would have negligible or no impact on fluid minerals; therefore, these impacts are not discussed in detail: recreation, wind energy development, industrial solar development, range management, wild horse management, ESR, and habitat restoration.

Direct and Indirect Impacts on Fluid Minerals

Impacts from Travel Management on Fluid Minerals

A variety of management actions affecting travel and transportation are being applied or are proposed to be applied under Alternatives B through D to reduce adverse impacts on GRSG and their habitats. These have varying degrees of potential adverse impacts on leasing and development of fluid minerals (oil and gas). In general, management actions for resources and resource uses could affect oil and gas production when they result in reduced availability of federal mineral estate for leasing, reduced access to new or existing leases due to restrictions on use of the overlying surface lands, and reduced efficiency and increased operational costs that make a potentially developable site economically infeasible.

Reduced Availability of Federal Mineral Estate for New Oil and Gas Leases

Alternative A-None of the five field offices currently manages areas as closed to fluid minerals leasing because of travel management considerations, and new or existing leases are not subject to closures or other travel limitations. Current management by Field Office is as follows:

Colorado River Valley Field Office-Current management identifies 2,800 acres of PPH as open to OHV travel, 200 acres as closed, and 21,600 acres as limited. Within PGH, 3,000 are inventoried as open, 2,300 as closed, and 11,200 as limited. The area closed to OHV travel is extremely small in respect to PPH lands available for fluid mineral leasing, representing only 0.1 percent of 22,800 total acres. Furthermore, most of these lands are mapped as low potential for oil and gas development. In relation to PGH, the area closed to OHV travel represents 14 percent of 16,200 total acres. Closures would not apply to authorized oil and gas exploration and development.

Grand Junction Field Office-The mapped GRSG habitat is largely accessible via an extensive network of roads and trails in the area. Travel surfaces range from paved roads to primitive dirt roads only accessible by high clearance, four-wheel-drive vehicles, OHVs, foot, or horseback. Currently, all of the BLM lands within PPH are managed as open to cross-country travel for all modes of transportation. Within PPH, 17 miles of travel routes have been inventoried on BLM-managed lands. In PGH, some 6,300 acres of BLM lands are managed as open to cross-country travel, and 2,500 acres are managed with a seasonal closure (December 1 to May 1) to motorized use to protect wintering big game. During the rest of the year, motorized travel in that area is limited to existing routes. Within PGH, 32 miles of travel routes have been inventoried. Vehicular traffic within the mapped GRSG habitat is generally very light. Traffic temporarily increases during oil and gas drilling and completion operations. Slight seasonal increases in traffic also result during fall hunting seasons.

Kremmling Field Office-Under Alternative A, a small portion of PPH in Zones 11 and 13 would be closed to OHV travel. Areas closed to OHV travel total 8,700 acres, or 0.02 percent of total BLM surface estate within the KFO; a vast majority of these lands is outside of PPH and PGH. The potential impacts on leasing and development of fluid minerals from travel management closures would be negligible, if any. Overall, most areas are open (307,300 acres, or approximately 81 percent of BLM land within the KFO) to OHV travel, or limited to existing routes (7,300 acres, or 0.019 percent) or designated routes (54,500 acres, or 14.4 percent). Exception criteria also apply that would allow administrative access with BLM authorization when travel is approved in areas closed or limited to existing or designated routes. For instance, exceptions may be granted when OHV travel is necessary for valid existing rights or to access mineral and energy sites in areas where travel is not designated as open. Travel restrictions would primarily have an objective other than reducing adverse impacts on GRSG and their habitats. Routes could be constructed in PPH and PGH. A 3 percent disturbance cap would not be applied or affect construction of new roads.

Little Snake Field Office-Current management under the 2011 RMP includes designating areas as open, limited, or closed to vehicle use consistent with the following guidelines:

- Enables access where needed
- Limits points of access to reduce the number of redundant roads and trails
- Reroutes, rehabilitates, or eliminates existing roads and trails that are damaging cultural or natural resources
- Reroutes roads and trails that are landlocked by private parcels

- Restricts access to meet resource objectives, such as imposing seasonal road closures and installing gates
- Concentrates stream and riparian crossings
- Reduces habitat fragmentation
- Considers new construction and reconstruction of roads and trails
- Pursues access to specific parcels to improve access to public lands for land management purposes

As an outcome of that process, the LSFO has made travel management designations for Colorado MZs within its boundaries. For both PPH and PGH, most lands are designated as limited (552,000 acres in PPH, 451,200 acres in PGH); closed areas include 18,400 acres in PPH and 8,700 acres in PGH, while open areas comprise 31 acres of PPH and 19,700 acres of PGH.

White River Field Office-Under current management, no restrictions on travel in PPH are proposed. BLM roads within the WRFO are open to public travel at all times, subject to any limitations or restrictions outlined in the 1997 White River RMP. Travel restrictions would primarily have an objective other than reducing adverse impacts on GRSG and their habitats. Existing routes in PPH could be upgraded to a higher use category (e.g., from trail to primitive road or from primitive road to road). Routes could be constructed in PPH. Restrictions on public vehicle access could be applied, as outlined in the 1997 White River RMP. Methods restricting access may include installing lockable gates, barricades, and other deterrents, installing signs, or reclaiming and abandoning roads or trails.

Within the WRFO, 1,070 miles of routes are designated as limited and 17 miles are designated as closed in mapped PPH. This translates to a total of 288,000 acres of BLM-administered lands designated as limited and 7,500 acres designated as closed to motorized use in the PPH. Within mapped PGH, a total of 1,324 miles are designated as limited and 9 miles designated as closed. This translates to approximately 322,300 acres of BLM-administered land designated as limited and 3,300 acres as closed to motorized use in PGH. No areas within the WRFO are designated as open.

Alternative B-None of the travel restrictions under this alternative would preclude leasing currently unleased federal fluid mineral estate. However, any new leases would have a lease stipulation stating that no new roads could be constructed in PPH or existing routes upgraded to a higher use category in PPH. Limitations on new or upgraded roads could adversely impact whether a specific parcel is suitable for development in terms of access. This could result in a de facto limitation on new leases, although the scale of such impact, if it were to occur, cannot be quantified at this time.

Alternative C-As under Alternative B, none of the measures related to travel management would preclude leasing currently unleased federal fluid minerals. However, Alternative C would apply limits on realigning or upgrading routes within ADH, and not only PPH, and would prohibit new roads within 4 miles of a lek. As with Alternative B, it is possible that the travel restrictions could reduce industry interest in nominating or bidding on future leases in certain areas, although the degree to which this would result in a de facto limitation on new leases cannot be quantified.

Alternative D-This alternative is less restrictive than Alternatives B and C in that no consideration would be given to permanent closures, and road realignments and upgrades would be less severely

constrained; therefore, it is unlikely that travel management would result in a de facto closure to future leasing under Alternative D.

Reduced Access to New or Existing Federal Oil and Gas Leases

Alternative A-See the discussion of current management and associated impacts for Alternative A under *Reduced Availability of Federal Mineral Estate for New Oil and Gas Leases*. None of the restrictions under current management would apply to leasing and development of federal oil and gas resources but could guide project-specific planning.

Alternative B-Under this alternative, restrictions on travel would be implemented in PPH to reduce disturbance of GRSG from movement, noise, dust, and incidental human activity associated with vehicular travel. Motorized travel would be restricted to existing routes. No routes in PPH could be upgraded to a higher use category (e.g., from trail to primitive road or from primitive road to road) unless necessary. This would include for motorist safety or to avoid constructing a new road outside the PPH, and then only if impacts on GRSG would be minimal. Similarly, no new routes could be constructed in PPH, although portions of existing routes may be rerouted for the same reasons. An exception to the prohibition on new routes, except for realignments, is in the case of valid existing rights (current leases). To access current leases, new routes could be constructed; however, this would be allowed only to the minimum standard necessary for safe travel by the required types of vehicles and intensity of use, and only to the extent permissible, with a 3 percent disturbance cap. Where existing routes are no longer needed, Alternative B would require that the area be restored with seed mixes appropriate for use in GRSG habitat and potentially including transplanted sagebrush.

Travel management planning under Alternative B would also consider the need for seasonal or permanent closures or for limiting routes to administrative use. This would entail completing an activity-level travel plan within 5 years of the ROD for the EIS. Any permanent or seasonal closures resulting from an activity-level travel plan required to be developed within 5 years of the ROD could further reduce development potential by restricting access to affected leases.

Compared to Alternative A, restricting travel to existing routes and limitations on upgrading or realigning existing routes under Alternative B could affect approximately 1.25 million acres of federal mineral estate lands in the planning area. This represents slightly more than 50 percent of the federal minerals within the 2.47 million acres of federal minerals in the decision area.

Because the timing, size, and location of projects subject to these restrictions are unknown at this time, any impacts of travel restrictions under this Alternative B on future access to oil and gas leases and numbers of wells cannot be quantified, except in conjunction with specific project proposals. Estimates of areas that would have travel restricted to existing routes and limitations on upgrading or realigning existing routes, by field office, are as follows:

Colorado River Valley Field Office-0 acres

Grand Junction Field Office-5,500 acres

Kremmling Field Office-591,800 acres

Little Snake Field Office-458,600 acres

White River Field Office-197,300 acres

Routt National Forest-5,200 acres

Alternative C-In terms of travel management, this alternative is similar to Alternative B. For existing leases, the accommodation for new roads would be more restrictive, with no construction within a 4-mile buffer of a lek. Four other types of restrictions under Alternative B-for example, allowing realignments or route upgrades only in certain specified situations and closing and revegetating unneeded routes to restore GRSG habitat-would apply to ADH instead of PPH. Other measures are the same as under Alternative B.

Based on the above, Alternative C would be more restrictive than Alternative B, with greater potential for making leasing or development infeasible in terms of acres of federal leases accessible. Based on current lek locations within the planning area, approximately 1.34 million acres would be closed to new route construction and realignment or upgrading. This is 7 percent more area than under Alternative B and approximately 54 percent of the total federal fluid mineral estate in the decision area. However, it is not possible to estimate the impacts on oil and gas development in terms of numbers of wells due to reduced access. This is because the exact size and location of potentially affected projects are unknown. Estimates of areas that would have travel restricted to existing routes and limitations on upgrading or realigning existing routes, by field office, are as follows:

Colorado River Valley Field Office-29,800 acres

Grand Junction Field Office-14,400 acres

Kremmling Field Office-109,100 acres

Little Snake Field Office-922,100 acres

White River Field Office-297,300 acres

Routt National Forest-20,000 acres

Alternative D-This alternative is generally similar to Alternative B, although it is more restrictive in some aspects and less restrictive in others. For example, the consideration for seasonal closures on travel would apply to ADH instead of PPH. On the other hand, no consideration would be given to permanent closures. New roads needed to access valid existing rights (current leases) would use the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, also known as the Gold Book, and would be limited to a 5 percent instead of 3 percent disturbance cap. In addition, an exception could be granted for the 5 percent disturbance cap under certain circumstances. These include if GRSG populations within the MZ were healthy and stable or increasing and the construction would not adversely affect GRSG due to habitat loss or disruptive activities. Similarly, road reroutes and upgrades would be less severely restricted. The evaluation would be based on adverse impacts on GRSG populations instead of a requirement for a benefit in terms of safety or to avoid new construction.

In general, impacts would be somewhat less than under Alternative B in severity and extent, and the BLM/USFS would have greater flexibility to evaluate and approve projects on a case-by-case basis. Impacts would be substantially less than under Alternative C, which prohibits new road construction within 4 miles of a lek.

Alternative D would apply more widely but have greater flexibility for the BLM/USFS to approve projects based on site-specific conditions, mitigation, and other considerations. Because of this, a

quantitative estimate of area to which the alternative applies would not be a meaningful number in terms of impacts on fluid minerals.

Increased Costs and Decreased Efficiency of Oil and Gas Development

The restrictions under Alternatives B, C, and D on new road construction, realigning or upgrading existing roads, giving consideration to seasonal or permanent closures, and the 3 percent or 5 percent disturbance caps have the potential to make small or marginal projects economically nonviable due to increased costs.

The degree to which increased costs and decreased efficiency, such as from longer or more difficult access routes or from seasonal closures would affect the scale and location of future development, and would depend on several factors: the increased cost of complying with the restriction and the number of wells potentially lost in relation to the volume and market value of the commodity being produced (oil, natural gas, or associated hydrocarbons). For small or economically marginal projects, and areas where the restrictions would greatly increase costs, the result could be to reduce fluid minerals development at a scale that would be considered significant at the local (field office) and potentially larger (state and regional) levels.

Impacts from Lands and Realty Management on Fluid Minerals

Management actions related to lands and realty in conjunction with protection of GRSG and their habitats and use area could adversely impact fluid minerals leasing and development. This potential includes all three types of impacts on oil and gas described previously: reduced availability, reduced accessibility, and increased costs.

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

Identification of ROW avoidance areas, while not creating absolute barriers to their use for access roads or pipelines-or for locating surface facilities on federal lands for the purpose of accessing private minerals-could make permissible facilities infeasible for technical or economic reasons. Some other potential management actions or BMPs could also affect cost sufficiently to make a project infeasible, for example, collocating a new pipeline along an existing road that follows a long, indirect, or topographically difficult route. Other types of lands and realty actions, such as identifying areas for withdrawals and land tenure adjustments (disposal/acquisition/retention) are not expected to significantly affect fluid minerals leasing or development, although analysis of outcomes of land tenure adjustment and withdrawals cannot be accessed until specific proposals are submitted to the BLM/USFS for review.

The expected outcomes of lands-related management actions and BMPs on oil and gas leasing and development under the four alternatives analyzed in this EIS are summarized below.

Reduced Availability of Federal Fluid Mineral Estate for New Oil and Gas Leases

Alternative A-In general, lands and realty actions do not affect availability of lands for leasing for oil and gas development. This is because ROWs and associated exclusion and avoidance area management applies to surface rather than subsurface estates. Therefore, this management would affect primarily the access to oil and gas leases across off-lease lands via ROW grants.

Exceptions in the GJFO are 700 acres of PPH and 1,100 acres of PGH identified for disposal under the 1997 RMP.

A major exception is in the LSFO, for which the 2011 RMP manages as ROW exclusion areas 13,700 acres of PPH and 53,200 acres of PGH, and as ROW avoidance areas 20,900 acres of PPH and 28,700 acres of PGH. Under the RMP, none of the ROW exclusion or avoidance areas, totaling 116,500 acres of mapped GRSG habitat, would be available for fluid minerals leasing.

For the remaining field offices, ROW exclusion areas and, to a lesser extent, ROW avoidance areas could affect the practicability of new fluid minerals leases if they would present an absolute barrier to access (see the analysis for Alternative A in the subsection below on reduced access to fluid minerals).Current management by field office is summarized below.

Colorado River Valley Field Office-Under current management, a total of 8,300 acres of existing ROWs are in PPH and 4,700 acres are in PGH. Future ROWs would be allowed within either habitat area, barring criteria established by the current RMP. Additionally, no ROW exclusion or avoidance areas are identified within PPH or PGH lands under Alternative A.

Grand Junction Field Office-Numerous ROWs for roads and natural gas pipelines are within mapped PPH and PGH in the GJFO. Portions of the mapped habitat are on small, isolated public land parcels classified for disposal in the 1987 RMP. These include 700 acres of PPH and 1,100 acres of PGH. In addition, ROW exclusion areas include 100 acres of PGH, while ROW avoidance areas include 200 acres of PPH and 3,900 acres of PGH. Existing ROWs include 1,100 acres in PPH and 600 acres in PGH.

Kremmling Field Office-Land use authorizations would focus on concentrating linear facilities (i.e., pipelines, transmission lines, and routes) within or contiguous with existing corridors where possible. Authorizations would be avoided in locations that would harass livestock or wildlife or that would impact fragile areas, such as threatened and endangered species habitats. When considering land tenure adjustments, the KFO would retain all BLM-administered lands or interests in land (such as easements) that enhance multiple-use and sustained-yield management and would acquire lands or interests in land that complement important resource values and further management objectives. As standard practice, abandoned ROWs are required to be reclaimed on BLM-administered lands. Under this alternative KFO would not manage any areas as exclusion or avoidance areas, so there would be no impact on oil and gas leasing and development.

Little Snake Field Office-A total of 99,800 acres of ROWs are located in PPH and 91,100 acres in PGH. Under this alternative, LSFO would allow for appropriate ROW routes and development sites (e.g., renewable energy and communication), while identifying areas that would not be compatible with such use. Objectives for achieving this goal include providing access for roads, utilities, transmission lines, communication sites, and access for the development of oil and gas pipeline routes and other uses associated with oil and gas development in an environmentally responsible manner. The LSFO would also encourage ROWs in existing corridors, such as major roads, including certain county roads, electric transmission lines, and oil and gas pipelines. ROW exclusion areas in unleased high-potential areas for oil and gas total 12,700 acres, while ROW avoidance areas include 22,400 acres of mapped habitat.

White River Field Office-Under this alternative, land use authorizations would be denied in exclusion areas, as defined in the 1997 White River RMP. The exception would be for short-term land use permits involving no development and projects that are consistent with management objectives for the area. Under current management, areas identified as ROW exclusion are not

identified as such for GRSG habitat; however, ROW exclusion areas do overlap with PPH and PGH. New access roads, pipelines, electric distribution lines, and other utilities would be precluded in these exclusion areas. Under this alternative, areas identified as exclusion areas could affect availability for leasing or accessibility for development of approximately 11,700 acres.

Avoidance areas would require that impacts be avoided. Nevertheless, the ROW could be allowed, subject to COAs (see Appendix B of the 1997 White River RMP), all applicable surface use stipulations (see Appendix A of the 1997 White River RMP), and any site-specific stipulations identified through the NEPA process. Avoidance areas are defined in the 1997 White River RMP and include GRSG leks and areas managed to meet other objectives. Under this alternative, avoidance areas could affect availability or access for approximately 47,200 acres.

Alternative B-This alternative includes no measures that would specifically preclude new leasing of federal fluid mineral resources. However, such restrictions as managing PPH as ROW exclusion areas and a 3 percent disturbance cap could render some currently unleased parcels impracticable to lease because of impossible or impracticable access across off-lease lands. It is not possible to quantify this potential impact; however, see the analysis under Alternative B in the subsection below .

Alternative C-This is similar to Alternative B, except that managing all GRSG habitat as ROW exclusion areas would increase the total area of unleased lands potentially precluded from future leasing due to impossible or impracticable access. See the discussion under Alternative C in the subsection below.

Alternative D-This alternative would be less restrictive than Alternatives B or C by identifying PPH as ROW avoidance areas, and the disturbance cap would be 5 percent instead of 3 percent. Consequently, this alternative is less likely than Alternatives B and C to result in de facto restrictions of future leasing.

Reduced Access to New or Existing Federal Oil and Gas Leases

Alternative A-See the discussion of current management and associated impacts in the analysis of reduced availability of fluid mineral from lands and realty management, above.

Alternative B-Under this alternative, PPH would be identified as ROW exclusion areas, precluding new access roads and pipelines, electric distribution lines, or other utilities. Exceptions would be considered in the case of a valid existing right not yet developed, where a new ROW could be completed entirely within the disturbance footprint of an existing ROW (e.g., locating a pipeline beneath a power line or along an existing road); or, in the case of a valid existing right already developed, where the new ROWs could be collocated with an existing ROW. If a new access road or other ROW could not be collocated with an existing ROW, it may be constructed only if impacts were minimized and disturbance were to remain within a 3 percent cap. If the cap would be avoided, mitigation would be required.

Compared to Alternative A, identifying PPH as ROW exclusion areas could affect availability or access for federal mineral estate lands that do not currently have such restrictions. This could delay or make more difficult ROW projects that overlap with existing leases on which new or additional development is likely, due to the limited number of acres left under the 3 percent anthropogenic disturbance cap. For some Colorado MZs, new access roads or other ROWs could not be constructed outside existing ROWs if the zone is over the 3 percent disturbance cap. However, specific impacts on leasing and development of currently unleased minerals cannot be

quantified without project-specific information on the size and configuration of such leases, in relation to adjacent federal or private surface lands and existing or feasible new access routes.

Other actions or BMPs in PPH under Alternative B to increase protections for GRSG and their habitats are to remove, bury, or modify existing power lines and remove and restore unused surface facilities associated with ROW grants.

Additional measures to be applied in PGH include managing PGH as ROW avoidance areas, which would require that impacts on GRSG and their habitats be avoided, where practicable, or minimized and mitigated and collocating necessary new ROW features with existing features. These could add to the costs of new oil and gas projects, and, where very long and indirect alignments are involved, burying existing power lines would be required. These requirements could make a potential project economically infeasible.

Also among land tenure measures, requirements for PPH under Alternative B include a prohibition against disposal of BLM-administered or National Forest System lands and a goal of acquiring certain private lands. Without project-specific information, it is not possible to assess this impact fully. Nevertheless, it could prevent some otherwise accessible private lands from being used for fluid mineral development and keep some lands in federal ownership that might otherwise be disposed of and hence available for access to fluid minerals.

Not all restrictions applicable under Alternative B would have the effect of precluding development or of making future leasing impracticable due to access limitations. The total area to which these restrictions would apply is approximately 631,700 acres, or 47 percent of BLM surface lands in the 21 Colorado MZs. Note, however, that ROW actions do not apply to lands with private surface. However, an exact assessment of the impact of these restrictions on access to new or future leases sufficient to preclude or significantly impede development is not possible. Estimates of areas to which the restrictions apply, by field office, are as follows:

Colorado River Valley Field Office-0 acres

Grand Junction Field Office-14,400 acres

Kremmling Field Office-203,500 acres

Little Snake Field Office-116,500 acres

White River Field Office-297,300 acres

Alternative C-Under this alternative, the measures related to PPH in Alternative B would be applied to ADH areas. This is therefore likely to result in greater impacts on oil and gas leasing and development since more lands would be affected. Specifically, compared to Alternative A, managing ADH as ROW exclusion areas could affect availability or access for federal mineral estate lands that do not currently have such restrictions.

The requirements under Alternative B for removing, burying, or modifying power lines and for removing and restoring any unused ROW corridors would also be applied under Alternative C. This alternative would require relocating unbuilt ROW corridors outside PPH and also the measures under Alternative B related to land tenure adjustments. However, the actions related to PGH- management as ROW avoidance areas and requiring collocation of new ROW alignments with existing alignments-would not be applied under this alternative, reducing somewhat the impacts on oil and gas development in PGH. The total area to which these restrictions would

apply is approximately 1.34 million acres, or 99 percent of BLM-administered surface lands in the 21 Colorado MZs. However, an exact assessment of the impact of these restrictions on access to new or future leases sufficient to preclude or significantly impede development is not possible. Estimates of areas to which the restrictions apply, by field office, are as follows:

Colorado River Valley Field Office-29,900 acres

Grand Junction Field Office-14,400 acres

Kremmling Field Office-203,500 acres

Little Snake Field Office-793,700 acres

White River Field Office-297,300 acres

Alternative D-This alternative would be less restricting than Alternatives B and C by making PPH avoidance rather than exclusion areas for ROWs. Also within PPH, new ROWs may be collocated in existing corridors without the need for staying within the existing disturbance footprint. New ROWs for valid existing lease rights would also be less difficult to implement, including accepting impacts where access would otherwise be inaccessible. The associated disturbance cap for access to valid existing rights would be 5 percent, compared to 3 percent in Alternative B, although mitigation would be required.

Alternative D would require only raptor perch deterrents instead of burying power lines in PPH. In addition, unused ROWs would be required to be reclaimed only where mandated by regulation. Furthermore, new ROWs would be allowed where a compelling reason exists and GRSG populations would not be adversely affected by habitat loss or disruptive actives. The Alternative B and C requirements for relocating unbuilt corridors from inside to outside PPH would also not be applied under Alternative D. Actions related to PGH and to land tenure adjustments are the same as those in Alternatives B and D or, where different, would have the same relative impact on oil and gas development compared to current management.

Impacts from Fluid Minerals Management on Fluid Minerals (Oil and Gas)

In the Rocky Mountains, habitat loss or modification, surface infrastructure, associated vehicular travel, and disturbance from equipment to develop federal fluid mineral resources have been identified as key threats to GRSG populations and seasonally critical habitat uses. Consequently, the alternatives analyzed in this EIS include a number of management actions and mandatory mitigations to reduce the scale, frequency, and severity of impacts from oil and gas.

The *General Description* section presents information on the general fluid minerals program as administered by the BLM and the extent of fluid minerals in the planning area. The *Methodology and Assumptions* section summarizes the types of impacts likely to result for fluid minerals leasing and development and the tools available to the BLM/USFS for avoiding, minimizing, or offsetting those impacts.

The following paragraphs compare the management actions and key BMPs incorporated into the alternatives analyzed in detail in this EIS. They also compare the result of impacts on the availability of federal fluid minerals for development, access to those resources, and economic viability of development based on increased costs to the oil and gas operator.

Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases

Alternative A

Colorado River Valley Field Office-The CRVFO planning area and the Roan Plateau planning area have approximately 40,300 acres of PPH and 56,000 acres of PGH. However, 17,400 acres of PPH and 11,500 acres of PGH are split-estate lands (private surface, federal minerals). Most lands that fall within PPH are mapped as low potential for development of oil and gas resources. Conversely, most lands that fall within PGH, namely the Roan Plateau planning area, are mapped as high potential for oil and gas development.

Grand Junction Field Office-The GJFO planning area contains approximately 78,700 acres of lands within GRSG habitat, 14,500 acres of which are BLM-administered lands with federal surface and an additional 8,600 acres are split-estate. Potential for oil and gas development occurs within all mapped GRSG habitat, most of which (55,600 acres) has no federal mineral interest. Of the total acres available for leasing in GRSG habitat, approximately 5,500 acres are mapped as PPH and 8,900 acres are mapped as PGH. No acres within the planning area are managed as unavailable to fluid mineral leasing.

Kremmling Field Office-Current restrictions on use prohibit surface occupancy and surface-disturbing activities within a 0.25-mile radius of an active lek. A total of 642,900 acres of federal mineral estate would be open to oil and gas leasing, 114,000 acres of which are considered to have high potential for oil and gas development; approximately 10,600 acres would be closed to oil and gas leasing and geophysical development, none of which has high potential for development.

Little Snake Field Office-The 2011 RMP identified 92,000 acres of GRSG habitat as closed to leasing for fluid minerals. Other restrictions in PPH and PGH under the 2011 RMP would not preclude leasing but could affect accessibility or economic viability of future leasing and development for Alternative A in the subsection below on reduced access to fluid minerals . In addition, a total of 92,000 acres of NSO stipulations and 12,800 acres of ROW exclusion areas are in GRSG habitat. This could result in a de facto limit on future leasing due to no access or difficult access. Exceptions, modifications, and waivers could be provided, as detailed in the 2011 RMP.

For new leases in high priority GRSG habitat, a lease stipulation would be attached to comply with two criteria: a 1 percent disturbance limitation and preparation of a plan of development illustrating a strategy for leaving large blocks of undisturbed habitat. These criteria would be mandatory, with exceptions considered on case-by-case basis. An exception to the 1 percent threshold requires the operator to demonstrate extraordinary means to mitigate or improve high-priority habitats. This could include enlisting surrounding leaseholders into a plan to protect even larger blocks of habitat or performing BLM-approved compensatory mitigation.

White River Field Office-Under current management, areas closed to fluid mineral leasing as described in the 1997 White River RMP are the six WSAs and the National Park Service's Harper's Corner Road withdrawal. While these areas are closed to fluid mineral leasing for reasons other than protecting GRSG habitat, there is overlap between these areas and GRSG PPH and PGH, particularly with the Harper's Corner Road withdrawal and Bull Canyon and Willow Creek WSAs. Under this alternative 3,000 acres in PPH and 1,700 acres in PGH are unavailable for fluid mineral leasing. Most acreage unavailable to leasing is in areas of low potential for oil and gas development, with a small amount of area having high potential for developments in the southern portions of the Harper's Corner Road withdrawal and Bull Canyon and Willow Creek WSAs.

Alternative B-Under this alternative, PPH would be closed to future leasing for fluid minerals. An exception would allow the BLM/USFS to prepare a comprehensive leasing plan for areas of "checkerboard" or other mixed federal-private surface and mineral estates. This could allow leasing of selected areas that could be accessed from outside the PPH. Exploration using minimally disruptive methods would also be allowed.

Closing all PPH to future leasing would remove 447,000 acres of currently unleased federal minerals in high-potential areas for oil and gas within PPH from future oil and gas leasing. Estimates of affected acres by field office are as follows:

Colorado River Valley Field Office-0 acres

Grand Junction Field Office-1,600 acres

Kremmling Field Office-52,200 acres

Little Snake Field Office-337,700 acres

White River Field Office-59,500 acres

Note that all estimates for the CRVFO in this analysis assume that the existing leases atop the Roan Plateau (mapped as PGH) remain valid.

Alternative C-Under this alternative, the prohibition against future fluid minerals leasing, or reissuing of expired leases, would apply to ADH instead of PPH, with the same potential exceptions as described above. Because of the broader application of the closure to leasing, this alternative would remove a greater area of federal fluid mineral estate lands than Alternative B. Estimates of affected acres by field office are as follows:

Colorado River Valley Field Office-500 acres

Grand Junction Field Office-14,400 acres

Kremmling Field Office-64,200 acres

Little Snake Field Office-521,000 acres

White River Field Office-132,800 acres

Alternative D-Under this alternative, the prohibition against future fluid minerals leasing, or reissuing of expired leases, would not be applied. Also, 0 acres of unleased, high-potential, federal fluid mineral estate would be closed to leasing. Instead, PPH would be leased with an NSO stipulation for fluid minerals. The NSO would allow an exception if GRSG populations were stable or increasing and GRSG populations would not be adversely affected by habitat loss or disruptive activities. In the event that development is allowed under an exception, mitigation would be required for impacts beyond a 5 percent disturbance cap.

The degree to which this measure would affect availability of new leases would depend on whether a particular parcel being considered is sufficiently small and located close enough to private lands or non-NSO federal lands to allow directional drilling into minerals underlying the NSO area. It would also depend on whether site-specific conditions would warrant granting an exception to the NSO. Because these situations cannot be quantified at present, it is not possible

to estimate the degree to which Alternative D would result in a de facto limit on new leasing due to impossibility or impracticability.

Reduced Access to New or Existing Oil and Gas Leases

Alternative A

Colorado River Valley Field Office-Under its current RMP, the CRVFO does not have restrictions on access to federal fluid minerals in unleased areas of high potential for oil and gas development. An exception is the Roan Plateau planning area, which is fully leased (29,800 acres of mapped PGH). The area has a variety of NSO, CSU, and TL stipulations to protect sensitive resources but not specifically related to GRSG.

Grand Junction Field Office- Under its current RMP, the GJFO has just over 12,000 acres leased in GRSG habitat. Approximately one-half of the leased acres within GRSG habitat are managed for restricted surface disturbance (3,800 acres of NSO and 1,400 acres of CSU).

Kremmling Field Office-A TL stipulation would restrict surface occupancy and surface-disturbing activities during crucial winter habitat and nesting habitat timeframes; these are December 16 to March 15 and March 1 to June 30, respectively. All mitigation and conservation measures not already required as stipulations would be analyzed in a site-specific environmental analysis document and would be incorporated, as appropriate, into COAs of permits, plans of development, or other use authorizations. The BLM has the discretion to modify surface operations to change or to add specific mitigation measures when supported by scientific analysis.

Little Snake Field Office-Current management under the 2011 RMP includes a total of 992,800 acres of mapped GRSG habitat. This includes TL stipulations to protect seasonally critical periods of use, 1,023,100 acres with CSU stipulations to provide BLM with the ability to place special restrictions on location and design of projects, and 151,100 acres of NSO stipulations to prohibit surface occupancy and surface disturbance.

White River Field Office-Restrictions under this alternative include a TL for wintering concentrations of GRSG from December 16 to March 15. Another TL for April 15 to July 7 would be applied in GRSG nesting habitat once a threshold of 10 percent of habitat available within 2 miles of identified leks has been affected, either directly and indirectly impacted. A total 115,000 acres of NSOs and 455,500 acres of TLs, in addition to CSU stipulations, could tend to make some unleased areas undesirable for future leasing because of the impracticability of accessing the federal fluid mineral resources.

Alternative B-For valid existing rights (existing leases), Alternative B would apply a number of restrictions on surface use in PPH, subject to an evaluation of whether the restrictions are reasonable and in conformance with the approved RMP. These include the following:

- No new surface occupancy in PPH during any time of year
- If the lease is entirely within PPH, no new surface occupancy within 4 miles of a lek and permitted surface disturbance limited to one per section (1 square mile, 640 acres), including the well pad and associated access road and collocated pipelines, with no more than 3 percent surface disturbance in that section
- If a lease in PPH is entirely within 4 miles of a lek, limit new surface disturbance to one per section (pad plus road/pipeline) with, surface disturbance of no more than 3 percent of that

section, and require new development to be placed farthest from the lease or other portion with the least impact on GRSG use

- Apply a 3 percent cap to applications for permits to drill on existing leases in PPH that are not yet developed. An exception to the 3 percent cap would be considered where effective mitigation can be demonstrated to offset the resultant impact on GRSG. Priority would be on conducting the mitigation first in PPH or second in PGH, and first where it would benefit the impacted GRSG population or second in the same MZ

- Apply a seasonal restriction on exploratory drilling that prohibits surface-disturbing activities in PPH during the nesting and early brood-rearing season

The first four bullets above have a significant potential for reducing the ability of an operator to access fully the potential downhole targets (wells) included within a given federal oil and gas lease. However, the magnitude of those impacts cannot be assessed without project-specific information on where an affected lease is located, its size, and its spatial relationship to other leases. It would also require information on private surface lands, existing utility and road corridors that the new corridors would intersect, and one or more GRSG leks and other seasonally critical habitats that facilities are required to avoid. The particular downhole geology of a specific lease is also important in relation to the potential number of wells reachable from a single well pad. The last bullet, application of a seasonal restriction on exploratory drilling, is more difficult to assess.

Exploratory drilling of a single well can normally be timed to avoid such a seasonal restriction. However, if exploratory drilling is interpreted to mean any new wells not in a developed field, applying the seasonal restriction to multiple exploratory pads and wells within the same lease or other geographic areas could effectively limit accessibility to the resource. This is particularly true if the same area is subject to another TL restriction, such as big game winter range, potentially leaving too small a period within which to conduct the exploratory drilling.

Although it is not possible to fully quantify these impacts (i.e., determine the number of leases that are entirely within PPH and subject to a limit of one disturbance per 640 acres and what portions of how many leases are within 4 miles of a lek) the approximate extent to which these restrictions could apply is estimated at 616,100 acres. This amounts to 61 percent of the 1.01 million acres of leased federal mineral estate in GRSG habitat in the planning area. If new well pads were reduced from a typical current average of four per section to one per section, but with the same number of wells per pad, it could potentially reduce future development on existing leases by 75 percent. However, this impact level would decrease in proportion to the greater numbers of wells per pad. Although the reduction could be less than this-depending on specific situations of geology, directional drilling technology, economics, other applicable surface-use constraints, and the degree to which the leases are already developed-it is clear that a substantial reduction in production of oil and gas would be the outcome. Estimates of affected acres by field office are as follows:

Colorado River Valley Field Office-0 acres

Grand Junction Field Office-3,900 acres

Kremmling Field Office-118,100 acres

Little Snake Field Office-358,900 acres

White River Field Office-135,100 acres

Alternative C-For valid existing rights (existing leases), Alternative C would apply the restrictions on surface use in PPH listed under Alternative B, with some applied instead to ADH areas or worded more restrictively.

Alternative C is the same as Alternative B in the following manner:

- No new surface occupancy in PPH during any time of year
- If the lease is entirely within PPH, no new surface occupancy within 4 miles of a lek and permitted surface disturbance limited to one per section (which is 1 square mile, 640 acres), including the well pad and associated access road and collocated pipelines, with no more than 3 percent surface disturbance in that section
- If a lease in PPH is entirely within 4 miles of a lek, limit new surface disturbance to one per section (pad plus road/pipeline), with surface disturbance of no more than 3 percent of that section, and require new development to be placed farthest from the lease or other portion with the least impact on GRSG use

The following, under Alternative C, is the same as Alternative B but applied to ADH, with or without additional wording changes:

- Apply a 3 percent cap to applications for permits to drill on existing leases in ADH that are not yet developed. An exception to the 3 percent cap would be considered where effective mitigation can be demonstrated to offset the resultant impact on GRSG. Priority would be on conducting the mitigation first in PPH or second in PGH, and first where it would benefit the impacted GRSG population or second in the same MZ
- Apply a seasonal restriction in ADH areas on exploratory drilling that prohibits surface-disturbing activities in PPH during the nesting and early brood-rearing season

The following aspects of Alternative C are not included under Alternative B:

- In ADH areas, explore options to amend, cancel, or buy out leases in ACECs or occupied habitats
- In ADH areas, require relinquishment of leases/authorizations where necessary to mitigate the impacts of a proposed or approved development

As described for Alternative B, the magnitude of impacts associated with Alternative C cannot be assessed without project-specific information. This information includes where an affected lease is located, its size, and its spatial relationship to other leases, private surface lands, existing utility and road corridors that the new corridors would intersect, and one or more GRSG leks and other seasonally critical habitats that facilities are required to avoid. The particular downhole geology of a specific lease is also important in relation to the potential number of wells reachable from a single well pad. Moreover, the last two bullets above for this alternative could more significantly restrict access to valid existing rights and in fact would make those leases unavailable for development in all or in part.

In general, however, applying some restrictions to ADH areas would affect a greater number and area of federal leases than under Alternative B. These restrictions are canceling leases in ADH areas that are in ACECs or occupied habitat and requiring potential additional leases in ADH areas to be relinquished. The language of the last two bullets above, potentially cancelling or

requiring relinquishment of existing leases and authorizations, would further increase adverse impacts on oil and gas development under this alternative.

Although not all of the restrictions would apply to all areas of PPH or ADH in high potential lands for oil and gas in the planning area, the total of potentially affected lands is the entire 1.01 million acres of currently leased. Because of the complex combination of constraints on development under this alternative and the many site-specific and project-specific variables for a given situation, it is difficult to estimate the amount to which development could be reduced under Alternative C. However, with some constraints applying to ADH instead of PPH, and with the limit of one pad per section (compared to a current average on four per section) applying within 4 miles of a lek, it is possible that the result would be the same level of reduction in future development as under Alternative B (75 percent). The actual impact could vary substantially, depending on the many variables described for Alternative B; these are specific situations of geology, directional drilling technology, economics, other applicable surface-use constraints, and the degree to which the leases are already developed. Estimates of affected acres by field office are as follows:

Colorado River Valley Field Office-29,800 acres

Grand Junction Field Office-12,300 acres

Kremmling Field Office-124,400 acres

Little Snake Field Office-446,600 acres

White River Field Office-289,500 acres

Alternative D-For valid existing leases, Alternative D would replace some of the more absolute restrictions of Alternatives B and C with greater flexibility to assess individual projects, based on site-specific conditions and project-specific design. Based on the site-specific and project-specific considerations, the BLM/USFS could approve the action with COAs identified during project review. The COAs would be necessary and appropriate for avoiding, minimizing, or offsetting potential impacts on GRSG and their habitats. Examples include the following:

- In PPH, prohibit surface occupancy or disturbance during lek and early brood-rearing seasons. Require mitigation for disturbance in excess of 5 percent. Certain exception criteria would be applied to accommodate the surface occupancy when needed for continuing multi-year directional drilling programs or when the GRSG populations would not be adversely affected

- In PPH, apply a seasonal restriction on exploratory drilling that prohibits surface-disturbing activities during the nesting and early brood-rearing season-same as Alternative B

- Apply a 5 percent (instead of 3 percent) cap to applications for permits to drill on existing leases in PPH that are not yet developed. An exception to the 5 percent cap would be considered where effective mitigation could be demonstrated to offset the resultant impact on GRSG or where additional disturbance would not adversely affect GRSG populations. Any mitigation would be conducted with priority first in PPH or second in PGH, in occupied habitat. It would also prioritize first those areas where it would benefit the impacted GRSG population or second areas in the same MZ.

As with Alternatives B and C, the magnitude of impacts associated with Alternative D cannot be assessed without project-specific information. This information is where an affected lease is located, its size, and its spatial relationship to other leases, private surface lands, existing utility

and road corridors that the new corridors would intersect, and one or more GRSG leks and other seasonally critical habitats that facilities are required to avoid. The particular downhole geology of a specific lease is also important in relation to the potential number of wells reachable from a single well pad.

In general, the greater flexibility available to the BLM/USFS under this alternative would reduce impacts on fluid minerals leasing and development. Applying a 5 percent cap restriction instead of 3 percent cap and limiting the cap to PPH instead of ADH would result in fewer constraints on oil and gas activities than under either Alternative B or C. For example, a 5 percent cap could allow 60 percent more surface disturbance than with a 3 percent cap in PPH.

Because this alternative would apply more widely but with less stringent restrictions and greater flexibility to approve projects, the number of acres potentially affected is not a meaningful number because the impacts could be minimal across much of the area. Therefore, it is not possible at this time to estimate the percent reduction.

Increased Costs and Decreased Efficiency of Oil and Gas Development

Alternative A-All of the field offices apply a variety of mitigation measures and BMPs as COAs for oil and gas projects. This is done under the BLM/USFS regulatory authority and is a matter of routine during the NEPA process for specific projects and areas.

Alternative B-Among the representative measures described in **Chapter 2** as mandatory BMPs, relatively few could significantly affect the economic feasibility of individual oil and gas projects. Those with the greatest potential for affecting future developments are the following:

- Place liquid gathering and storage facilities outside PPH-Potentially cost prohibitive where a well pad would be located several miles from the storage tanks due to the additional piping costs when water or liquid condensates are produced in very small quantities from a natural gas well and more efficiently hauled off-site with trucks
- Place new utility developments in existing utility or road corridors-Potentially cost prohibitive where the road follows a long and topographically complex route, thereby lengthening the utility and potentially requiring one or more lift stations for liquids
- Bury electric distribution lines-Potentially cost-prohibitive where a well pad would be located a long distance from the nearest utility tie-in, compared to constructing an aboveground line fitted with raptor deterrents
- Limit noise to less than 10 decibels above ambient levels at sunrise at a lek perimeter during the lek season and require noise shields during the lek, brood-rearing, and winter-use seasons-This could be cost prohibitive if it were to require erecting expensive, site-specific, acoustical barriers for only one or a few wells
- Locate all new compressors outside PPH-This could be cost prohibitive in certain situations, depending on the topography over which gas-gathering pipelines are installed, the pressure of the natural gas at the wellhead, and the location and availability of a permissible compressor in relation to commercial pipelines, access roads, and other utilities
- Incorporate GRSG habitat requirements in reclamation-This is unlikely to be an issue for well pad reclamation. However, very long road or pipeline corridors could be prohibitively expensive if they require including GRSG components if planting or transplanting sagebrush

is required instead of including sagebrush in a seed mix with native perennial bunchgrasses and forbs.

It is not possible to assess quantitatively the potential for these impacts to affect individual projects. This is because of the lack of specificity concerning where the projects would occur and how substantially these would affect the project's economic feasibility. For example, elevated costs in conjunction with a single well pad with a few wells would be more likely to affect feasibility than the same costs in conjunction with multiple well pads or with a single pad from which numerous wells are drilled. Overall, a determination of the extent to which increased costs and decreased efficiency would affect fluid minerals development is a function of project- and site-specific considerations and of market forces at the time. However, it is possible that some well pads, access roads, pipelines, and other facilities would be affected to the extent that marginal projects are economically nonviable, reducing the number of future oil and gas wells to an extent that may be considered significant at the local, state, or regional levels.

Alternative C-This is the same as Alternative B with regard to "mandatory BMPs" with the greatest potential to affect economic viability of an oil and gas project.

Alternative D-This is the same as Alternative B with regard to "mandatory BMPs" with the greatest potential to affect economic viability of an oil and gas project.

Impacts from Coal Management on Fluid Minerals

Alternatives B and C include management actions to protect GRSG and their habitats in relation to surface and subsurface coal mining projects and would prohibit new surface mines in PPH. Another measure under these alternatives would prohibit new subsurface mine leases in PPH, unless surface facilities would be located entirely outside PPH. This measure also would limit expansion of existing leases, unless new surface facilities were either located outside PPH or, if that is not possible, collocated with existing disturbances or otherwise kept to a minimum. Alternative D includes additional measures but is also aimed at limiting impacts on GRSG populations in both PPH and ADH by minimizing habitat loss and disruption. The potential impacts of these measures on fluid minerals leasing and development are summarized below. (Note that only the KFO has overlap between potentially developable coal and fluid minerals MZ 11 of that field office.)

<u>Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases due to Coal Management</u>

Alternative A-No significant adverse impacts anticipated due to lack of resource overlap.

Alternative B-Under this alternative, the field offices would find unsuitable all leasing for surface mining of coal in PPH. This could significantly reduce the amount of potential coal development in the KFO compared to Alternative A. This is because of the large area of high potentially developable resources not yet leased and the spatial relationship of those to unleased areas to PPH. No adverse impacts on oil and gas leasing and development are anticipated. However, these restrictions on coal could benefit oil and gas leasing and development if some future coal and fluid minerals projects were to compete for allowable surface impacts.

Alternative C-This is the same as Alternative B.

Alternative D-As with the other alternatives, no direct adverse impacts on oil and gas are expected from the prohibition against new surface coal mines and the limitations on new or expanded

subsurface mines. However, this alternative differs from Alternatives B and C by providing greater opportunity for new or expanded mines, subject to restrictions on the amount of surface disturbance in PPH and ADH areas.

Indirectly, this alternative could increase the amount of surface disturbance from coal development, thereby reducing the amount available under the 5 percent cap for future oil and gas activities. It would do this by potentially allowing additional habitat loss from surface mining and surface facilities associated with subsurface mining. Depending on the timing and location of future coal mines or expansion of existing mines in relation to future oil and gas projects, this could reduce the amount of fluid minerals development in the zone of overlap with developable coal.

Reduced Access to New or Existing Oil and Gas Leases

Impacts are the same as those described under the impacts from management of coal on fluid minerals.

Impacts from Locatable Minerals Management on Fluid Minerals

Alternatives analyzed in this EIS protect GRSG from developing locatable minerals are aimed at avoiding or minimizing new habitat loss and additional disruption of GRSG activities by prohibiting or limiting future mining in PPH. The potential impacts of these measures on fluid minerals leasing and development are summarized below. (Note that only the LSFO contains known locatable minerals resources, including uranium, gold, copper, and pharmaceutical limestone.)

Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases

Alternative A-There are no significant adverse impacts anticipated due to lack of overlap between locatable minerals resources and high potential areas for oil and gas.

Alternative B-This alternative includes proposing withdrawal from mineral entry in PPH and making existing claims subject to validity exams or buyout. In addition, before any surface-disturbing activities, plans of operation would be required to include additional effective mitigation in perpetuity, such as purchasing private land and mineral rights or severing subsurface mineral rights in PPH and deeding them to the US Government. This alternative also specifies that seasonal restrictions be considered if deemed likely to be effective in reducing impacts on GRSG use of seasonally critical habitats. The mandatory BMPs described in **Chapter 2** would also be required as COAs. No significant adverse impacts on fluid minerals leasing or development are anticipated.

Alternative C-This is the same as Alternative B except that RDFs for locatable minerals projects (**Chapter 2**) would instead be applied as applicable and technically feasible. No significant adverse impacts on fluid minerals leasing or development are anticipated.

Alternative D-This alternative does not include proposing withdrawal from mineral entry in PPH, potentially accommodating future development, subject to other restrictions. These include a requirement (also under Alternatives B and C) for requiring appropriate mitigation in plans of development and consideration of seasonal restrictions. Overall, the restrictions on locatable minerals development under Alternative D would not cause direct adverse impacts on leasing or development of federal fluid minerals.

Indirectly, this alternative could increase the amount of surface disturbance from developing these minerals, thereby reducing the amount available under the 5 percent cap for potential future fluid minerals development. It would do this by potentially allowing additional habitat loss from development of locatable minerals, which would be largely precluded by Alternatives B and C. At present, however, no overlap of potentially developable locatable minerals and areas with high potential for oil and gas are known within the planning area.

Reduced Access to New or Existing Oil and Gas Leases

Impacts are the same as those described under the impacts from management of locatable minerals on fluid minerals.

Impacts from Nonenergy Leasable Minerals Management on Fluid Leasable Minerals

Measures to protect GRSG and their habitat from the development of nonenergy leasable minerals (nahcolite) under the alternatives analyzed in this EIS are aimed at avoiding or minimizing new habitat loss and additional disruption of GRSG activities by prohibiting or limiting future mining activities in PPH.

None of the field offices have overlap between known nonenergy leasable minerals and areas of high potential for oil and gas development.

Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases

Alternative A-No significant adverse impacts are anticipated due to lack of overlap between nonenergy leasable minerals resources and high potential areas for oil and gas.

Alternative B-This alternative includes closing PPH to nonenergy leasable mineral entry and not permitting expansion of existing mines. The BMPs described in **Chapter 2** would be mandatory, including fluid minerals BMPs for solution mining operations. No significant adverse impacts on fluid minerals leasing or development are anticipated.

Alternative C-This is the same as Alternative B, except that mandatory BMPs for nonenergy leasable projects would instead be applied as applicable and technically feasible (see **Chapter 2**). No significant adverse impacts on fluid minerals leasing or development are anticipated.

Alternative D-This alternative would allow the BLM/USFS to consider expanding nonenergy leasable minerals leases in PPH. No significant adverse impacts on fluid minerals leasing or development are anticipated.

Reduced Access to New or Existing Oil and Gas Leases

Impacts are the same as those described under the impacts from management of locatable minerals on fluid minerals.

Impacts from Salable Minerals Management on Fluid Minerals

As with the solid minerals addressed above, the measures to protect GRSG in from developing salable minerals under the alternatives are aimed at avoiding or minimizing new habitat loss and additional disruption of GRSG activities by prohibiting or limiting future mining in PPH. (Note that only the KFO contains commercial quantities of salable materials on BLM-administered lands, regulated under 43 CFR, Part 3600. However, these lands do not overlap with high potential areas for oil and gas.)

Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases

Alternative A-The KFO would apply COAs and BMPs to disposal of salable minerals. Salable minerals on BLM-administered lands are regulated under 43 CFR, Part 3600. Disposal of salable minerals occurs primarily from established common use areas. No future mining is proposed, and these lands do not overlap with high potential areas for oil and gas. Therefore, no significant adverse impacts on oil and gas leasing and development are anticipated.

Alternative B-This alternative would close PPH to minerals material sales and would require restoration of salable minerals pits no longer in use to meet GRSG habitat conservation objectives for PPH. No significant adverse impacts on oil and gas leasing and development are anticipated.

Alternative C-This is the same as Alternative B.

Alternative D-This alternative would allow the BLM/USFS to consider expanding existing salable minerals sites. No significant adverse impacts on fluid minerals leasing and development are anticipated.

Reduced Access to New or Existing Oil and Gas Leases

Impacts are the same as those described under the impacts from management of locatable minerals on fluid minerals.

Increased Costs and Decreased Efficiency of Oil and Gas Developments

Impacts are the same as those described under the impacts from management of locatable minerals on fluid minerals.

Impacts from Fuels Management on Fluid Minerals

Management actions to protect GRSG and their habitats from fuels management are described in detail in **Section 4.7**, Wildland Fire Ecology and Management, and are presented in **Chapter 2**. These measures focus on ensuring that fuels reduction to reduce the risk of future catastrophic fires does not significantly affect GRSG populations either through disruption of GRSG activities or destruction of occupied or suitable habitat. Results of the analysis of potential impacts from fuels management on oil and gas activities are summarized below by alternative.

Reduced Access to New or Existing Oil and Gas Leases

Impacts are the same as those described under the impacts from fuels management on fluid minerals.

Increased Costs and Decreased Efficiency of Oil and Gas Developments

Impacts are the same as those described under the impacts from fuels management on fluid minerals.

Impacts from Fire Operations on Fluid Minerals

Management actions to protect GRSG and their habitats from fire operations are described in detail in **Section 4.7**, Wildland Fire Ecology and Management, and are presented in **Chapter 2**. Results of the analysis of potential impacts from fuels management on oil and gas activities are summarized below.

Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases

Alternative A-No significant adverse impacts are anticipated. The priority placed on fire suppression in GRSG habitat could benefit oil and gas operations by reducing the potential for fire damage to surface facilities in those areas.

Alternative B-This is the same as Alternative A.

Alternative C-This is the same as Alternative A.

Alternative D-This is the same as Alternative A.

Reduced Access to New or Existing Oil and Gas Leases

Impacts are the same as those described under Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases.

Increased Costs and Decreased Efficiency of Oil and Gas Developments

Impacts are the same as those described under Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases.

Impacts from ACEC/Zoological Area Management on Fluid Minerals

Reduced Availability of Federal Mineral Estate for New Oil and Gas Leases

Alternative A

Colorado River Valley Field Office-Under Alternative A, approximately 300 acres of PPH and 10,200 acres of PGH overlap with lands managed as ACECs. Three of these are within the currently leased Roan Plateau management area,; while the remaining two are in areas with low potential for oil and gas development.

Grand Junction Field Office-No ACECs are located in PPH or PGH.

Kremmling Field Office-Current ACECs are the North Park Natural Area (300 acres) and the Kremmling Cretaceous Ammonite RNA (200 acres), both with NSO stipulations to protect sensitive resource values. Of these, the North Park ACEC is located in PPH.

Little Snake Field Office-ACECs would be closed to oil and gas operations. This includes 2,800 acres in PPH and 2,900 acres in PGH.

White River Field Office-Seventeen ACECs are designated under Alternative A. Although there are no NSO, CSU, or ROW exclusion or avoidance areas to protect the resource values on which the ACECs are based, none of the ACECs is closed to leasing. The acreages for exclusion and avoidance areas are the same as discussed in the discussion of impacts of lands and realty management from Reduced Availability of fluid minerals under Alternative A (see above): 7,200 acres in PPH and 9,900 acres in PGH.

Alternative B-Impacts would be expected to be the same as those described under Alternative A,

Alternative C-This alternative includes a requirement to designate all PPH as a Sage-Grouse Habitat ACEC. This designation emphasizes management for GRSG populations, seasonal activity areas, and other crucial needs; however, it does not, in and of itself, carry any special

restrictions on leasing or development of fluid minerals. There are no additional impacts expected beyond those already described in the discussion of impacts of fluid minerals management on access to fluid minerals under Alternative A.

Alternative D-Impacts would be the same as those described under the *Reduced Availability of* fluid minerals *Fluid Minerals Due to Designation of ACECs*.

Reduced Access to New or Existing Oil and Gas Leases

Impacts are the same as those described under *Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases*.

Increased Costs and Decreased Efficiency of Oil and Gas Developments

No significant impacts on fluid minerals from increased costs related to ACEC designations are anticipated, except as related to other restrictions associated with the ACECs and addressed previously (e.g., restrictions on travel management, lands and realty, and fluid minerals) applied to the various ACECs.

Summary of Impacts on Fluid Leasable Minerals

Alternative A-Under current management, the five field offices use a combination of management (e.g., closed to leasing), lease stipulations (NSO, CSU, and TL), and project-specific COAs to manage fluid mineral leasing and development. These management measures are a way to avoid or minimize adverse impacts on other resources and resource uses, especially sensitive resources, such as GRSG and their habitat. The LSFO, which published its current RMP in 2011, has identified 7,000 acres of unleased minerals in GRSG habitat as closed to leasing for fluid minerals. The WRFO, which published its current plan in 1997, has identified 4,700 acres of GRSG habitat as closed to leasing. For other high potential areas for oil and gas in these field offices and for the three remaining field offices with older plans (CRVFO, GJFO, and KFO), protections for GRSG and their habitats consist of lease stipulations and, especially, COAs applied under the BLM/USFS' regulatory authority.

In terms of total fluid mineral estate within the planning area, 100,200 acres are closed to fluid mineral leasing under current RMPs. This represents 7.7 percent of the total of currently unleased fluid minerals in the 21 Colorado MZs. In addition, 298,000 acres of leased or unleased lands in the 21 MZs are protected with NSO stipulations, and 24,200 acres are managed as ROW exclusion areas. Both of these restrictions prohibit surface-disturbing and long-term surface occupancy. Although these restrictions are mostly related to resources and uses other than GRSG, and while they relate to surface use without precluding leasing of the underlying fluid minerals, their combined 522,200 acres represent 7.8 percent of the 4.15 million acres of all lands within the Colorado MZs.

Alternative B-Under Alternative B, the 447,000 acres of unleased fluid minerals in areas with high potential for oil and gas and in areas of PPH would be closed to leasing.

Additional measures under Alternative B would apply to currently leased lands with the objective of greatly reducing the amount and density of surface disturbance. The total area affected-estimated at 616,100 acres of existing leases-would be subject to reducing well pad density to 1 per 640 acres instead of the current typical density in some parts of the planning area of 4 per 640 acres. The actual impact could vary substantially, depending on site-specific geology,

directional drilling technology, economics, other applicable surface-use constraints, and the degree to which the leases are already developed.

Other constraints on fluid minerals under Alternative B include restrictions on new, realigned, or upgraded roads in PPH and a requirement for PPH lands to be managed as ROW exclusion areas. Although these measures would not preclude new leasing per se, they could make access to new or existing leases difficult or potentially impossible by prohibiting use of BLM/USFS surface lands to access the leases. While the impact on the amount of future development cannot be calculated because of the many variables affecting a given site or project-for example, availability of alternative access across private lands or across non-PPH areas-it is noteworthy that an estimated 1.25 million acres of federal mineral estate in the planning area would come under the road restrictions under this alternative; 631,700 acres would come under the requirement for ROW exclusion areas. These are potentially substantial impediments to future development, even if they do not result in a de facto constraint on leasing.

Constraints associated with the other resources and uses analyzed above would generally have only a minor impact on future leasing of federal fluid minerals and additional development of existing leases.

The 3 percent disturbance cap applicable to a variety of potential ground-disturbing activities under Alternative B could be the determinative measure, notwithstanding the various other constraints summarized above. For example, while anthropogenic disturbance accounts for only 86,400 acres (2 percent) of the 4.1 million acres of federal lands within the 21 Colorado MZs, that total is two-thirds of the way toward the 3 percent disturbance cap. Indeed, three of the 21 zones are already above the three percent cap, and ten more are more than halfway to that amount of disturbance.

Based on the above, Alternative B would have significantly greater impacts on fluid minerals than Alternative A.

Alternative C-Under Alternative C, 733,600 acres of currently unleased fluid minerals in areas with high potential for oil and gas and in ADH would be closed to leasing.

Additional measures under Alternative C would apply to currently leased lands with the objective of greatly reducing the amount and density of surface disturbance. The total area affected-more than 1.01 million acres of existing leases-would be subject to a 75 percent reduction in well pad density, to one per 640 acres. The actual impact could vary substantially, depending on site-specific geology, directional drilling technology, economics, other applicable surface-use constraints, and the degree to which the leases are already developed. This is a 63 percent greater loss of future wells due to reduction in pad density than under Alternative B.

Other constraints on fluid minerals under Alternative C include restrictions on new, realigned, or upgraded roads in ADH and a requirement for ADH as ROW exclusion areas. Although these measures would not preclude new leasing per se, they could make access to new or existing leases difficult or potentially impossible by prohibiting use of BLM/USFS surface lands to access the leases. Although the impact on the amount of future development cannot be calculated because of the many variables affecting a given site or project (e.g., availability of alternative access across private lands or across non-PPH areas) it is noteworthy that an estimated 1.34 million acres of federal mineral estate in the planning area would come under the road restrictions and would be managed as ROW exclusion areas. These are potentially substantial impediments to future development, even if they do not result in a de facto constraint on leasing.

The constraints summarized above are in addition to limits based on the 3 percent disturbance cap applicable to a number of activities under this alternative. Three of the 21 MZs already above that threshold, and ten more zones are more than halfway to that cap.

Based on the above, Alternative C would have significantly greater impacts of fluid minerals than Alternative B.

Alternative D-This alternative generally gives the BLM/USFS more flexibility in decisions about issuing new leases and approving additional development of existing leases. For example, PPH would not be closed to leasing but could be leased with an NSO stipulation, with exception criteria. In addition, any approved projects would be subject to a 5 percent disturbance cap instead of a 3 percent disturbance cap. Greater flexibility in applying constraints on development includes measures related to travel management and lands (ROW) actions. These and other measures for which greater flexibility is available under Alternative D make it less subject to such wholesale reductions in the amount of future development as in Alternatives B and C. However, it is not possible to quantify the reductions because the flexibility built into this alternative would be highly variable, depending on site-specific and project-specific conditions. Furthermore, while the 5 percent disturbance cap is less restrictive than the 3 percent cap of Alternatives B and C, one of the 21 MZs is already above that amount, another is at 4.6 percent, and four more are nearly halfway to 5 percent with the current level of development.

Although the impacts under this alternative are not easily quantified, the large areas across which they would apply indicates that even these less onerous restrictions would result in significantly greater protections for GRSG and significantly fewer and lesser adverse impacts than under Alternative A.

4.8.2. Coal

General Description

Federal coal resources are administered by the BLM, regardless of surface estate ownership, through lease sales under the Mineral Leasing Act.

Current federal coal leases comprise 11,000 acres of GRSG habitat, or 0.4 percent of the total federal mineral estate in the planning area. Unleased areas of federal mineral estate found to be suitable for coal leasing or managed as open for leasing comprise 518,600 acres of GRSG habitat, or 21 percent of the total federal mineral estate within the planning area.

Table 3.43, Acres of Federal Mineral Estate in GRSG Habitat-Coal, summarizes this information for the five BLM field offices.

Methodology and Assumptions

General Impacts on Coal

Indicators of impacts on coal and the measurements used to describe the impacts (where available or appropriate) are described below:

- Reduced Availability of Coal Resources to New Coal Leases

Specific measure: Closure of federal mineral estate lands to leasing

Amount of federal minerals available versus closed to leasing (fewer new leases)

Indirect impacts include loss of coal production for public use and for generating sales and tax revenues and federal royalties from production

- Reduced Access to Existing Coal Leases

Specific measure: NSO or equivalent on all or parts of new leases

Fewer leases (large or contiguous small leases with no nearby private land)

Indirect impacts include reduced coal production for public use and for generating lease sales and tax revenues and federal royalties from production

Specific measure: ROW exclusions on lands needed for road and utility access

Fewer new leases, fewer leases on lands with ROW restrictions

Indirect impacts include reduced coal production for public use and for generating lease sales and tax revenues and federal royalties from production

Specific measure: Restrictions on amount or location of surface-disturbing activities (mine areas, ancillary facilities, air ventilation facilities for subsurface mines, access roads, conveyors, power lines, and railroad lines) on new or existing leases

Fewer potential exploration targets reachable; fewer locations for ancillary facilities available.

Indirect impacts include higher cost of location of surface facilities and adverse financial impact on lessee to accessing a portion of mineral estate from nearby private land.

- Increased Costs and Reduced Efficiency of Coal Development

Specific measures (examples): Seasonal closures, undergrounding of electric distribution lines, noise abatement, visual screening, higher reclamation costs, and specialized fencing)

Reduced development in otherwise permissible areas (fewer leases, fewer or smaller expansions of existing mines), particular for marginal coal resource areas or during periods of low market prices for coal.

Indirect impacts include reduced production of coal for public use and for generating lease sale and tax revenues and federal royalties from production; adverse financial impact on lessee (especially for restrictions on existing leases)

For all of these types of impacts, it is impossible to state with certainty in the context of this LUPA/EIS the degree to which they would result in the adverse impacts noted above. Only the following, as identified during project-specific NEPA analysis, would allow a definitive estimate of the impacts on coal production

- Planning for specific lease sales
- The outcomes of those lease sales

- The locations and scales of new or expanded mines

These considerations, along with changes in coal prices, suitability of specific coal deposits for specific industrial or commercial uses (e.g., electrical generation), and geopolitical factors, are likely to profoundly affect how each alternative analyzed in this EIS impacts coal leasing and development for the foreseeable future.

Assumptions

- Coal resources are not evenly distributed across the landscape
- Coal mining operations are sensitive to costs, especially when prices are depressed
- Coal operators need to understand potential for future lease expansion at the time of lease acquisition or development
- Ability to construct facilities or roads and pipelines on private lands to access federal minerals is subject to landowner approval, not guaranteed
- Mining techniques are highly technical and not uniformly applicable
- Seasonal closures on travel may make development infeasible
- Spacing of surface facilities for subsurface mines (e.g., air vents) is mandated by regulations for worker safety
- Practicability of conveyors instead of trucks for hauling depends on distance and production rate
- Minimum 5 years needed for restoring self-sustaining native grass and forb cover on reclaimed mine surface and roadway alignment
- Minimum of 10 years needed for successfully sagebrush becoming established or colonizing reclaimed mine surface and roadway alignment

Implementing management actions for the following resources would have negligible or no impact on coal management; therefore, these impacts are not discussed in detail: wind energy development, industrial solar development, range management, wild horses, recreation, non-energy leasable minerals, salable minerals, ESR, and habitat restoration.

Additionally, only those indicators which are affected by a management action are discussed in detail below.

Direct and Indirect Impacts on Coal

Impacts from Travel Management on Coal

A variety of management actions affecting travel and transportation are currently being applied or are proposed to be applied under Alternatives B, C, and D, to reduce adverse impacts on GRSG and their habitats. These have varying degrees of potential adverse impacts on leasing and development of coal resources. In general, management actions for resources and resource uses could affect potential coal development when they result in any of the following:

- Reduced availability of identified potentially developable coal resources for leasing
- Reduced access to new or existing leases or mines due to restrictions on use of the overlying surface lands
- Reduced efficiency and increased operational costs that make a potential coal development economically infeasible

Reduced Availability of Federal Mineral Estate for New Coal Leases

Alternative A-None of the five field offices currently manages areas as closed to coal leasing. This is because travel management considerations and new or existing leases are not subject to closures or other travel limitations. Current management is summarized below.

Colorado River Valley Field Office-Current management in the CRVFO protects coal resources with restrictions on oil and gas development. The NSO, detailed under Alternative A in the current LUP, prohibits surface occupancy and surface-disturbing activities within the area of an approved surface coal mine. No travel management designations apply to coal resources identified under the current LUP.

Grand Junction Field Office-The mapped GRSG habitat is largely accessible via an extensive network of roads and trails in the area. Travel surfaces range from paved roads to primitive dirt roads, accessible only by high clearance four-wheel-drive vehicles, OHVs, or on foot or horseback. Currently, all of the BLM lands within PPH are managed as open to cross-country travel for all modes of transportation. Within PPH, 17 miles of travel routes have been inventoried on BLM-managed lands. In PGH, 6,300 acres of BLM lands are managed as open to cross-country travel, and 2,500 acres are managed with a seasonal closure (December 1 to May 1) to motorized use to protect wintering big game. During the rest of the year, motorized travel in that area is limited to existing routes. Within PGH, 32 miles of travel routes have been inventoried; vehicular traffic within the mapped habitat is generally very light. Traffic temporarily increases during oil and gas drilling and completion. Traffic also increases during fall hunting seasons.

Kremmling Field Office-Approximately 45,000 acres of the federal mineral estate within the KFO planning area would be open to further consideration for coal leasing. Current travel restrictions primarily have an objective other than reducing adverse impacts on GRSG and their habitats; most of these closures are outside of PPH and PGH and outside of areas identified as having potential for coal leasing and development. Travel restrictions and site-specific TLs could be applied as design criteria that would prohibit surface occupancy and surface-disturbing activities during specified times of the year. These restrictions and prohibitions would be in GRSG crucial winter habitat and nesting habitat and within or up to a 2-mile radius of an active lek. Where these areas coincide with sites that have potential coal resource development, design features and COAs could limit, prevent, or require relocation of coal exploration and development.

Overall, most areas are open to OHV travel (307,300 acres; approximately 81 percent of BLM land within the KFO) or are limited to existing (7,300 acres; approximately 0.019 percent) or designated routes (54,500 acres; approximately 14.4 percent). Administrative access would be available for permitted coal exploration actions and for coal development, with BLM authorization. Exception criteria allow for travel in areas otherwise closed or limited to existing or designated routes within leased coal lands. Routes could also be constructed in PPH and PGH. A 3 percent disturbance cap would not be applied and would not affect new road construction.

Consequently, road closures and other travel management restrictions should result in only minor impacts on coal resource exploration and development.

Little Snake Field Office-A comprehensive transportation plan is underway to designate roads and trails as open, closed, or limited, in order to meet management needs and minimize impacts on resources and habitats. The number of unmanaged roads and trails would be reduced. Vehicle closures do not apply to BLM ROWs, county or state roads, or other valid existing rights, including permitted mining operations. Other permitted uses may be allowed under special authorization on a case-by-case basis.

White River Field Office-Travel restrictions to existing routes and limitations on upgrading or realigning existing routes affect approximately 33,400 acres of federal coal resources. BLM roads within the WRFO are open to public travel at all times, subject to any limitations or restrictions outlined in the 1997 White River RMP. Travel restrictions would primarily have an objective other than reducing adverse impacts on GRSG and their habitats. Existing routes in PPH could be upgraded to a higher use category (e.g., from trail to primitive road or from primitive road to road). Routes could be constructed in PPH. Restrictions on vehicular access by the public could be applied as outlined in the 1997 White River RMP. Limitations on new or upgraded roads could adversely impact whether a specific area is suitable in terms of access. Even where access is available to a portion of a lease or to nearby private lands, where federal minerals could be accessed by underground mining, the technical and economic feasibility of coal development may be significantly reduced. An activity-level travel plan would have to be developed within 5 years of the ROD. Any permanent or seasonal closures resulting from the travel plan could further reduce development potential by restricting access or reducing feasibility and economic viability of any affected lease.

Alternative B-None of the actions related to travel management under this alternative would preclude leasing federal mineral estate for coal mining. However, limitations on new or upgraded roads could adversely impact whether a specific area of resource is suitable in terms of access. Even where access is available to a portion of a lease or to nearby private lands, where federal minerals could be accessed by underground mining, the technical and economic feasibility of coal development may be significantly reduced. An activity-level travel plan would have to be developed within 5 years of the ROD. Any permanent or seasonal closures resulting from the travel plan could further reduce development potential by restricting access or reducing feasibility and economic viability of any affected lease.

Alternative C-In terms of travel management, this alternative is similar to Alternative B in that none of the measures would preclude future coal leasing. However, some of the travel management restrictions on new, realigned, or upgraded routes would apply to ADH instead of PPH. Consequently, Alternative C would be more restrictive than Alternative B, with greater potential for making coal leasing or development infeasible, thereby resulting in a de facto closure of some areas to future leasing.

Alternative D-Like the other alternatives, Alternative D would not preclude leasing for coal mining. Consideration of seasonal closures on travel would apply to ADH instead of only to PPH lands, but no consideration would be given to permanent closures. New road construction would be permitted if it would not adversely affect GRSG due to habitat loss or disruption. On balance, this alternative would be less likely than the other alternatives to result in a de facto closure of some areas to future leasing.

Reduced Access to New or Existing Coal Leases

Alternative A-See the discussion of current management and associated impacts above under *Reduced Availability of Federal Mineral Estate for New Coal Leases*. None of the restrictions under current management would apply to leasing and development of federal coal resources but could guide project-specific planning.

Alternative B-Under this alternative, restrictions on travel would be implemented in PPH to reduce disturbance of GRSG from movement, noise, dust, and incidental human activity associated with vehicular travel. Motorized travel would be restricted to existing routes. No exiting routes in PPH could be upgraded to a higher use category (e.g., from trail to primitive road or from primitive road to road). The exception would be if the upgrading were necessary for motorist safety or to avoid constructing a new road outside the PPH, and then only if impacts on GRSG would be minimal. Similarly, no new routes could be constructed in PPH, although portions of existing routes may be rerouted to allow for motorist safety or to avoid constructing a new route outside the PPH and only if impacts on GRSG would be minimal. An exception to the prohibition on new routes, except for realignments, is in the case of valid existing rights (current leases). To access current leases, new routes could be constructed, but only to the minimum standard necessary for safe travel by the required types of vehicles and intensity of use, and only to the extent permissible with a 3 percent disturbance cap.

Where existing routes are no longer needed, Alternative B would require that they be restored using seed mixes appropriate for use in GRSG habitat and potentially transplanted sagebrush. Travel management planning under Alternative B would also include the need for seasonal or permanent closures or for limiting routes to administrative use. This would entail completing an activity-level travel plan within 5 years of the ROD for the EIS.

Under Alternative B, restricting travel to existing routes and limiting their upgrading or realignment could limit access to federal coal resources. However, impacts could be negligible when existing routes are designated as closed or open with restrictions. Although the limitations on upgraded or realigned routes are not absolute-for example, they could be permitted where needed for safety-this requires a determination that impacts on GRSG would be minimal. Because exact numbers and locations of projects where these limitations would be applied are unknown at this time, the availability of a variance has not been assumed for this impact assessment. However, by definition, any variance that may be granted would not have significant adverse impacts on GRSG.

Without site-specific and project-specific information (e.g., practicability of other routes), it is not possible to quantify the degree to which the restrictions on access under Alternative B would preclude further leasing and development. Nevertheless, 668,900 acres of potentially developable coal resources could be affected by closures to road construction, realignment, and upgrading. Estimates of affected acres by field office are as follows:

Colorado River Valley Field Office-0 acres

Grand Junction Field Office-0 acres

Kremmling Field Office-45,000 acres

Little Snake Field Office-219,200 acres

White River Field Office-10 acres

Alternative C-In terms of travel management, this alternative is similar to Alternative B. For existing leases and mines, the accommodation for new roads would be more restrictive, with no construction within 4 miles of a lek. Four other types of restrictions under Alternative B would apply to ADH as well as PPH. These are (1) limiting route construction to realignments of existing routes; (2) allowing realignments only where impacts on GRSG habitat would be minimal, where it avoids a new road, or when needed for motorist safety; (3) allowing no upgrades of existing routes that would change the route category or capacity unless it avoids a new road or is necessary for motorist safety; and (4) requiring the use of transplanted sagebrush in addition to native seeds in reseeding roads. . Other measures are the same as under Alternative B. Consequently, Alternative C would be somewhat more restrictive than Alternative B, with greater potential for making coal leasing or development infeasible or, at a minimum, reducing the amount of development and increasing costs. Based on currently identifiable lek locations, an estimated 711,500 acres of potentially developable coal resources would be closed to road construction, realignment, or upgrading. Estimates of affected acres by field office are as follows:

Colorado River Valley Field Office-0 acres

Grand Junction Field Office-0 acres

Kremmling Field Office-45,000 acres

Little Snake Field Office-225,600 acres

White River Field Office-28,100 acres

Alternative D-This alternative is also similar to Alternative B, although it is more restrictive in some aspects and less restrictive in others. For example, the consideration for seasonal closures on travel would apply to ADH instead of only to PPH. On the other hand, permanent closures would not be considered. New roads needed to access current leases or existing mines would be build using the Gold Book standard and would be limited to a 5 percent instead of 3 percent disturbance cap. In addition, an exception could be granted for the 5 percent disturbance cap. This would be the case if GRSG populations in the MZ were healthy and stable or increasing and that the construction would not adversely affect GRSG due to habitat loss or disruption. Similarly, road reroutes and upgrades would be less severely restricted, with the evaluation based on adverse impacts on GRSG populations instead of a requirement for a benefit in terms of safety or to avoid new construction.

On balance, this alternative would place fewer impediments on coal leasing and development from travel management than Alternative B. This consists of new travel restrictions that could affect accessibility, feasibility, and costs of development of federal coal resources in areas that do not currently have such restrictions. Impacts would be substantially fewer than under Alternative C, which would prohibit new road construction within 4 miles of a lek.

It is not possible to quantify impacts precisely under this alternative. This is because the more accommodating restrictions would result in substantial portions of potentially affected acres not being effectively closed or constrained, relative to future coal development.

Impacts from Lands and Realty Management on Coal

Management actions related to lands and realty in conjunction with protection of GRSG and their habitats and use area could adversely impact coal leasing and development. This potential

includes all three types of impacts on coal resources described previously: reduced availability, reduced accessibility, and increased costs.

Reduced Availability of Federal Mineral Estate for New Coal Leases

Alternative A-In the KFO, land use authorizations would focus on concentrating linear facilities in or contiguous with existing corridors, where possible. Authorizations would be avoided in locations that would harass livestock or wildlife or that would impact fragile areas, such as threatened and endangered habitats. When considering land tenure adjustments, the KFO would retain all public lands or interests in land (such as easements) that enhance multiple-use and sustained-yield management. It would acquire lands or interests in land that complement important resource values and further management objectives. As standard practice, abandoned ROWs are required to be reclaimed on BLM-administered and National Forest System lands. Under this alternative, the KFO would not identify any areas as exclusion or avoidance areas, so there would be no impact on the leasing and development of federal coal resources.

None of the existing LUPs for field offices in the planning area include specific closures to leasing potentially developable coal resources. However, areas managed as ROW exclusion or avoidance areas could restrict surface use sufficient to make leasing infeasible for projects requiring a ROW to access coal leases or facilities. For example, LSFO's current RMP (2011) identifies ROW exclusion areas that would preclude or constrain access to 11,700 acres of potentially developable coal resources. It also would preclude or constrain access to ROW avoidance areas, which would affect access to approximately 47,200 acres of this resource. (See the analysis of constraints on access under *Reduced Access to New or Existing Coal Leases* below)

Alternative B-Under this alternative, PPH would be managed as ROW exclusion areas, precluding new access roads and electric distribution lines, conveyors, or other surface facilities. Depending on the specific site and project design, this could impede access sufficient to make leasing impracticable.

Alternative C-Under this alternative, the same measures related to PPH in Alternative B would be applied to ADH areas. This is therefore likely to result in greater impacts on access to coal resources sufficient to make leasing impracticable.

Alternative D-This alternative would be less restrictive than Alternatives B and C by managing PPH as ROW avoidance areas rather than exclusion areas. Consequently, Alternative D is less likely to result in constraints on access sufficient to make coal leasing impracticable.

Reduced Access to New or Existing Coal Leases

Alternative A-Impacts are the same as those under *Reduced Availability of Federal Mineral Estate for New Coal Leases*.

Alternative B-Under this alternative, PPH would be managed as ROW exclusion areas, precluding new access roads and electric distribution lines, conveyors, or other surface facilities. Two exceptions would be considered: In the case of an existing lease not yet developed, where a new ROW could be completed entirely within the disturbance footprint of an existing ROW (e.g., locating a power line along an existing road); in the case of an existing mine, ROWs could be collocated with an existing ROW. If a new access road or other ROW could not be collocated with an existing ROW, it could be constructed only if impacts were minimized and disturbance were to remain within a 3 percent cap. If the cap were exceeded, mitigation would then be required.

Managing PPH as ROW exclusion areas could affect the availability or access to 264,200 acres of potentially developable coal resources that do not currently have such restrictions. However, specific impacts on leasing and developing currently unleased coal cannot be quantified without project-specific information on the size and configuration of potential future leases, in relation to adjacent federal or private surface lands and existing or feasible new access routes.

Other actions or BMPs in PPH under Alternative B to increase protection of GRSG and their habitats include removing, burying, or modifying power lines and removing and restoring the locations of unused surface facilities associated with ROW grants.

Additional measures to be applied in PGH are as follows:

- Managing PGH as ROW avoidance areas, which would require that impacts on GRSG and their habitats be avoided where practicable or minimized and mitigated
- Collocating necessary new ROW features with existing features.

These measures could add to the costs of new coal leases and new or expanded coal mines. Where very long and indirect alignments are involved, existing power lines would have to be buried, which could make a potential project economically infeasible.

Among land tenure measures, requirements for PPH under Alternative B include a prohibition against disposal of BLM-administered and National Forest System lands and a goal of acquiring certain private lands. Without project-specific information, it is not possible to assess this impact fully, but it could make some otherwise accessible private lands from being used for coal development and keep some lands in federal ownership that might otherwise be disposed of and hence available for access to potentially developable coal resources. Estimates of affected acres by field office are as follows:

Colorado River Valley Field Office-0 acres

Grand Junction Field Office-0 acres

Kremmling Field Office-45,000 acres (approximate)

Little Snake Field Office-219,200 acres

White River Field Office-10 acres

Alternative C-Under this alternative, the measures related to PPH in Alternative B would be applied to ADH areas. This is therefore likely to result in greater impacts on coal leasing and development, since more lands would be affected. Managing ADH as ROW exclusion areas could affect the availability or access for approximately 517,900 acres of federal coal resources that do not currently have such restrictions.

The requirements under Alternative B for removing, burying, or modifying power lines and for removing and restoring any unused ROWs corridors would also be applied under Alternative C, as the requirement for relocating unbuilt ROW corridors outside PPH, as would measures under Alternative B related to land tenure adjustments. However, the actions related to PGH-management as ROW avoidance areas and requiring collocation of new ROW alignments with existing alignments-would not be applied under this alternative, reducing somewhat the impacts on coal leasing and development in PGH. Estimates of affected acres by Field Office are:

Colorado River Valley Field Office-0 acres

Grand Junction Field Office-0 acres

Kremmling Field Office-45,000 acres (approximate)

Little Snake Field Office-444,800 acres

White River Field Office-28,100 acres

Alternative D-This alternative would be less restrictive than Alternatives B and C by managing PPH as ROW avoidance rather than ROW exclusion. Also within PPH, new ROWs may be collocated within existing corridors without the need for staying within the existing footprint. New ROWs in relation with existing leases or mines would also be less difficult to implement, including accepting impacts where access would otherwise be inaccessible. The associated disturbance cap for access to valid existing rights would be 5 percent, compared to 3 percent under Alternative B, although mitigation would be required.

Alternative D would also require only raptor perch deterrents instead of burying existing power lines in PPH. In addition, unused ROWs would be required to be reclaimed only where mandated by regulation. Furthermore, new ROWs would be allowed where a compelling reason exists and GRSG populations would not be adversely affected by habitat loss or disruptive activities. The Alternative B and C requirements for relocating unbuilt corridors from inside to outside PPH would also not be applied under Alternative D. Actions related to PGH and to land tenure adjustments are the same as those under Alternatives B and D or, where different, would have the same relative impact on coal leasing and development compared to current management.

The likely outcomes of lands-related management actions and BMPs on leasing and development of federal coal resources under Alternative D cannot be quantified. However, because it represents fewer and less stringent constraints on development, it is likely that most projects could be developed with appropriate planning and design and adequate mitigation.

Increased Costs and Decreased Efficiency of Coal Mining Operations

No significant adverse impacts are anticipated under any of the four alternatives.

Impacts from Fluid Minerals (Oil and Gas) Management on Coal

In the Rocky Mountain region, habitat loss or modification, surface infrastructure, associated vehicle travel, and disturbance from equipment operations associated with federal fluid mineral development have been identified as key threats to GRSG populations and habitat. Consequently, the alternatives analyzed in this EIS include a number of management actions and mandatory mitigations to reduce the scale, frequency, and severity of impacts from oil and gas. (See **Section 4.8.1**, Fluid Leasable Minerals.) Note that to a large extent, management actions variously prohibiting or restricting fluid minerals projects under the alternatives analyzed do not affect the potential for new or expanded coal leases and developments.

Exceptions include the extent to which measures that either restrict or accommodate oil and gas leasing and development may increase or decrease future development of coal resources by affecting the amount of new surface disturbance allowable for coal projects under applicable disturbance caps.

Reduced Availability of Federal Mineral Estate for New Coal Leases

No management actions for fluid minerals in any of the field offices specifically preclude leasing to develop coal resources. However, in areas of overlap between potentially developable coal and high-potential for oil and gas, leasing and development for fluid minerals could consume the allowable surface disturbance caps under the various alternatives, precluding some coal projects in areas of overlap. The only current area of known overlap is in Zone 11 of the KFO.

Alternative A-No significant adverse impacts are anticipated. In the KFO, approximately 45,000 acres of the federal mineral estate would be open to further consideration for coal leasing. Within the area of federally leased coal lands, surface occupancy and surface-disturbing activities from oil and gas operations would be restricted, such as with NSO and CSU stipulations. This would benefit coal resource. Future coal mining is considered to have low potential.

Alternative B-This alternative closes PPH areas to new leases for oil and gas and places stringent constraints on existing leases, including a 3 percent disturbance cap. This alternative therefore has less potential than Alternative A to preclude future coal development in Zone 11 of the KFO.

Alternative C-Impacts are the same as under Alternative B, with more stringent restrictions on fluid minerals and therefore lesser potential to preclude future coal development in Zone 11 of the KFO.

Alternative D-Impacts are the same as under Alternative B, but with less stringent restrictions on fluid minerals and therefore somewhat greater potential for precluding future coal development in Zone 11 of the KFO.

Reduced Access to New or Existing Coal Leases

Impacts are the same as under *Reduced Availability of Federal Mineral Estate for New Coal Leases*.

Increased Costs and Reduced Efficiency of Coal Developments

No significant adverse impacts are anticipated under any of the four alternatives.

Impacts from Coal Management on Coal

The WRFO and LSFO include existing coal leases, and both of these field offices plus KFO include lands acceptable for further consideration of coal leasing (see below). Surface mines represent significant areas of habitat loss, along with associated vehicular traffic, noise and dust generation, electrical distribution lines, and light pollution. Subsurface mines, while resulting in less habitat loss, also have surface facilities and most of the other sources of impacts associated with surface mines.

The *General Description* section presents information on the coal program as administered by the BLM and the extent of coal resources in the planning area; *Methodology and Assumptions* summarizes the types of impacts likely to result from coal leasing and development and the tools available to the BLM/USFS for avoiding, minimizing, or offsetting those impacts.

The following paragraphs compare the management actions and key BMPs of coal mining and are incorporated into the alternatives analyzed in detail. Impacts are grouped into three categories for each alternative: impacts on the availability of federal coal resources for development, on the access to those resources, and on the economic viability of development projects, based on increased costs to the mine operator.

Reduced Availability of Federal Mineral Estate for New Coal Leases

Alternative A

Colorado River Valley Field Office-The current LUP identifies 28,500 acres as open to consideration for coal leasing. However, a more recent analysis has concluded that none of the resources, located of the anti-dip slope of the Grand Hogback, are potentially developable using current mining technologies and based on the quantity and quality of the coal. Coal unsuitability criteria at 43 CFR, Part 3461, will be applied to any future coal applications that may be received.

Grand Junction Field Office-Coal is found in the subsurface in GRSG habitat areas, but at depths greater than 3,000 feet, making it uneconomical to mine with today's methods and economics. Some coals of the Mesaverde Group are exposed in the Book Cliffs north of Grand Junction. The coals in the GJFO planning area vary, from semibituminous to bituminous B and C in apparent rank. The coal is non-coking, non-agglomerating. A moderate potential exists for underground mining in these areas within the next 20 years, but this mining would not affect GRSG habitat.

Kremmling Field Office-Under Alternative A, approximately 45,000 acres of the federal mineral estate within the KFO would be open to further consideration for coal leasing. Within the area of federally leased coal lands, surface occupancy and surface-disturbing activities related to oil and gas operations would be restricted. Coal mining would result in surface-disturbing activities and mitigation, and design features would be applied to proposed coal operations in order to reduce or mitigate impacts on other resources. No coal mines are currently active in the KFO due to the lack of reasonable cost transportation, and the potential for future coal development is relatively low.

Little Snake Field Office-A total of 623,900 acres are deemed acceptable for further consideration for leasing for either surface or underground development (coal planning area). Site-specific activity planning, including additional environmental analysis, will be needed before a decision to lease specific tracts can be made. Exploratory drilling will be allowed in order to obtain sufficient data for resource management decisions and to make fair market value determinations.

White River Field Office-The management of coal resources developed in the 1981 Coal Amendment was carried forward into the 1997 White River RMP. The coal unsuitability criteria at 43 CFR, Part 3461, were not reapplied at the time the 1997 RMP was developed. The unsuitability criteria will be reapplied at the time an application is received. The acreage identified as unsuitable for further coal leasing based on wildlife issues will be modified with updated wildlife information as coal lease applications are received. Reapplication of the coal unsuitability criteria will be completed in coordination with CPW. No existing coal leases overlap with mapped PPH for GRSG, but 5,300 acres of existing leases are within mapped PGH. Five acres of PPH and 28,100 acres of PGH are identified as acceptable for further coal leasing and no acres are identified as unsuitable.

Alternative B-Under this alternative, the field offices would find unsuitable all leasing for surface mining of coal in PPH, using the criteria set forth in 43 CFR, Part 3461.5. This would close all PPH to future surface coal mining, affecting 264,200 acres of potentially developable coal in the planning area. This is 51 percent of the combined 518,600 acres of potentially developable coal. Estimates of areas of coal resources affected, by field office, are as follows:

Colorado River Valley Field Office-0 acres

Grand Junction Field Office-0 acres

Kremmling Field Office-45,000 acres

Little Snake Field Office-219,200 acres

White River Field Office-10 acres

Alternative C-Impacts are the same as those under Alternative B.

Alternative D-Under Alternative D, the requirement for a finding of unsuitability for future leasing of coal for surface mining is replaced with a requirement for a finding of unsuitability where GRSG cannot be adequately protected. In addition, any disturbances that may be permitted in ADH areas as a consequence of this provision would have a limit on surface disturbance of 5 percent of the particular MZ. Where the 5 percent cap cannot be achieved, additional mitigation is required. The language of the provision under this alternative prevents it from being a de facto bar to leasing.

The degree to which this measure would affect the availability of new leases depends on whether a particular parcel being considered contains or is within 4 miles of a GRSG lek or could be developed within a 5 percent disturbance cap. Based on mapping of currently known leks, with associated 4-mile buffers, this could affect more potentially developable coal resources than under the other alternatives. Estimates of affected acres are not a reliable indicator of impacts on future coal development. This is because the restrictions under Alternative D would not be applied absolutely but only when GRSG could not be adequately protected through project location, design, and other mitigations.

Reduced Access to New or Existing Coal Leases

Alternative A-There are no significant adverse impacts anticipated under Alternative A.

Alternative B-Under this alternative, new leases for coal subsurface mines would be granted in PPH if all associated surface facilities are located outside PPH. In the case of existing leases in PPH, any new surface facilities must be collocated with existing surface disturbances or, if that is not possible, kept to the absolute minimum. Although not prohibiting new or expanded coal development in PPH, this measure could reduce access to those resources if portions of a subsurface resource could not be fully developed owing to a lack of sufficient surface features, such as ventilation fans overlying the belowground workings. Estimates of affected acres by field office are as follows:

Colorado River Valley Field Office-0 acres

Grand Junction Field Office-0 acres

Kremmling Field Office-45,000 acres

Little Snake Field Office-219,200 acres

White River Field Office-10 acres

Alternative C-The impacts are the same as those under Alternative B.

Alternative D-For subsurface mines, Alternative D would be the same as Alternatives B and C by allowing new coal leases if all surface facilities are placed outside any PPH area. However,

Alternative C differs by applying a 5 percent disturbance cap per Colorado MZ to any approved projects, with additional mitigation required for disturbance in excess of 5 percent.

Unlike Alternatives B and C, this alternative includes two potential bases for exemption from this provision: in conformance with federal coal leasing regulations, federal lands with coal deposits are not assessed as unsuitable when they would be mined entirely by underground methods; alternatively, where surface impacts would accompany the subsurface mine, it would be assessed as unsuitable if one or more unsuitability criteria apply, unless a relevant exception or exemption applies. In the latter case, disturbance would be limited to 5 percent in any Colorado MZ, and additional mitigation would be required to offset unavoidable impacts.

The magnitude of impacts associated with Alternative D cannot be assessed without project-specific information on where an affected lease is located and the spatial relationship of any surface facilities to GRSG habitat. Because the restrictions under this alternative would not be applied absolutely but only when GRSG could not be adequately protected through project location, design, and other mitigations, estimates of affected acres are not a reliable indicator of potential impacts on future coal development.

Increased Costs and Reduced Efficiency of Coal Developments

Alternative A-No significant adverse impacts are anticipated under Alternative A.

Alternative B-In general, **Chapter 2** does not list "mandatory BMPs" for coal projects under Alternative B as it does for some other resources and uses. However, Alternative B includes the following management action for ADH areas: Require minimization of surface-disturbing or disruptive activities (including operations and maintenance) where needed to reduce impacts on important seasonal GRSG habitats (e.g., leks). These would be applied as COAs during project-specific planning. The measure also includes a requirement for additional mitigation to offset unavoidable impacts.

It is not possible to assess quantitatively the potential for COAs and additional mitigation under this measure to affect individual projects. This is because of lack of specificity concerning where the projects would occur and how substantially these would affect the project's economic feasibility. However, it should be noted that by applying some of the measures under Alternatives B and C to ADH instead of PPH, much larger areas are included than shown under *Reduced Availability of Federal Mineral Estate for New Coal Leases* and *Reduced Access to New or Existing Coal Leases*. For example, including ADH adds 225,600 acres in the LSFO and 28,100 acres in the WRFO to which these restrictions would apply. Nonetheless, it is important to note that these restrictions are not absolute and would not apply uniformly across the entire area of coal lands.

Based on the above, these measures would significantly reduce the economic viability of most coal projects, and such minimization is already incorporated into the BLM/USFS project screening process under NEPA.

Alternative C-The impacts are the same as those under Alternative B.

Alternative D-Under Alternatives B and C, surface disturbance and disruptive activities would be minimized in ADH areas to protect seasonally important GRSG habitats. In addition, Alternative D includes the following measures not included in Alternatives B and C that represent potentially

increased costs and decreased operational efficiencies that could affect the economic viability of a project:

- Ensure that exploration does not adversely affect GRSG populations through habitat loss or disruptive activities and, where practicable, limit the disturbance to 5 percent in the affected Colorado MZ.
- For renewals of existing subsurface coal leases, require that any new surface facilities be placed outside PPH or, if that is not technically feasible, require minimal footprint and attach COAs for protecting GRSG and their habitats.
- For renewals or readjustments of existing surface coal leases in ADH, apply COAs for protecting GRSG.
- For new leases and authorizations, require minimization of surface-disturbing or disruptive activities (including operations and maintenance) during activity level planning.
- For existing leases, encourage the lessee to voluntarily apply BMPs and mitigate impacts on GRSG during the term of the lease.

It is not possible to assess quantitatively the potential for COAs and additional mitigation to affect individual projects. This is because of a lack of specificity concerning where the projects would occur and how substantially these would affect the project's economic feasibility. However, these measures would not significantly reduce the economic viability of most coal projects, and such minimization is already incorporated into the BLM/USFS project review during the NEPA process.

Impacts from Locatable Minerals Management on Coal

Alternative measures analyzed for protecting GRSG in relation to developing locatable minerals are aimed at avoiding or minimizing new habitat loss and additional disruption of GRSG activities. They would accomplish this by prohibiting or limiting future mining in PPH. The potential impacts of these measures on coal leasing and development are summarized below by alternative. Note that only the LSFO contains locatable minerals resources, including uranium, gold, copper, and pharmaceutical limestone.

<u>Reduced Availability of Federal Mineral Estate for New Coal Leases</u>

Alternative A-The LSFO includes overlap between known locatable mineral resources and coal resources, across 623,900 acres in its coal MZ. At present, the potential for conflicts between locatable minerals and future coal leasing and development cannot be quantified. This is because the impact would depend on specific locations, timing, and project designs.

Alternatives B, C and D-Indirectly, by potentially allowing additional habitat loss from development of locatable minerals, this alternative could increase the amount of surface disturbance that would result by developing these minerals. This would reduce the amount available under the 5 percent cap for potential future coal mining under this alternative. This impact cannot be quantified in conjunction with this EIS due to the lack of specific information on the timing, location, and extent of future coal mines or expansion of existing mines in relation to future locatable mineral developments. If such conflict were to arise, the result could be to reduce the amount of coal development in zones that also contain existing locatable minerals mining as well as current coal leases or existing coal mines. In the LSFO, the only field office with overlap

between locatable minerals resources and federal coal resources, this could adversely affect coal leasing and development in the 623,900 acres of developable coal.

Reduced Access New and Existing Coal Leases

Impacts are the same as under *Reduced Availability of Federal Mineral Estate for New Coal Leases*.

Increased Costs and Decreased Efficiency of Coal Developments

No significant adverse impacts are anticipated.

Impacts from Fuels Management on Coal

Management actions for protecting GRSG and their habitats in relation to fuels management are described in detail in **Section 4.7**, Wildland Fire Ecology and Management, and are presented in **Chapter 2**. These measures focus on ensuring that fuels reduction activities to reduce the risk of future catastrophic fires do not significantly affect GRSG populations, either through disruption of GRSG activities or destruction of occupied or suitable habitat. Potential impacts from fuels management on coal leasing and development is expected to be negligible or beneficial, as summarized below.

Reduced Availability of Federal Fluid Minerals for New Coal Leases

Alternative A-No significant adverse impacts are anticipated. Fuels management under this alternative could benefit coal development operations by reducing the risk of fire damage to surface facilities in those areas.

Alternative B-The impacts are the same as those under Alternative A.

Alternative C-The impacts are the same as those under Alternative A.

Alternative D-The impacts are the same as those under Alternative A.

Reduced Access to New or Existing Coal Leases

The impacts are the same as under *Reduced Availability of Federal Minerals for New Coal Leases*.

Increased Costs and Decreased Efficiency of Coal Developments

The impacts are the same as under *Reduced Availability of Federal Minerals for New Coal Leases*.

Impacts from Fire Operations on Coal

Management actions for protecting GRSG and their habitats from fire operations are described in detail in **Section 4.7**, Wildland Fire Ecology and Management, and are presented in **Chapter 2**. Impacts of fire operations on coal projects are expected to be negligible or beneficial, as summarized below.

Reduced Availability of Federal Fluid Minerals for New Coal Leases

Alternative A-No significant adverse impacts are anticipated. The priority placed on fire suppression in GRSG habitat could benefit coal development operations by reducing the potential for fire damage of surface facilities in those areas.

Alternative B-The impacts are the same as those under Alternative A.

Alternative C-The impacts are the same as those under Alternative A.

Alternative D-The impacts are the same as those under Alternative A.

Reduced Access to New or Existing Coal Leases

The impacts are the same under *Reduced Availability of Federal Minerals for New Coal Leases*.

Increased Costs and Decreased Efficiency of Coal Developments

The impacts are the same as under *Reduced Availability of Federal Minerals for New Coal Leases*.

Impacts from ACEC/Zoological Area Management on Coal

Reduced Availability of Federal Mineral Estate for New Coal Leases

Alternative A

Colorado River Valley Field Office-Under Alternative A, approximately 300 acres of PPH and 10,200 acres of PGH overlap with lands managed as ACECs. None of these is in an area of potentially developable coal resources.

Grand Junction Field Office-There are no ACECs in PPH or PGH.

Kremmling Field Office-Current ACECs within the KFO are the North Park Natural Area (300 acres) and the Kremmling Cretaceous Ammonite RNA (198 acres), both with NSO stipulations to protect sensitive resource values. Of these, the North Park ACEC is in PPH.

Little Snake Field Office-ACECs would be closed to oil and gas operations. This includes 2,800 acres in PPH and 2,900 acres in PGH.

White River Field Office-Seventeen ACECs are designated under Alternative A. Although they have NSO, CSU, or ROW exclusion or avoidance area management to protect the resource values on which the ACECs are based, none of the ACECs is closed to leasing. The acreages for exclusion and avoidance areas are the same as discussed under *Reduced Availability of Federal Mineral Estate for New Coal Leases* in *Impacts from Lands and Realty Management on Coal*, namely 7,200 acres in PPH and 9,900 acres in PGH.

Alternative B-No adverse impacts are anticipated.

Alternative C-This alternative would designate all PPH as a Sage-Grouse Habitat ACEC. This designation emphasizes management for GRSG populations, seasonal activity areas, and other crucial needs; however, it does not, in and of itself, carry any special restrictions on leasing or development of fluid minerals.

Alternative D- No adverse impacts are anticipated.

Reduced Access to New or Existing Oil and Gas Leases

The impacts are the same as under *Reduced Availability of Federal Mineral Estate for New Coal Leases*.

Increased Costs and Decreased Efficiency of Oil and Gas Developments

The impacts are the same as under *Reduced Availability of Federal Mineral Estate for New Coal Leases*.

Summary of Impacts on Coal

Alternative A-Under current management, the field offices use a combination of leasing terms and conditions and project-specific COAs to manage coal leasing and development. The goal is to avoid or minimize adverse impacts on other resources and resource uses, especially sensitive resources such as GRSG and their habitat. The LSFO and WRFO contain existing leases, while these and the KFO include substantial areas of unleased lands potentially suitable for leasing: 264,200 acres in PPH and 254,500 acres in PGH. Existing leases include 5,300 acres in PGH in the WRFO. Existing leases in the LSFO for underground mines are 1,600 acres in PPH and 4,100 acres in PGH.

Alternative B-Under Alternative B, field offices would find unsuitable all leasing for surface coal mining in PPH using the criteria set forth in 43 CFR, Part 3461.5. This would close all PPH to future surface coal mining, affecting 264,200 acres of potentially developable coal in the planning area. This is 51 percent of the combined 518,700 acres of potentially developable coal.

Additional measures under Alternative B would apply to currently leased and unleased coal resources, with the objective of reducing the amount of surface disturbance. The total area affected could significantly reduce access to coal resources or could increase the cost of accessing and developing the resource. The actual impact cannot be quantified and could vary substantially. This would depend on site-specific geology, mining technology, economics, other applicable surface-use constraints, and the availability of private surface or unaffected federal surface in the vicinity.

Other constraints on coal under Alternative B include restrictions on new, realigned, or upgraded roads in PPH and a requirement for PPH lands as ROW exclusion areas. Although these measures would not preclude new leasing or development per se, they could make access to new or existing leases difficult or potentially impossible by prohibiting use of BLM/USFS surface lands to access coal leases. While the impact on the amount of future development cannot be meaningfully calculated because of the many variables affecting a given site or project (e.g., availability of alternative access across private lands or across non-PPH areas) more than half a million acres of coal resource in the planning area would come under the road restrictions, as well as the requirement for ROW exclusion areas. These are potentially substantial impediments to future development, even if they do not result in a de facto constraint on leasing.

Constraints associated with the other resources and uses analyzed above would generally have only a minor impact on future leasing of federal coal resources. The 3 percent disturbance cap applicable to a variety of potential ground-disturbing activities under Alternative B could be the determinative measure, notwithstanding the various other constraints summarized above. For example, while anthropogenic disturbance accounts for only 86,400 acres (2 percent) of the 4.1 million acres of federal lands in the 21 Colorado MZs, that total is two-thirds of the way toward the 3 percent disturbance cap. Indeed, three of the 21 zones are already above the 3 percent cap, and ten more are more than halfway to that amount of disturbance. By its nature, surface coal mining is much more consumptive of surface lands than many other types of resource developments, such as oil and gas.

Based on the above, Alternative B would have significantly greater impacts on coal resources than Alternative A.

Alternative C-Under Alternative C, field offices would also find unsuitable all leasing for surface mining of coal in PPH, using the criteria set forth in 43 CFR, Part 3461.5. As with Alternative B, this would close all PPH to future surface mining of coal, affecting 264,200 acres of potentially developable coal in the planning area. This is 51 percent of the combined 518,600 acres of potentially developable coal.

The measures under Alternative B would also apply to currently leased and unleased coal resources to reduce the amount surface disturbance, significantly reducing access to coal resources or increasing the cost of accessing and developing the resource. The actual impact cannot be quantified and could vary substantially, depending on site-specific geology, mining technology, economics, other applicable surface-use constraints, and the availability of private surface or unaffected federal surface in the vicinity.

Also, as under Alternative B, this alternative includes restrictions on new, realigned, or upgraded roads in PPH and a requirement for PPH lands as ROW exclusion areas. This could make access to new or existing leases difficult or potentially impossible by prohibiting use of BLM-administered and National Forest System surface lands to access coal leases. These are potentially substantial impediments to future development, even if they do not result in a de facto constraint on leasing. Constraints associated with the other resources and uses analyzed above would generally have only a minor impact on future leasing of federal coal resources.

Based on the above, Alternative C would have approximately the same impacts on coal leasing and development as under Alternative B but greater than under Alternative.

Alternative D-Under this alternative, the requirement to find all coal resources unsuitable for future leasing is replaced with a requirement of a finding of unsuitability when GRSG cannot be adequately protected. In addition, the BLM/USFS would have greater flexibility in approving projects with adequate design and mitigation, subject to a 5 percent disturbance cap. At present, one of the 21 MZs is already above that amount, and five more are approaching it.

Because of this greater flexibility for approving projects, it is not possible to quantify the degree to which the restrictions would be applied absent site-specific and project-specific information. However, because of the large areas across which the restrictions on coal under Alternative D would be applied, impacts on coal leasing and development would be significantly greater than under Alternative A but significantly less than under Alternatives B and C.

4.9. Minerals (Locatable)

4.9.1. General Description

Unlike leasable minerals (e.g., oil and gas or coal) or salable minerals (e.g., sand and gravel), where issuing a lease or permit is at the BLM's discretion, the discovery and location of a locatable mineral claim is initiated by the mining claimant. Surface-disturbing activities on mining claims are regulated per 43 CFR, Part 3809. For exploration activities that will disturb 5 acres or fewer, the claimant is required to submit a Notice of Intent to the BLM. For exploration involving more than 5 acres and for actual mining operations regardless of acreage, the claimant must submit a plan of operations for approval by the BLM before mining can begin. These regulations do not

apply to lands in the National Forest System acquired lands, or on BLM-administered WSAs. If a mining claimant's operation is on lands patented under the Stock Raising Homestead Act and no written surface owner consent exists, then a plan of operations must be submitted for BLM approval. Where the surface owner's consent has been obtained, the claimant does not need to submit an Notice of Intent or obtain plan of operations approval.

Actions that could occur through implementing an alternative could affect the availability and opportunity for development of a locatable mineral resource when areas are withdrawn from locatable mineral entry. Other actions could increase costs of development by adding additional limits on the ability of a claimant to efficiently develop these types of locatable minerals or reduce a claimant's ability to access minerals.

4.9.2. Methodology and Assumptions

General Impacts on Locatable Minerals

Indicators of impacts on locatable minerals and the measurements used to describe the impacts (where available or appropriate) are described below:

- Actions that reduce availability and opportunity for development of a resource (e.g., mineral withdrawal)

Amount of federal minerals available versus closed to development

Indirect impacts include loss of production of mineral resource for the public use and for the generation of sale revenues, federal royalties from production, and tax revenues

- Actions placing restrictions or requirements that reduce efficiency and increase operational costs that could make development infeasible

Amount of federal lands with restrictions (e.g., RDFs, PDFs, and TLs)

Indirect impacts include reduced production of mineral resources for the public use and for the generation of revenues, federal royalties, and tax revenues; possible adverse impact of higher cost of accessing portion of lease via more circuitous route for access road, electric utility lines, seasonal limitations to road use, or additional restrictions/requirements on development activities

- Actions that affect the ability to access minerals

Amount of acres or miles that would affect the ability to access mining claims (e.g., ROW exclusions and disturbance caps)

adverse impact of restrictions affecting the ability to access minerals that would otherwise be available, including limits to road construction, permanent road closures, avoidance, and exclusion areas

Assumptions

- Any alternative that limits locatable mineral development (i.e., reduces the area available for development) will have some adverse impact on locatable minerals.

- The 43 CFR 3809 and 36 CFR 228, Subpart A, regulations manage surface-disturbing activities on mining claims.
- Mineral operations are sensitive to costs, especially when prices are depressed.
- Validity of mining claims is based on profitability.
- Ability to construct roads and pipelines on private lands to access federal minerals is subject to landowner approval, which is not guaranteed.
- Mineral resources are not evenly distributed across the landscape.
- Operators need predictable continuity of operations before acquiring or developing.
- Development techniques are highly technical and not uniformly applicable.
- Seasonal closures on travel may make full development over many years infeasible.
- A minimum of 5 years is needed for restoration of self-sustaining native grass/forb cover on reclamation.
- A minimum of 10 years is needed for successful establishment or colonization by sagebrush on reclamation.

Implementing management actions for the following resources or resource uses would have negligible or no impact on locatable minerals and are, therefore, not discussed in detail: recreation management, range management, wind energy development, industrial solar, wild horse management, fluid minerals and solid minerals, nonenergy leasable minerals, salable minerals, fuels management, fire operations, ESR, and habitat restoration.

4.9.3. Direct and Indirect Impacts on Locatable Minerals

Impacts from Travel Management on Locatable Minerals

Management actions for resources and resource uses could affect potential locatable mineral development when they result in (1) reduced availability of identified potentially developable locatable mineral resources, (2) reduced access to new or existing mines due to restrictions on use of the overlying surface lands, and (3) reduced efficiency and increased operational costs that make potential locatable mineral development economically infeasible.

Alternative A-A total of 574,100 acres of PPH and 412,100 acres of PGH would continue to be managed as open to cross-country travel. A similar amount of acres would continue to be managed as limited to designated routes. Compared to Alternatives B, C, and D, Alternative A has the most acres of open travel designation and the fewest restrictions on upgrades to routes; therefore, it has the fewest impacts on locatable minerals.

Alternative B-Under Alternative B, restrictions on travel would be implemented in PPH, including changing 574,100 acres from open to limited in PPH. Motorized travel would be restricted to existing routes. No existing routes in PPH could be upgraded to a higher use category (e.g., from trail to primitive road or from primitive road to road) unless necessary for motorist safety or to avoid constructing a new road outside the PPH, and then only if impacts on GRSG would be minimal. Similarly, no new routes could be constructed in PPH, although portions of existing

routes may be rerouted to allow for motorist safety or to avoid constructing a new route outside the PPH, and only if impacts on GRSG would be minimal. An exception to the prohibition on new routes, except for realignments, is in the case of valid existing rights (current mining claims). To access current mining claims, new routes could be constructed but only to the minimum standard necessary for safe travel by the required types of vehicles and intensity of use, and only to the extent permissible with a 3 percent disturbance cap. Requirements for mitigation could result in increased difficulty of access and increased cost for locatable minerals.

Restricting travel to existing routes and limiting upgrading or realigning existing routes would adversely affect locatable minerals. None of the actions related to travel management would preclude locating mining claims on federal mineral estate. However, limitations on new or upgraded roads could adversely impact whether a specific area of resource is suitable in terms of access. Even where access is available to a portion of a claim, or to nearby private lands from which the federal minerals could be accessed, the value of the claim may be significantly reduced. Any permanent or seasonal closures resulting from an activity-level travel plan required to be developed within 5 years of the ROD could further reduce development potential by restricting access or reducing economic feasibility and economic viability of any affected claim or mine.

Alternative C-In terms of travel management, this alternative is similar to Alternative B. For existing claims and mines, the accommodation for new roads would be more restrictive, with no construction within a 4-mile buffer of a lek. Other types of restrictions under Alternative B, such as allowing realignments or route upgrades only in certain specified situations and closing and revegetating unneeded routes to restore GRSG habitat, would apply to ADH as well as PPH areas. Other measures are the same as under Alternative B.

Based on the above, Alternative C would be somewhat more restrictive than Alternative B, due to greater overlap with locatable minerals, with greater potential for making location of mining claims or development infeasible or, at a minimum, reducing the amount of development and increasing costs.

Alternative D-This alternative is also similar to Alternative B, although more restrictive in some aspects and less restrictive in others. For example, the consideration for seasonal closures on travel would apply to ADH instead of only to PPH lands. On the other hand, no consideration would be given to permanent closures. New roads needed to access current claims or existing mines would use the Gold Book standard and would be limited to a 5 percent instead of 3 percent disturbance cap. In addition, an exception could be granted for the 5 percent disturbance cap if GRSG populations within the MZ are healthy and stable or increasing and that the construction would not adversely affect GRSG due to habitat loss or disruptive activities.

Road reroutes and upgrades would be less severely restricted, with the evaluation based on adverse impacts on GRSG populations instead of a requirement for a benefit in terms of safety or to avoid construction. On balance, this alternative would place fewer impediments to mining claims and development from travel management than Alternatives B and C.

Impacts from Lands and Realty Management on Locatable Minerals

Management actions related to lands and realty actions in relation to protection of GRSG and their habitats and use area could adversely impact locatable minerals. This potential includes all three types of impacts on locatable mineral resources described previously: reduced availability, reduced accessibility, and increased costs.

Reduced availability is expected to be the least significant impact from lands and realty actions. This is because the BLM does not require a lands action (i.e., issuance of a ROW grant) for surface occupancy of federal lands to develop mining claims. However, accessibility to new mining claims could be more difficult if management of specific areas as ROW exclusion areas makes access more restricted into those areas.

ROW avoidance areas, while not creating absolute barriers to their use for access roads or utilities-or for locating surface facilities on federal lands for the purpose of accessing private minerals-could make permissible facilities infeasible for technical or economic reasons. Some other potential management actions or BMPs could also affect costs sufficiently to make a project infeasible, such as collocating utilities along an existing road that follows a long, indirect, or topographically difficult route. Other types of lands and realty actions, such as recommending PPH areas for withdrawal and land tenure adjustments (disposal/acquisition/retention), could affect locatable minerals. Nevertheless, the outcomes of land tenure adjustment and withdrawals cannot be assessed until specific proposals are submitted to the BLM/USFS for review.

The expected outcomes of lands-related management actions and BMPs on locatable minerals and development of locatable minerals under the four alternatives analyzed in this EIS are summarized below.

Alternative A-A total of 24,200 acres are currently managed as exclusion area and 90,700 acres are currently managed as avoidance areas within GRSG habitat (ADH). This alternative includes the fewest restrictions to locations of ROW corridors and ROWs and the fewest restrictions for construction. There is no disturbance cap for construction of new ROWs. Under this alternative, limits to access and the potential for increased costs for the locatable mineral development would be minimal.

Alternative B-Under this alternative, PPH areas would be managed as ROW exclusion areas, precluding new access roads and electricity distribution lines, conveyors, or other surface facilities. ROW exclusion would apply to 926,200 acres of PPH. Exceptions would be considered in the case of an existing mining claim not yet developed, where a new ROW could be completed entirely within the disturbance footprint of an existing ROW (e.g., locating a power line along an existing road), or (2) in the case of an existing mine, where ROWs could be collocated with an existing ROW. If a new access road or other ROW could not be collocated with an existing ROW, it may be constructed only if impacts are minimized and disturbance remains within a 3 percent cap. If the cap would be avoided, mitigation would be required.

Other actions in PPH under Alternative B for increased protection of GRSG and their habitats include removing, burying, or modifying existing power lines and removing and restoring unused surface facilities associated with ROW grants.

Additional measures to be applied in PGH areas include managing PGH as ROW avoidance areas, which would require that impacts on GRSG and their habitats be avoided where practicable or minimized and mitigated, and collocating necessary new ROW features with existing features. These restrictions would be applied to 738,900 acres of PGH. This could add to the costs of new locatable mineral development or expanded mine development. Where very long and indirect alignments are involved or burying existing power lines would be required, this could make a potential project economically infeasible.

Impacts on the locatable minerals program are greater under Alternative B than Alternative A due to potential for restrictions on access and increased cost for access.

Among land tenure measures, requirements for PPH areas under Alternative B include a prohibition against disposing of BLM-administered or National Forest System lands and a goal of acquiring certain private lands. Without project-specific information, it is not possible to assess this impact fully, but it could make some otherwise accessible private lands from being used for locatable mineral development and keep some lands in federal ownership that might otherwise be disposed of and hence available for access to potentially developable locatable mineral resources.

Alternative C-Under this alternative, the measures related to PPH areas in Alternative B would be applied to ADH, resulting in exclusion area restrictions applied to 1,744,100 acres of GRSG habitat. This is therefore likely to result in greater impacts on locatable minerals and development of locatable minerals since more lands would be affected.

The requirements under Alternative B for removing, burying, or modifying power lines and for removing and restoring any unused ROW corridors would also be applied under Alternative C, as would the requirement for relocating unbuilt ROW corridors outside PPH and measures under Alternative B related to land tenure adjustments.

Alternative C would have the greatest impacts on locatable minerals because restrictions would be applied to the most acres, increasing the potential for reduced availability, reduced access, and increased costs for access to developing minerals.

Alternative D-This alternative would be less restrictive than Alternatives B and C by making PPH habitat avoidance rather than exclusion areas for ROWs. Also within PPH, new ROWs may be collocated within existing corridors without the requirement for collocation within the existing disturbance footprint. New ROWs in relation with existing mining claims or mines would also be less difficult to authorize, including accepting impacts where access would otherwise be inaccessible. The associated disturbance cap for access to valid existing rights would be 5 percent, compared to 3 percent under Alternative B, although mitigation would be required. Land withdrawals in PPH are not proposed; impacts are the same as Alternative A.

Alternative D proposes a disturbance exception criterion. Where data-based documentation is available to warrant a conclusion, the disturbance cap may be authorized in excess of 5 percent without requiring additional mitigation.

Alternative D would require only raptor perch deterrents instead of burying existing power lines in PPH areas. In addition, unused ROWs would be required to be reclaimed only where mandated by regulation. Furthermore, new ROWs would be allowed where a compelling reason exists and GRSG populations would not be adversely affected by habitat loss or disruptive actives. The Alternative B and C requirements for relocating unbuilt corridors from inside to outside PPH areas would also not be applied under Alternative D. Actions related to PGH areas and to land tenure adjustments are the same as those in Alternatives B and D or, where different, would have the same relative impact on locatable minerals and mine development compared to current management.

This alternative would have fewer impacts on locatable mineral development than Alternatives B and C but more impacts than Alternative A.

Impacts from Locatable Minerals on Locatable Minerals

There are several management actions affecting locatable minerals currently proposed under Alternatives B through D to reduce adverse impacts on GRSG and their habitats. These actions have varying degrees of potential adverse impacts on locatable minerals.

Generally, the management actions would result in reduced availability of federal mineral estate through withdrawal, eliminating access to existing mining claims through validity exams or buyout, and reduced efficiency and increased operational costs that could make operations economically infeasible, and therefore, render the mining claim invalid.

Alternative A-The BLM manages 52,200 acres of mining claims in PPH and 40,300 acres in PGH. Alternative A has the fewest restrictions for locatable minerals and the fewest acres subject to withdrawal from mineral entry. There are currently 40,600 acres withdrawn from mineral entry in PPH and 124,800 acres withdrawn in ADH.

Alternative B-Under this alternative, all PPH would be withdrawn from mineral entry, subjecting existing claims to validity exams or buyout, potentially invalidating or cancelling existing mining claims. Under this alternative, approximately 923,200 acres would be identified for withdrawal and 52,200 acres of existing mining claims would be subject to new restrictions. Pursuant to FLPMA, withdrawals exceeding 5,000 acres require congressional approval. Where plans of operations are required prior to any proposed surface-disturbing activities, additional mitigation would be required and seasonal restrictions would be considered if deemed necessary. These actions would result in impacts on the locatable minerals program through reduced access and increased cost due to requirements for mitigation. Alternative B would have greater impacts on locatable minerals than Alternative A.

Alternative C-This is the same as Alternative B.

Alternative D-Under this alternative, withdrawal from mineral entry in PPH is not proposed. Plans of operations in PPH would require appropriate effective mitigation for conservation. Validity exams for mining claims within existing withdrawn areas are proposed. Also, seasonal restrictions would be applied if deemed necessary to prevent unnecessary or undue degradation. In ADH areas, operators would be requested to agree to the SDFs shown in **Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features.

Reduced availability to federal locatable minerals is the same as Alternative A; reduced accessibility and increased costs are the same as Alternative C.

Alternative D would have slightly greater impacts on locatable minerals than Alternative A due to increased costs associated with seasonal restrictions, but it would have fewer impacts than Alternatives B and C.

Impacts from ACEC/Zoological Area Management on Locatable Minerals

Under Alternatives A, B, and D, all existing ACECs would continue to be managed as designated.

Alternative C would recognize all of the existing ACECs and would designate all PPH as a Sage-Grouse Habitat ACEC to protect its habitat. Alternative C would not add additional restrictions to locatable minerals beyond those described above.

4.9.4. Summary of Impacts on Locatable Minerals

Alternative A would have the fewest restrictions on availability and access and would have the least impact on locatable minerals.

Alternative B would have greater impacts on locatable minerals than Alternative A because more acres would be unavailable to mineral entry and greater restrictions would result in reduced efficiency and increased cost of developing the locatable mineral resource.

For the most part, impacts from Alternative C are similar to those under Alternative B, with more restrictions on access due to travel management and realty restrictions.

Alternative D would have more impacts on locatable minerals than Alternative A but fewer than Alternatives B and C.

4.10. Minerals (Salable)

Impacts described in this section are also applicable to nonenergy leasable minerals; no separate discussion for nonenergy leasable minerals is included.

4.10.1. General Description

The BLM and USFS have the authority to dispose of sand, gravel, clay, and other common variety minerals that are not subject to mineral leasing or location under the mining laws. Salable mineral material disposals are discretionary. Regulations regarding the disposal of salable minerals are found at 43 CFR 3600 and 36 CFR 228, Subpart C. The BLM and USFS sell mineral materials to the public at fair market value but gives them free to states, counties, or other government entities for public projects. Exploration for mineral materials is permitted by a letter of authorization of a sampling and testing program. Disposal of mineral materials conforms to individual LUPs.

Actions that could occur through implementing an alternative could affect the availability and opportunity for developing a salable mineral when areas are withdrawn from mineral entry. Other actions could affect costs of development by adding additional limits on the ability of operators to efficiently develop these types of salable minerals or reduce operators' ability to access minerals.

4.10.2. Methodology and Assumptions

General Impacts on Salable Minerals

Indicators of impacts on salable minerals and the measurements used to describe the impacts (where available or appropriate) are described below:

- Actions that reduce the availability and opportunity for development of resources (i.e., mineral withdrawal)

Amount of federal minerals available versus closed to development

Indirect impacts include loss of production of the mineral for public use and for revenues, federal royalties from production, and tax revenues

- Actions placing restrictions or requirements that reduce efficiency and increased operational costs that could make development infeasible

Acreage unavailable for surface disturbance

Indirect impacts include reduced production of mineral resources for the public use and for the generation of revenues and tax revenues; possible adverse impact of higher cost of accessing portion of lease via more circuitous route for access road, electric utility lines, seasonal limitations to road use or additional restrictions and requirements on development

- Actions that affect the ability to access minerals

Acreage unavailable for surface disturbance

Indirect impacts include adverse impacts of restrictions affecting the ability to access minerals that would otherwise be available; includes limits to road construction, permanent road closures, avoidance, and exclusion areas

Assumptions

- The terms “salable minerals” and “mineral materials” are used interchangeably.
- Any alternative that limits salable mineral development (i.e., reduces the area available for development) will have some adverse impact on the mineral materials.
- The 43 CFR, Part 3600, regulations manage disposal of mineral materials.
- Mineral operations are sensitive to costs, especially when prices are depressed.
- Ability to construct roads and utilities on private lands to access federal minerals subject to landowner approval are not guaranteed.
- Mineral resources are not evenly distributed across the landscape.
- Operators need predictable continuity of operations before acquiring or developing land.
- Development techniques are highly technical and not uniformly applicable.
- Seasonal closures on travel may make full development infeasible.
- A minimum of 5 years is needed for restoring self-sustaining native grass and forb cover on reclamation.
- A minimum of 10 years is needed for successful establishment or colonization by sagebrush on reclamation.

Implementing management actions for the following resources or resource uses would have negligible or no impact on salable minerals and are therefore not discussed in detail: recreation, range management, wind energy development, industrial solar, wild horse management, fuels management, fire operations, ESR, and habitat restoration.

4.10.3. Direct and Indirect Impacts on Salable Minerals

Impacts from Travel Management on Salable Minerals

Management actions for resources and resource uses could affect potential salable minerals when they result in the following:

- Reduced availability of identified, potentially developable, mineral material resources for disposal
- Reduced access to new or existing mineral material mines due to restrictions on use of the overlying surface lands
- Reduced efficiency and increased operational costs that make a potential mineral material development economically infeasible

Alternative A-A total of 574,100 acres of PPH and 412,100 acres of PGH would continue to be managed as open to cross-country travel. A similar acreage of routes would continue to be managed as limited to designated routes. Compared to the action alternatives, Alternative A has the most acres of open travel designation and the fewest restrictions on upgrades to routes; therefore, Alternative A has the fewest impacts on availability, access, and economic feasibility of salable minerals.

Alternative B-Restrictions on travel would be implemented in PPH, including changing 574,100 acres from open to limited in PPH. Motorized travel would be restricted to existing routes. No existing routes in PPH could be upgraded to a higher use category (e.g., from trail to primitive road or from primitive road to road) unless it were necessary for motorist safety or to avoid constructing a new road outside the PPH, and then only if impacts on GRSG would be minimal. Similarly, no new routes could be constructed in PPH, although portions of existing routes may be rerouted to allow for motorist safety or to avoid constructing a new route outside the PPH, and only if impacts on GRSG would be minimal. An exception to the prohibition on new routes, except for realignments, is in the case of valid existing rights (current mining claims). To access current mineral material disposal sites, new routes could be constructed, but only to the minimum standard necessary for safe travel by the required types of vehicles and intensity of use, and only to the extent permissible, with a 3 percent disturbance cap. Requirements for mitigation could result in increased difficulty of access and increased cost for salable minerals.

Restricting travel to existing routes and limitations on upgrading or realigning of existing routes would adversely affect salable minerals.

Compared to Alternative A, management actions under Alternative B (restricting travel to existing routes and limiting upgrading or realigning of existing routes) would have a greater impact on salable minerals. Those impacts would be greater within areas with the potential for locatable mineral deposits, potentially increasing the cost of development due to difficulty of access.

Alternative C-In terms of travel management, this alternative is similar to Alternative B. For existing mineral material disposal sites, the accommodation for new roads would be more restrictive, with no construction within a 4-mile buffer of a GRSG lek. Other types of restrictions under Alternative B (such as allowing realignments or route upgrades only in certain specified situations and closing and revegetating unneeded routes to restore GRSG habitat) would apply to ADH as well as PPH. Other measures are the same as under Alternative B.

Based on the above, Alternative C would be somewhat more restrictive than Alternative B, due to greater overlap with salable minerals, with a greater potential for making location of mineral material disposal sites infeasible or, at a minimum, reducing the amount of development and increasing costs.

Alternative D-This alternative is also similar to Alternative B, although it is more restrictive in some aspects and less restrictive in others. For example, the consideration for seasonal closures on travel would apply to ADH instead of only to PPH lands. On the other hand, no consideration would be given to permanent closures. New roads needed to access current claims or existing mines would use the Gold Book standard and would be limited to a 5 percent instead of 3 percent disturbance cap. In addition, an exception could be granted for the 5 percent disturbance cap if GRSG populations within the MZ were healthy and stable or increasing and if the construction would not adversely affect GRSG due to habitat loss or disruption.

Road reroutes and upgrades would be less severely restricted, with the evaluation based on adverse impacts on GRSG populations instead of a requirement for a benefit in terms of safety or to avoid construction. On balance, this alternative would place fewer impediments to salable minerals and development from travel management than would Alternatives B and C

Impacts from Lands and Realty Management on Salable Minerals

Management actions for lands and realty, in relation to protecting GRSG and their habitats, could adversely impact salable minerals. This potential includes all three types of impacts on salable minerals described previously: reduced availability, reduced accessibility, and increased costs.

Reduced availability is expected because accessibility to new salable mineral sites could be significantly reduced or precluded when management of specific areas as ROW exclusion areas would prohibit access roads or utility corridors (e.g., power lines, railroad sidings, and roads) into those areas.

ROW avoidance areas, while not creating absolute barriers to their use for access roads or utilities-or for locating surface facilities on federal lands for accessing private minerals-could make permissible facilities infeasible for technical or economic reasons. Some other potential management actions could also affect costs enough to make a project infeasible, such as collocating utilities along a road that follows a long, indirect, or topographically difficult route. Other types of lands and realty actions, such as identifying areas for withdrawals and land tenure adjustments (disposal, acquisition, or retention) could affect salable minerals, although analysis of outcomes of land tenure adjustment and withdrawals cannot be assessed until specific proposals are submitted to the BLM/USFS for review.

Alternative A-A total of 24,200 acres are managed as exclusion area and 90,700 acres are managed as avoidance areas within GRSG habitat (ADH). This alternative includes the fewest restrictions to locations of ROW corridors and ROWs and the fewest restrictions for construction. There is no disturbance cap for construction of new ROWs. Under this alternative, limits to access and the potential for increased costs for salable mineral development would be minimal.

Alternative B-Under this alternative, PPH would be managed as ROW exclusion areas, precluding new access roads and electric distribution lines, conveyors, or other surface facilities. ROW exclusion would apply to 923,200 acres of PPH. Exceptions would be considered, for example, in the case of a mineral materials disposal site not yet developed, in which a new ROW could be completed entirely within the disturbance footprint of a ROW (e.g., locating a power line along an existing road); or, in the case of an existing site, ROWs could be collocated with an existing ROW. If a new access road or other ROW could not be collocated with an existing ROW, it may be constructed only if impacts are minimized and disturbance remains within a 3 percent cap. If the cap could be avoided, mitigation would be required.

Other actions in PPH under Alternative B to protect GRSG and their habitats include removing, burying, or modifying power lines and removing and restoring unused surface facilities associated with ROW grants.

Additional measures to be applied in PGH areas are to manage PGH as ROW avoidance areas, which would require impacts on GRSG and their habitats to be avoided where practicable, or minimized and mitigated; necessary new ROW features would be collocated with existing features. These restrictions would be applied to 738,900 acres of PGH. This could add to the costs of new mineral material disposal sites or expanded development, where very long and indirect alignments are involved, or existing power lines would have to be buried. This could make a potential project economically infeasible.

Impacts on the salable minerals program under Alternative B are greater than under Alternative A because of the potential for restrictions and increased cost for access.

Among land tenure measures, requirements for PPH under Alternative B include a prohibition against the BLM/USFS disposing of the lands it administers and setting a goal to acquire certain private lands. Without project-specific information, it is not possible to assess this impact fully, but it could prevent some otherwise accessible private lands from being used for salable mineral development. It also could keep some lands in federal ownership that might otherwise be disposed of and hence unavailable for potentially developable salable mineral resources.

Alternative C-Under this alternative, the measures related to PPH under Alternative B would be applied to ADH area, resulting in exclusion area restrictions applied to 1,744,100 acres of GRSG habitat. This is therefore likely to have greater impacts on salable minerals since more lands would be affected.

The requirements under Alternative B for removing, burying, or modifying power lines and for removing and restoring any unused ROW corridors would also be applied under Alternative C. This is because there is no requirement for relocating unbuilt ROW corridors outside PPH, as would be the case for land tenure adjustments under Alternative B.

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

Alternative D-This alternative would be less restrictive than Alternatives B and C by making PPH habitat avoidance areas, rather than exclusion areas, for ROWs. Also within PPH, new ROWs may be collocated within existing corridors without the requirement for collocation within the disturbance footprint. New ROWs for mineral material disposal sites would have fewer siting restrictions.. The associated disturbance cap for access to valid existing rights would be 5 percent, compared to 3 percent under Alternative B, although mitigation would be required. Land withdrawals in PPH are not proposed; impacts are the same as under Alternative A.

Alternative D proposes a disturbance exception criterion. Where data-based documentation is available to warrant a conclusion, the disturbance cap may be allowed to go beyond 5 percent without requiring additional mitigation.

Alternative D would require raptor perch deterrents rather than burying existing power lines in PPH. In addition, unused ROWs would have to be reclaimed only where it is regulated. Furthermore, new ROWs would be allowed where a compelling reason exists, and GRSG

populations would not be adversely affected by habitat loss or disruptive actives. The requirements of Alternatives B and C for relocating unbuilt corridors from inside to outside PPH would also not be applied under Alternative D. Actions related to PGH areas and to land tenure adjustments are the same as those in Alternatives B and D, or where they are different, they would have the same relative impact as now on salable minerals and mine development.

This alternative has fewer impacts on salable mineral development than Alternatives B and C but more impacts than Alternative A.

Impacts from Fluid Minerals, Solid Minerals (Coal), Locatable Minerals, and Nonenergy Leasable Minerals Management on Salable Minerals

Impacts from managing fluid, solid, locatable, and nonenergy leasable minerals would have minimal impact on salable minerals. The only exception would be the limits on surface disturbance proposed for Alternatives B, C, and D. Existing leases for minerals and mining claims for locatable minerals all carry a valid existing right and would likely take precedence if acres of surface disturbance were limited due to development within GRSG habitat. Although the cap on surface disturbing acres could impact salable minerals, the overlap between GRSG habitat and salable mineral potential is not extensive.

Alternative A-Under Alternative A, managing fluid, solid, locatable, and nonenergy leasables would have a minimal impact on salable minerals.

Alternative B-Under Alternative B, there would be a 3 percent limit on all surface disturbance in PPH. The limit on surface disturbance could impact both the acres available for salable minerals and the extraction cost if mitigation were required before the surface was disturbed. Alternative B has a greater impact on salable minerals than Alternative A.

Alternative C-Under Alternative C, there would be a limit of 3 percent on all surface disturbance in ADH. This could impact both the acres available for salable minerals and the cost for extraction if mitigation were required before surface disturbance. Alternative C has the greatest impact on the salable minerals program because the disturbance cap is applied to a greater number of acres and is more likely to overlap with salable mineral potential.

Alternative D-Under Alternative D, there would be a 5 percent limit on all surface disturbance in ecological sites in PPH that support sagebrush. This could impact both the acres available for salable minerals and the cost for extraction. Alternative D has a greater impact on salable minerals than Alternative A, but less than Alternatives B and C.

Impacts from Salable Minerals Management on Salable Minerals

The proposed management actions under Alternatives B, C, and D to reduce adverse impacts on GRSG and their habitats would affect salable minerals. These actions have varying degrees of potential adverse impacts on salable minerals. Generally, the management actions would reduce the availability of federal mineral estate through certain restrictions. These are closure and disturbance caps on PPH to mineral material sales and increased reclamation costs that could make operations economically infeasible.

Alternative A-Under Alternative A, 1,246,200 acres would continue to be managed as open to salable minerals in PPH. See **Table 3.46**, Acres of Mineral Material Disposal Sites within GRSG

Habitat in the Planning Area, and **Table 3.47**, Mineral Materials in the Planning Area, for acres managed as mineral material disposal sites and acres closed to mineral material sales within PPH and PGH. The existing mineral material disposal sites would continue to be managed with no restrictions to protect GRSG.

Alternative A has the least impact on salable minerals because it has the fewest restrictions on existing sites and the most acres available for mineral materials disposal sites.

Alternative B would close all PPH to mineral material sales. The impact would be greater in those areas where there is a potential for salable minerals; this impact is described by field office below. This alternative would have a greater impact on salable minerals than Alternative A because there would be a greater number of acres unavailable for salable minerals, which would place greater restrictions on existing mineral material sites.

Colorado River Valley Field Office-Within the CRVFO, Alternative B would close approximately 24,400 acres of PPH in Zone 14 to salable mineral development. This is about a 5 percent reduction in the total amount of potential salable minerals across the CRVFO. However, salable mineral resources are not evenly distributed across the landscape, and a comprehensive analysis of impacts on salable mineral development is unavailable. Regardless, any permanent closure of federal minerals would adversely affect the development of the salable mineral resources.

Grand Junction Field Office-There is little potential for salable minerals in GJFO PPH, so impacts are the same across all alternatives.

Kremmling Field Office-Under this alternative, PPH would be closed to mineral material sales. Salable mineral pits no longer in use would be restored to meet GRSG habitat conservation objectives. Compared to the Alternative A, closing all PPH in the KFO to mineral material sales would reduce the acreage open to mineral material sales to 46,353 of BLM-administered lands. This would significantly reduce the amount of potential salable minerals development in the KFO, compared to Alternative A, because of the large area closed to mineral material sales and the overlap of such areas to PPH.

Little Snake Field Office-Under this alternative, PPH would be closed to mineral material sales and salable mineral pits no longer in use would be restored to meet GRSG habitat conservation objectives. Compared to Alternative A, closing all PPH in the LSFO to mineral material sales would reduce the acreage open to mineral material sales by 730,900 acres of federal mineral estate lands. This would significantly reduce the amount of potential salable minerals development in the LSFO, compared to Alternative A, because of the large area closed to mineral material sales and the overlap of such areas to PPH.

White River Field Office-Within the WRFO, 139,900 acres open to mineral material sales would be closed, significantly reducing the amount of potential salable mineral development, compared to Alternative A.

It is not possible to assess the potential for these impacts to affect individual projects. This is because of a lack of specific project locations and how substantially this would affect the project's economic feasibility.

Alternative B would have a greater impact on salable minerals than Alternative A by reducing the acres available for mineral materials sites in PPH.

Alternative C-This is the Same as Alternative B.

Alternative D-Under this alternative, continuing to operate mineral material sales would be considered, along with expanding mineral material sales sites. Where practicable, permitted disturbances would be limited to 5 percent in any Colorado MZ. Where disturbance were to exceed 5 percent, additional effective mitigation would offset the resulting loss of GRSG habitat. In ADH, salable mineral pits no longer in use would be restored in order to meet GRSG habitat conservation objectives. GRSG habitat would be reclaimed and restored to improve GRSG habitat in the long term.

Impacts on reduced availability and accessibility to salable minerals are the same as under Alternatives A and B. Impacts on reduced efficiency and increased cost for salable minerals are greater under Alternative D than Alternative A. This is because of the required disturbance mitigation, which exceeds a 5 percent cap, and required reclamation.

Impacts from ACEC/Zoological AreaManagement on Salable Minerals

Alternatives A, B, and D-All existing ACECs would continue to be managed as designated, and no additional impacts on salable minerals would be expected.

Alternative C-All ACECs would be recognized, and all PPH would be designated a Sage-Grouse Habitat ACEC to protect GRSG habitat. Alternative C would not add more restrictions to salable minerals beyond those described above.

4.10.4. Summary of Impacts on Salable Minerals

Alternative A has the fewest restrictions on availability and access and the least impact on salable minerals.

Alternative B has greater impacts on salable minerals than Alternative A because more acres would be unavailable for mineral material disposal sites. Moreover, greater restrictions would result in reduced efficiency and increased cost of developing the salable minerals.

For the most part, impacts from Alternative C is similar to Alternative B, with more restrictions on access due to travel management and realty restrictions.

Alternative D has more impacts on salable minerals than Alternative A, but fewer than Alternatives B and C.

4.11. Travel Management

4.11.1. General Description

This section is an analysis of potential impacts on public access and travel from implementing management actions and allowable uses to meet resource and resource use objectives for the various programs. Travel designations support resource programs and are designed to help achieve their objectives. The land use emphasis for each area guides travel designations. Consequently, the travel designations would adhere to the management prescriptions included under each alternative, while following the theme of each alternative. Impacts resulting from the travel system on other resources and resource uses are discussed in those particular resource

sections of this chapter. The existing conditions for trails and travel management, including current management by field office, are described in **Section 3.10**, Travel Management.

As required by Executive Order and regulation, all BLM-administered lands are classified as open, limited, or closed to motorized travel. Additionally, for areas classified as limited, the BLM designates the types or modes of travel-pedestrian, equestrian, bicycle, and motorized; limitations on time or season of use; limitations on certain types of vehicles (e.g., OHVs, motorcycles, all-terrain vehicles, and mechanized, such as mountain bikes); limitations on licensed or permitted vehicles or users; limitations on BLM administrative use only; or other types of limitations.

4.11.2. Methodology and Assumptions

Impact analyses and conclusions were based on interdisciplinary team knowledge of the travel system and information provided by other agencies and the public.

The travel system is managed to achieve the goals and objectives of each alternative and to provide for appropriate public access. This program is considered a support function for all BLM resource programs. As such, the determination of significance for travel management is based on the BLM's ability to administer comprehensive public travel along with administrative access for resource management.

General Impacts on Travel Management

Indicators of impacts on travel management and the measurements used to describe the impacts (where available or appropriate) are described below:

- Impacts on OHV area designations (open, limited, or closed)

Change of acres with an open or limited designation

- Impacts on the existing route network

Management actions that reduce designated routes

- Impacts on new route construction or route maintenance

Management actions that reduce opportunities for route construction or route maintenance for any or all modes of travel

Assumptions

The analysis makes the following assumptions:

- All types and modes of travel, designations, and limitations associated with public access are analyzed.
- The travel designations would not affect ROW holders, permitted uses, county or state roads, or other valid existing rights. Travel closures/limitations apply only to public access.
- The demand to increase travel routes on BLM/USFS lands would continue to increase over the life of the plan, especially near communities.

- The BLM/USFS has no authority over US highways, state, or county roads on BLM-administered or National Forest System lands, so those routes are not included in the analysis tables.
- The incidence of resource damage and conflicts among mechanized, motorized, and nonmotorized activities would increase with increasing use of BLM/USFS lands.
- If necessary, the BLM would evaluate RS-2477 assertions under process and criteria separate from this planning process.
- Impacts on travel management occur from both limitations (i.e., wildlife stipulations, special designations, and cultural resources) and permitted uses (i.e., gas development, livestock grazing, and mining).
- Due to significant increases in use and the development of new vehicle technologies, designation of large areas as open to cross-country travel is no longer a viable management strategy. There is no motorized/mechanized cross-country travel in areas designated as limited or closed (excluding game retrieval carts). Exceptions for motorized cross-country travel can be included within the terms and conditions of a lease or permit or by separate written authorization.
- Pedestrian and equestrian access would not be restricted by travel designations that limit or prohibit motorized/mechanized travel, and pedestrian and equestrian access would be allowed on all routes open to motorized and mechanized uses, unless otherwise specified.
- Administrative use authorizations are granted on a case-by-case basis with approval from the BLM/USFS.
- New routes, reroutes, or closures to the travel network in the limited areas would be changed adaptively through activity-level planning with site-specific NEPA analyses.
- Management actions that close or limit travel in areas with an open designation would limit the public's ability to access dispersed camp sites, retrieve game, and travel cross-country.
- Management actions that limit route construction would limit expansion of travel networks and would restrict public access.
- Management actions that seasonally close travel would constrain public access during the closure.

Implementing management actions for the following resources would have negligible or no impact on travel management and are therefore not discussed in detail: recreation management, range management, wild horse management, fuels management, fire operations, ESR, habitat restoration, and ACECs.

4.11.3. Direct and Indirect Impacts on Travel Management

The following discussion of the impacts on travel and access focuses on management actions and allowable uses that restrict or facilitate travel opportunities. The analysis describes the changes to miles of routes open for public use, the adjustments in the number of acres open, limited, or closed to off-road travel, and the specific travel restrictions (such as seasonal restrictions) that would affect access.

Impacts from Travel Management on Travel Management

Impacts on OHV Area Designations, the Existing Route Network, and New Route Construction or Route Maintenance

Travel management actions in this EIS are aimed at avoiding or minimizing new habitat loss and additional disruption of GRSG activities by prohibiting or limiting travel in PPH and PGH areas.

Alternative A-Compared to the action alternatives, Alternative A has the most acres of open travel designation (574,100) and a similar amount of designated routes. Each field office has seasonally limited or closed portions of the planning area to public travel or placed TLs on surface-disturbing activities. See **Table 2.3**, Description of Alternatives A and B, for a summary of these management actions.

Alternative B-Under Alternative B, all management actions would occur on PPH. The management action that limits motorized travel to existing roads, primitive roads, and trails would change 574,100 acres from open to limited in PPH. The 3 percent disturbance threshold could restrict the amount of new routes that could be constructed; any routes constructed in excess of the disturbance cap would require mitigation necessary to offset the resulting loss of habitat. The impacts from implementation actions, such as evaluating the need for permanent or seasonal road closures, activity-level travel plans, limiting new route construction, and restoration of routes in PPH could only be evaluated during implementation. The impacts from these implementation actions would be analyzed in subsequent NEPA documents

Alternative C-Impacts from Alternative C are the same as or similar to those under Alternative B, except Alternative C would further restrict the construction of new routes by not allowing new routes within a 4-mile buffer from leks in ADH. Alternative C would place additional restrictions in ADH for construction new routes, upgrading routes, and reseeding closed routes.

Alternative D-Impacts from Alternative D are the same as or similar to those under Alternative B, except Alternative D would allow a 5 percent disturbance threshold before route construction would be limited and would require mitigation necessary to offset the resulting loss of habitat.

Impacts from Lands and Realty Management on Travel Management

Impacts on OHV Area Designations and the Existing Route Network

Land Tenure Adjustments

Land tenure adjustments could benefit the overall management of travel and transportation. These actions would help to facilitate the location of transportation systems by providing for a more contiguous BLM-administered and National Forest System land base and encouraging such developments near communities. Management actions that limit land tenure adjustments would adversely impact travel management.

Under Alternative A, each BLM field office has specific criteria to use in regard to land tenure adjustments. Under Alternatives B, C, and D, land tenure adjustments within GRSG habitat would be specifically pursued, where such adjustments would benefit GRSG. This difference in management approach is not likely to have a significant impact on travel and transportation management.

ROWs

To avoid ROWs that could negatively impact GRSG, the BLM could identify areas as ROW avoidance areas or ROW exclusion areas. Within avoidance areas, ROWs may not be totally unavailable but should not be permitted, if possible. ROWs are to be completely prohibited from exclusion areas. Across all alternatives, identifying ROW avoidance and exclusion areas and requiring the collocation of ROWs could lead to increased use on the existing route system. ROW holders may build, maintain, or improve routes, which would improve public access to some areas.

Alternative A-Compared to Alternatives B, C, and D, Alternative A has the least amount of ROW exclusion and avoidance and requires the least amount of collocation of infrastructure (see **Table 2.2**, Comparative Summary of Alternatives, for a comparison of ROW avoidance and exclusion acreages by alternative).

Alternative B-Compared to Alternative A, Alternative B would have more ROW exclusion and avoidance and would require more collocation of infrastructure in PPH.

Alternative C-Impacts from Alternative C are the same as or similar to those under Alternative B, except Alternative C would require collocation of ROWs in ADH.

Alternative D-Impacts from Alternative D are the same as or similar to those under Alternative B.

Impacts from Wind Energy and Industrial Solar Development on Travel Management

Impacts on New Route Construction or Route Maintenance

Energy development often leads to the improvement of roads. New roads constructed for wind or solar energy development could be gated and not offer new public access. Wind or solar energy development also often leads to the improvement of existing roads. This could reduce the amount of primitive roads and trails available to the public.

Alternatives A, B, and D-Under these alternatives, limited wind or solar energy development could occur in some portions of GRSG habitat. This could lead to new routes or the improvement of some existing routes.

Alternative C-Under this alternative, wind or solar energy development would be prohibited in ADH, so there would be no beneficial impacts on travel management, as described above.

Impacts from Fluid Minerals Management on Travel Management

Impacts on New Route Construction or Route Maintenance

Energy development can lead to the upgrading of existing routes and construction of new roads. However, new roads constructed for fluid minerals management can be gated to prevent public access .

Alternative A-Compared to the action alternatives, Alternative A has the least amount of restrictions on unleased and leased fluid minerals. Limited fluid minerals development could occur in some portions of GRSG habitat, which could lead to the improvement of existing roads.

Alternatives B and D-Compared to Alternative A, Alternatives B and D have more restrictions on unleased and leased fluid minerals, so there would be less improvement of existing roads. Under Alternative B, however, no upgrading of routes that would change the route category would be authorized in PPH, which would limit the benefit to travel management.

Alternative C-Compared to Alternative B, Alternative C has more restrictions to unleased and leased fluid minerals. This alternative would allow the least amount of improvement of existing roads.

Impacts from Solid Minerals, Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on Travel Management

Impacts on New Route Construction or Route Maintenance

Development often leads to the improvement of roads. New roads constructed for solid minerals management could be gated and not offer new public access. Solid minerals development also often leads to the improvement of existing roads. The improvement of roads could reduce the amount of primitive roads and trails available to the public.

Alternative A-Compared to Alternatives B, C, and D, Alternative A has the least amount of restrictions on solid minerals management. Limited solid minerals development could occur in some portions of GRSG habitat, which could lead to the improvement of existing roads.

Alternatives B, C, and D-Compared to Alternative A, Alternatives B, C, and D have more restrictions on solid minerals management, so there would be less improvement of existing roads.

4.11.4. Summary of Impacts on Travel Management

The degree of impact would be lowest under Alternative A because of fewer land use restrictions for the protection of GRSG. Alternative B would have slightly more restriction, and therefore slightly greater impact, than Alternative A. Alternative C would result in the greatest level of impact on transportation and access. Alternative D would have slightly less restriction, and therefore slightly less impact, than Alternative B.

4.12. Recreation

4.12.1. General Description

This section analyzes potential impacts on recreation resources from proposed management actions of other resources and resource uses. Existing conditions concerning recreation are described in Section 3.11, Recreation.

Current BLM recreation management guidance offers three options for RMP-level recreation allocations: identifying SRMAs, identifying ERMAs, or not identifying areas as either kind of recreation management area. In an SRMA, BLM management protects specific, high-quality recreation opportunities that result in specific outcomes. Outcomes include the experiences and benefits attained from recreation participation. Benefits from recreation include personal benefits to participants, benefits to local communities (social, political, and economic), and benefits to the environment. Outcomes depend on activities and the physical, social, and operational settings

where recreation occurs. Changes in recreation activities and settings can result in changes to the types of experiences visitors have and the types of personal, community, and environmental benefits that result from these experiences. A commitment is made in the SRMA allocation to specific, high quality, recreation opportunities.

In ERMAs, the BLM and partners make a commitment to support and sustain recreation and the associated qualities and conditions (recreation settings) of the recreation area. No commitment is made to protect the outcomes associated with recreation participation. In ERMAs, recreation is managed commensurate with other resource uses. The quality and quantity of recreation opportunities in an ERMA could change over time as a result of changes in use patterns and changes in other resource use program management.

In areas where no recreation management area is identified, the BLM makes a minimal commitment to recreation, by ensuring public health and safety, protecting biological and cultural resources, and reducing conflicts among recreationists and between recreation and other resource uses. In areas not identified as recreation management areas, recreation is managed to achieve other resource use objectives (e.g., livestock grazing and lands and realty).

BLM recreation management strategies, and the recreation management area definitions and management prescriptions described above, have evolved substantially over the past 30 years. Consequently, LUPs in the planning area contain significant variations in recreation management identifications, depending on the age of the plan and subsequent plan amendments. In 2006, guidance was issued regarding implementing Appendix C of the *BLM Land Use Planning Handbook*, which prescribes the use of outcome-based recreation management objectives for SRMAs and ERMAs (BLM 2006).

4.12.2. Methodology and Assumptions

General Impacts on Recreation

Direct impacts on recreation are those that allow, restrict, or prohibit opportunity, including both the opportunity for access (e.g., public closure) and opportunity to engage in specific activities (e.g., camping, shooting, and ATV riding). Indirect impacts are considered to be those that alter the physical, social, or administrative settings. Impacts on settings can either be the achievement of a desired setting or the unwanted shift in setting, such as to either a more primitive or urban environment.

Physical, social, and administrative settings are not specifically managed for in areas not identified as recreation management areas, although these areas do still provide intrinsic recreation values and opportunities. The indicator typically used to describe the impact on these areas is the availability of opportunities as described by either acreage restrictions or specific activity prohibitions.

For areas managed as SRMAs, both availability of recreation opportunities (activities and desired outcomes) and changes to physical, social, and administrative settings are used as indicators of impacts. This discussion analyzes the impacts that proposed management decisions would have on managing recreation settings and the targeted outcomes. For areas managed as ERMAs, both availability of activity opportunities and changes to the qualities and conditions (settings) are used as indicators of impacts. This discussion also analyzes the impacts that proposed management decisions would have on managing recreation and the prescribed setting conditions. Since visitor

use patterns are difficult to estimate and depend on many factors beyond the scope of management (e.g., recreation trends and economy), qualitative language-for example, "increase" or "decrease") is generally used unless quantitative visitor use data is available to describe anticipated impacts.

Indicators of impacts on recreation and the measurements used to describe the impacts (where available or appropriate) are described below:

- Impacts on recreation

Changes to the ability of the BLM to achieve targeted recreation outcomes (specific to SRMAs) and to achieve and maintain supporting setting conditions (specific to SRMAs and ERMAs)

Changes to the ability of the BLM to provide opportunities for targeted visitors (specific to SRMAs), targeted activities (specific to SRMAs), and protected activities (specific to ERMAs)

Short-term or long-term elimination or reduction of recreation opportunities, activities, or experiences

Changes in level of conflict among different recreation users and between other resource uses and recreation

Assumptions

The analysis has the following assumptions:

- Recreation would be managed to achieve the objectives of the field offices.
- Recreation management areas and associated objectives and management implementation would vary, based on the age of a field office's LUP.
- Traditional recreation uses within the planning area would continue and are anticipated to increase as local populations grow.
- Improved facilities, especially recreation trails, would result in increased use.
- Conflicts between motorized users and nonmotorized recreationists would increase with increasing use, especially in areas that area open to both.
- Demand for SRPs would increase over time.

4.12.3. Direct and Indirect Impacts on Recreation

Impacts from Travel Management on Recreation

Impacts on Recreation Outcomes and Settings and Recreation Opportunities

Impacts from Limiting Motorized Travel to Existing Roads, Primitive Roads, and Trails

Changes to area and route travel designations include changes to miles of routes or area acreages available for specified recreation activities, changes in the remoteness of the physical setting, and changes in the access attribute of the operational setting. Routes that are designated open for specific recreation uses continue to provide opportunities for those uses, and routes closed to

specified uses restrict opportunities for those uses. Areas designated as closed to motorized and mechanized travel results in a more primitive operational setting.

Where cross-country travel is currently allowed, limiting that type of use would reduce motorized/mechanized recreation, which depends on unrestricted travel, such as OHV exploration and hunting access. Opportunities for nonmotorized and nonmechanized recreation, such as hiking, horseback riding, and hunting, in a more natural or primitive setting would be expanded and enhanced.

Alternative A-This has the most areas open to cross-country motorized travel (574,100 acres in PPH, 412,100 acres in PGH); therefore, Alternative A would provide the most areas available for unrestricted OHV recreation and the fewest opportunities for nonmotorized recreation in a more primitive setting.

Alternatives B, C, and D-These would have fewer areas available for unrestricted OHV recreation than Alternative A and more opportunities than Alternative A for primitive nonmotorized recreation.

Impacts from Construction of Roads and Trails

In areas with high potential for development and in SRMAs and ERMAs, construction of roads and trails would have a greater impact on recreation than in areas with low potential for development or no recreation management area identification. Construction of roads and trails would increase the access attribute of the operational setting for OHV and mountain bike trail riding but would also reduce the remoteness attribute of the physical setting. This attribute represents how far a visitor is from a road or a trail. The farther it is from a road or trail, the more primitive and remote the setting is. The naturalness attribute of the physical setting would also be diminished by road and trail construction; therefore, road and trail construction would reduce opportunities for recreation, experiences, and outcomes requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A-This has the most areas available for surface-disturbing activities and so has the greatest potential to change recreation opportunities, activities or experiences. Impacts would vary, based on each area's prescribed recreation management objectives and the nature of the surface disturbance. Recreation opportunities requiring less remote or natural settings would benefit, while more primitive backcountry opportunities would likely be diminished.

Alternative B-This would limit surface disturbance and have more beneficial impacts for primitive backcountry recreation than Alternative A. It would allow fewer opportunities than Alternative A for recreation that depends on road and trail development.

Alternative C-This has the fewest areas available for surface-disturbing activities and so has impacts similar to those for Alternative B, but it would provide greater benefit to primitive recreation settings and greater detriment to developed recreation.

Alternative D-This has impacts similar to Alternative B but with more potential for road and trail development.

Impacts from Restoration of Roads and Trails

In areas that contain higher densities of roads and trails, prioritization of restoration would have a greater impact on recreation resources than areas that contain a lower density of roads and trails. As described in the section above, travel management decisions can impact the recreation characteristics of an area. The remoteness attribute of the physical setting does not change based on whether a road or trail is open. It changes only if the road or trail is removed from the landscape. Consequently, any road or trail restoration creates a more primitive recreation setting, reducing opportunities for development-dependent recreation and increasing opportunities for primitive backcountry recreation activities and experiences.

Alternative A-This would put the lowest priority on restoration, which would therefore provide the most areas available for motorized/mechanized recreation and the fewest opportunities for nonmotorized recreation in a more primitive setting.

Alternative B-This would put a lower priority on restoration than Alternative C but would put a higher priority on restoration than Alternatives A and D.

Alternative C-This would put the highest priority on restoration and so would provide the most opportunities for recreation in a primitive setting and the fewest opportunities for motorized and mechanized recreation.

Alternative D-This would put a higher priority on restoring roads and trails than Alternative A, but Alternative D would put a lower priority on restoration than Alternatives B and C.

Impacts from Recreation Management on Recreation

Impacts on Recreation Outcomes and Settings, Recreation Opportunities, and Recreation Conflict

SRPs and USFS Recreation SUAs

Permits or authorizations that are in or near PPH could be terminated or modified. SRPs and SUAs within PPH, PGH, and linkage/connectivity areas that could be affected by these changes currently include big and small game hunting, mountain lion hunting, OHV tours, horseback and hiking tours, float boating, and fishing (see **Table 4.5**, BLM Special Recreation Permits Authorized in PPH, PGH, and Linkage/Connectivity Areas in the Decision Area). The types of modifications to permits or authorizations would determine the type and level of impact on recreation participants and service providers. Specific permit modifications are not prescribed at the EIS level, but potential adverse impacts could include loss of unique recreation opportunities provided by permittees, loss of commercial revenue to recreation service provider businesses, and loss of permit-generated fee revenue for the managing agencies. Beneficial impacts include reductions in user conflicts among different recreation users (either other permittees or the general public) and enhanced opportunities for GRSG-compatible recreation.

Table 4.5. BLM Special Recreation Permits Authorized in PPH, PGH, and Linkage/Connectivity Areas in the Decision Area

Field Office	Number of Permitted Activities Affected by Habitat Type*			Permitted Activity									Total SRPs in GRSG Habitat**
	PPH	PGH	Linkage	Big Game Hunting	Mtn. Lion Hunting	Small Game/ Bird Hunting	Equestrian Activities	OHV Activities	Hiking, Snow-shoeing, Skiing	Fishing	Boating	Other	
CRVFO	58	58	15	x	x	x	X	x	x	x	x	x	52
GJFO	11	11	0	x	x								11
KFO	25	21	2	x	x	x	X	x	x	x	x	x	42
LSFO	45	48	23	x	x		X					x	48
WRFO	25	29	22	x	x		X						29
								Decision Area Total					182

*Permitted activities may overlap multiple habitat types.

**Many SRPs are combination permits with multiple activities on one permit. Hence, this total may be less than the number of activities shown elsewhere in the table.

Alternative A-This would have the least impact with no change in current management.

Alternatives B and C-These would have the greatest impact since they have the most potential for modifying permit/authorization management. Only SRPs that are neutral or beneficial to GRSG would be authorized. This could impact existing and potential SRPs that could not be shown to be neutral or beneficial to GRSG.

Alternative D-This is not as restrictive as Alternatives B and C, but Alternative D would have a greater impact than Alternative A. Alternative D could still impact significant numbers of current permit or authorization holders because only those SRPs that would not adversely affect GRSG would be authorized.

Restrictions on camping and nonmotorized recreation

Timing restrictions on recreation would eliminate certain recreational opportunities in these areas during the identified time of year.

Alternatives A, B, and D-Under these alternatives, there would be no restrictions on camping or nonmotorized recreation above and beyond what is already in the existing LUPs and the Routt National Forest Plan. Impacts on camping and nonmotorized recreation are expected to be minimal under these alternatives.

Alternative C-This alternative would have the greatest adverse impact on recreation due to a seasonal prohibition on camping and other nonmotorized recreation within 4 miles of active GRSG leks. This restriction on camping and nonmotorized recreation would make large areas of the planning area unavailable for those uses during spring, a prime time for those activities. Many recreationists would be displaced under this alternative.

Impacts from Lands and Realty Management on Recreation

Impacts on Recreation Outcomes and Settings and Recreation Opportunities

Construction of Structures/Construction of Roads and Trails/Earthwork Construction and Vegetation Disturbance

In areas with high potential for surface disturbance and development and in SRMAs and ERMAs, construction of structures, roads and trail, and vegetation disturbance would have a greater impact on recreation than in areas with low potential for surface disturbance and development or areas outside of recreation management areas (see **Table 2.2**, Comparative Summary of Alternatives, for a comparison of ROW exclusion and avoidance areas by alternative). New ROWs, including those for power lines, pipelines, access roads, and communication sites, would diminish the naturalness of the physical setting and so would reduce opportunities for recreation activities, experiences, and outcomes that require more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Construction of roads and trails would increase the access attribute of the operational setting for certain recreation activities, such as OHV and mountain bike trail riding, but would also reduce the remoteness of the physical setting. Remoteness represents how far a visitor is from a road or a trail. The farther a visitor is from a road or trail, the more primitive the remoteness setting. The naturalness of the physical setting would also be diminished by road and trail construction; therefore, road and trail construction would reduce opportunities for recreation

activities, experiences, and outcomes, requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Utilities, communication facilities, and energy facilities, as well as their ancillary facilities and structures, would necessitate construction and vegetation clearing; this would in turn diminish the naturalness of the physical setting, reducing opportunities for recreation activities, experiences, and outcomes and requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A-Under Alternative A, there are 25,600 acres managed as ROW exclusion areas, and 127,600 acres managed as ROW avoidance areas. This alternative makes the most areas available for ROWs and associated structure building. With no restrictions in place to protect GRSG habitat specifically, Alternative A would have the greatest impact on recreation setting characteristics and the associated activities, experiences, and outcomes. Recreation opportunities requiring less remote or natural settings would benefit, while more primitive backcountry opportunities would likely be diminished.

Alternative B-Under Alternative B, there would be 930,500 acres managed as ROW exclusion areas. This alternative would implement restrictions to protect GRSG habitat, resulting in fewer areas available for ROWs and associated structure building. Therefore, impacts on recreation setting characteristics are less than under Alternatives A and D but would be greater than Alternative C.

Alternative C-Under Alternative C, there would be 1,761,500 acres managed as ROW exclusion areas. This alternative would make the fewest areas available for ROWs and associated structure building and so would have the least impact on recreation setting characteristics. Alternative C would have greater benefit to primitive recreation setting and greater detriment to developed or motorized recreation.

Alternative D-Under Alternative D, there would be 883,200 acres managed as ROW exclusion for large transmission lines (greater than 230 kilovolts), 65,200 acres managed as ROW avoidance for large transmission lines (greater than 230 kilovolts) and 930,500 acres managed as ROW avoidance areas. This alternative would have fewer impacts than Alternative A but greater impacts than Alternatives B and C. This has impacts similar to Alternative B but with more potential for road and trail development.

Impacts on Recreation Opportunities

Public Land Retention, Acquisitions, and Conservation Easements

Public land retention, acquisitions, and conservation easements in areas with high potential for surface disturbance and development would have a greater impact on recreation than in areas with low potential for surface disturbance and development. Retaining or acquiring GRSG habitat for public ownership, or for conservation purposes would enhance or preserve opportunities for recreation in primitive settings. However, management of areas retained, acquired, or preserved for GRSG protection would not likely emphasize recreation and would provide only limited primitive recreation opportunities.

Alternative A-This would not specifically target GRSG habitat for retention, acquisition, or conservation and so would be least likely to retain or expand areas potentially available for primitive recreation.

Alternative B-This would emphasize retention, acquisition, and conservation of PPH and so would be more likely to retain or expand areas potentially available for primitive recreation opportunities than Alternative A. Actual availability of these lands for recreation would depend on site-specific management strategies.

Alternative C-This has impacts similar to those of Alternatives B and D, but it would place greater emphasis on retention, acquisition, and conservation of GRSG habitat. Alternative C would therefore be most likely to retain or expand areas potentially available for primitive recreation. Actual availability of these lands for recreation would depend on site-specific management strategies.

Alternative D-This has impacts similar to those of Alternatives B and C, but it would provide more flexibility to allow disposal of federal lands; therefore, Alternative D is less likely than Alternatives B and C and more likely than Alternative A to retain or expand areas potentially available for primitive recreation.

Impacts from Wind Energy and Solar Energy Development on Recreation

Impacts on Recreation Outcomes, Settings, and Opportunities

Construction of Structures

In areas with high potential for development and in SRMAs and ERMAs, structure building would have a greater impact on recreation than in areas with low potential for development or no recreation management area identification. Wind or solar energy facilities, as well as their ancillary facilities and structures, would diminish the naturalness of the setting and so would reduce opportunities for recreation activities, experiences, and outcomes, requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A-This would have the most areas available for ROWs and associated structure building. With no restrictions in place to protect GRSG habitat specifically, Alternative A would have the greatest impact on recreation setting characteristics and the associated recreation activities, experiences, and outcomes.

Alternative B-This would implement restrictions to protect GRSG habitat, resulting in fewer areas available for ROWs and associated structure building; therefore, impacts on recreation setting characteristics are less than Alternative A and D but would be greater than Alternative C.

Alternative C-This would have the fewest areas available for ROWs and associated structure building and so would have the least impact on recreation setting characteristics.

Alternative D-This has fewer impacts than Alternative A but more impacts than Alternatives B and C.

Construction of Roads

In areas with high potential for surface disturbance and development, and SRMAs and ERMAs, construction of roads and trails would have a greater impact on recreation than in areas with low potential for surface disturbance and development or no recreation management area identification. Construction of roads associated with wind or solar energy development would increase the access attribute of the operational setting for certain recreation activities, such as

OHV and mountain bike trail riding, but it would also reduce the remoteness attribute of the physical setting. The remoteness of the physical setting represents how far a visitor is from a road or a trail. The farther a visitor is from a road or trail, the more primitive the remoteness setting. The naturalness of the setting would also be diminished by road construction; therefore, road construction would reduce opportunities for recreation activities, experiences, and outcomes, requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A-This would have the most areas available for surface-disturbing activities and so has the greatest potential to change recreation opportunities, activities, or experiences. Impacts would vary, based on each area's prescribed recreation management objectives and the nature of the surface disturbance. Recreation requiring less remote or natural settings would benefit, while more primitive backcountry opportunities would likely be diminished.

Alternative B-This would limit surface disturbance and have more beneficial impacts for primitive backcountry recreation than Alternative A. It would allow fewer opportunities than Alternative A for recreation that depends on road and trail development.

Alternative C-This would have the fewest areas available for surface-disturbing activities and so has impacts similar to those described for Alternative B but with greater benefit to primitive recreation setting and greater detriment to developed recreation.

Alternative D-This has impacts similar to Alternative B but with more potential for road and trail development.

Vegetation Disturbance

In areas with high potential for surface disturbance and development, and in SRMAs and ERMAs, changes in topography and vegetation disturbance would have a greater impact on the recreation setting characteristics for naturalness than in areas with low potential for surface disturbance and development or no recreation management area identification. Wind or solar energy developments, as well as their ancillary facilities and structures, would necessitate construction and vegetation clearing. This would in turn diminish the naturalness of the physical setting, reducing opportunities for recreation activities, experiences, and outcomes and requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A-This would have the most areas available for ROWs and associated vegetation disturbance. With no restrictions in place to protect GRSG habitat specifically, Alternative A would have the greatest impact on recreation setting characteristics and the associated recreation activities, experiences, and outcomes.

Alternative B-This would implement restrictions to protect GRSG habitat, resulting in fewer areas available for ROWs and associated vegetation disturbance; therefore, impacts on recreation setting characteristics would be less than under Alternative A and D but would be greater than under Alternative C.

Alternative C-This would have the fewest areas available for ROWs and associated vegetation disturbance, so it would have the least impact on recreation setting characteristics.

Alternative D-This has fewer impacts than Alternative A but greater impacts than Alternatives B and C.

Impacts from Range Management on Recreation

Impacts on Recreation Outcomes and Settings and Recreation Opportunities

Disturbance and Construction of Structures Associated with Range Management

Areas with high potential for vegetation disturbance and structure building associated with range management (such as water troughs, fences, and corrals) and in SRMAs and ERMAs would have a greater impact on recreation than areas with low potential for vegetation disturbance and construction of range management structures or no recreation management area identification. Vegetation disturbance and range management structures would diminish the naturalness of the physical setting and so would reduce opportunities for recreation activities, experiences, and outcomes, requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A-This would have the most areas available for livestock grazing and associated vegetation disturbance and structure building. Impacts on recreation setting characteristics, activities, experiences, and outcomes would be determined during analysis of site-specific management and project proposals.

Alternative B-This would implement range management strategies to protect and enhance GRSG habitat, which could alter the type, number, and location of range management structures. Impacts on recreation setting characteristics, activities, experiences, and outcomes would be determined during analysis of site-specific management and project proposals. Impacts are similar to those in Alternatives A, C, and D. Areas available for livestock grazing and associated vegetation disturbance and structure building would likely be less than under Alternatives A and D but greater than under Alternative C.

Alternative C-This has impacts similar to Alternative B but would likely have the fewest areas available for livestock grazing and associated vegetation disturbance and structure building.

Alternative D-This has impacts similar to Alternative B.

Presence or Evidence of Livestock

Areas open for livestock grazing would have a greater impact on recreation than areas not available for livestock grazing. The presence or evidence of livestock would diminish the naturalness of the physical setting and so would reduce opportunities for recreation activities, experiences, and outcomes, requiring more natural and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A-This has the most areas available for livestock grazing and so would have the greatest impacts on recreation setting characteristics, activities, experiences, and outcomes.

Alternative B-This would implement range management strategies to protect and enhance GRSG habitat, which could alter the number, location, and timing of livestock grazing. Impacts on recreation setting characteristics, activities, experiences, and outcomes would be determined during analysis of site-specific management and project proposals. Impacts are similar to those in Alternatives C and D. Areas available for livestock grazing would likely be less than Alternatives A and D but greater than Alternative C.

Alternative C-This has impacts similar to Alternative B but would likely have the fewest areas available for livestock grazing.

Alternative D-This has impacts similar to Alternative B.

Impacts from Wild Horse Management on Recreation

Impacts on Recreation Outcomes and Settings and Recreation Opportunities

Vegetation Disturbance and Construction of Structures

Designated wild horse HMAs and herd areas would have more potential for vegetation disturbance and structure building than areas not managed as HMAs or herd areas. The disturbances and structures are usually temporary and associated with gather events. Structures and vegetation disturbance would diminish the naturalness of the physical setting and so would reduce opportunities for some recreation activities, experiences, and outcomes, requiring more remote and primitive settings.

Alternative A-This would place the fewest restrictions on wild horse management and so would have the most potential for installation of structures to manage the herds. Impacts on recreation setting characteristics, activities, experiences, and outcomes would be determined during analysis of site-specific management and project proposals.

Alternative B-This would implement herd management strategies to protect and enhance GRSG habitat, which would alter the level of vegetation disturbance and the type, number, and location of structures. Impacts on recreation setting characteristics, activities, experiences, and outcomes would be determined during analysis of site-specific management and project proposals. Impacts would likely be similar to those under Alternatives A, C, and D. Areas used for wild horse activity, and associated vegetation disturbance and structure building, would likely be less than Alternative A and D but greater than Alternative C.

Alternative C-This has impacts similar to Alternative B but would likely have the fewest areas available for wild horse activity and associated vegetation disturbance and structure building.

Alternative D-This has impacts similar to Alternative B.

Presence or Evidence of Wild Horses

Designated HMAs and herd areas would have a greater impact on recreation than areas not managed as HMAs or herd areas. The presence or evidence of wild horses could enhance or diminish recreation experiences and outcomes, depending on user-desired or agency-defined objectives. In recreation management areas, recreation management objectives define these desired setting characteristics, experiences, and outcomes.

Alternative A-This would place the fewest restrictions on wild horse management and would likely provide the most potential for wild horse viewing. Impacts on recreation setting characteristics, activities, experiences, and outcomes would be determined during analysis of site-specific management and project proposals.

Alternative B-This would implement herd management strategies to protect and enhance GRSG habitat, which could alter opportunities for wild horse viewing. Impacts on recreation setting characteristics, activities, experiences, and outcomes would be determined during analysis of

site-specific management and project proposals. Impacts would likely be similar to those in Alternatives C and D.

Alternative C and D-These have impacts similar to Alternative B.

Impacts from Minerals (Fluid, Solid–Coal, Locatable, Nonenergy Leasable, and Salable Minerals) Management on Recreation

Impacts on Recreation Outcomes and Settings and Recreation Opportunities

Construction of Structures

In areas with high development potential and areas with high recreation concentration there is more likely to be resource conflict. . Energy or nonenergy minerals facilities, as well as their ancillary facilities and structures, would diminish the naturalness of the physical setting and so would reduce opportunities for recreation activities, experiences, and outcomes requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A-This would place the fewest restrictions on mineral development and so has the most potential for installing structures to extract the minerals. Alternative A would likely have the greatest impact on recreation setting characteristics and the associated recreation activities, experiences, and outcomes.

Alternative B-This would implement new restrictions on mineral development to protect GRSG habitat, likely resulting in fewer structures. Impacts on recreation setting characteristics would likely be less than under Alternative A and D but would be greater than under Alternative C.

Alternative C-This would place the most restrictions on mineral development and so would have the least impact on recreation setting characteristics.

Alternative D-This has fewer impacts than Alternative A but greater impacts than Alternatives B and C.

Construction of Roads

In areas with high development potential and areas with high recreation concentration there is more likely to be resource conflict. Construction of roads associated with energy or nonenergy mineral development would increase the access attribute of the operational setting for certain recreation activities, such as OHV and mountain bike trail riding. However, it would also reduce the remoteness of the setting, which represents how far a visitor is from a road or a trail. The farther a visitor is from a road or trail, the more primitive the remoteness setting. The naturalness attribute of the physical setting would also be diminished by road construction; therefore, road construction would reduce opportunities for recreation activities, experiences, and outcomes, requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A-This has the fewest restrictions on mineral development and so would have the greatest potential to change recreation opportunities, activities, or experiences. Impacts would vary, based on each area's prescribed recreation management objectives and the nature of the

surface disturbance. Recreation opportunities requiring less remote or natural settings would benefit, while more primitive backcountry opportunities would likely be diminished.

Alternative B-This would limit mineral development and would have more beneficial impacts for primitive backcountry recreation opportunities than Alternative A. It would allow fewer opportunities than Alternative A for recreation that depends on road and trail development.

Alternative C-This would place the most restrictions on mineral development and so has impacts similar to those described for Alternative B, but with greater benefits to primitive recreation settings and greater detriment to developed recreation.

Alternative D-This has impacts similar to Alternative B but with more potential for road and trail development.

Earthwork Construction and Vegetation Disturbance

In areas with high potential and availability for minerals development and in SRMAs and ERMAs, changes in topography and vegetation disturbance would have a greater impact on the recreation setting characteristics for naturalness than in areas with low potential and low or no availability for mineral development or no recreation management area identification. Energy or nonenergy minerals facilities, as well as their ancillary facilities and structures, would necessitate construction and vegetation clearing. This would in turn diminish the naturalness of the physical setting, reducing opportunities for recreation activities, experiences, and outcomes and requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A-This would place the fewest restrictions on mineral development and so would have the greatest potential for changes in topography, such as clearing and leveling of well pads. Alternative A would likely have the greatest impact on recreation setting characteristics and the associated recreation activities, experiences, and outcomes.

Alternative B-This would implement new restrictions, resulting in fewer areas available for mineral development and associated changes in topography and vegetation disturbance; therefore, impacts on recreation setting characteristics would be less than under Alternative A and D but would be greater than under Alternative C.

Alternative C-This would implement the most restrictions on mineral development and so would have the least impact on recreation setting characteristics.

Alternative D-This has fewer impacts than Alternative A but greater impacts than Alternatives B and C.

Impacts from Wildfire Suppression, Fuels Management, and Fire Rehabilitation on Recreation

Impacts on Recreation Opportunities

Short-Term Loss of Recreation Opportunities

Areas prioritized for wildfire suppression, fuels management, and fire rehabilitation would be more likely to experience short-term losses of recreation opportunities than areas not prioritized for those actions. Fire and fuels management generally require the short-term suspension of most

recreation within the immediate area of the project or incident. Recreation generally resumes following these fire management actions, but recreation setting characteristics are usually altered for a longer term.

Alternative A-This would not prioritize fire management in GRSG habitat, and there would be no increased likelihood of impacts on recreation.

Alternative B-This would focus fire management actions in PPH and would likely have greater short-term impacts on recreation than Alternatives A and D but fewer impacts than Alternative C.

Alternative C-This would focus fire management actions in ADH and would likely have the greatest short-term impacts on recreation.

Alternative D-This has more impacts than Alternative A but fewer impacts than Alternatives B and C.

Impacts on Recreation Outcomes and Settings and Recreation Opportunities

Vegetation Disturbance

In areas prioritized for wildfire suppression, fuels management, and fire rehabilitation and in SRMAs and ERMAs, vegetation disturbance would have a greater impact on recreation setting characteristics than in areas not prioritized for fire management or no recreation management area identification. Wildfires and fire management actions can result in large-scale vegetation disturbance and significant changes to the physical settings for recreation opportunities, potentially affecting the attainment of recreation management objectives.

Alternative A-This would not prioritize fire management in GRSG habitat, and there would be no increased likelihood of impacts on recreation.

Alternative B-This would focus fire management actions in PPH and would likely have greater impacts on recreation than Alternatives A and D but fewer impacts than Alternative C.

Alternative C-This would focus fire management actions in ADH and would likely have the greatest impacts on recreation.

Alternative D-This has more impacts than Alternative A but fewer than Alternatives B and C.

Impacts from Habitat Restoration on Recreation

Impacts on Recreation Outcomes and Settings and Recreation Opportunities

Restoration of Surface Disturbance

In areas that contain higher densities of surface disturbance, prioritization of restoration would have a greater impact on recreation than areas that contain a lower density of surface disturbance. Restoration of roads and trails would decrease the access attribute of the operational setting for certain recreation activities, such as OHV and mountain bike trail riding; however, it would also increase the remoteness attribute of the physical setting, which represents how far a visitor is from a road or a trail. The farther it is from a road or trail, the more primitive the remoteness setting is. The remoteness attribute of the physical setting does not change based on whether a road or trail is open; it changes only if the road or trail is removed from the landscape. Consequently,

any road or trail restoration creates a more primitive recreation setting, reducing opportunities for development-dependent recreation and increasing opportunities for primitive backcountry recreation. The naturalness attribute of the physical setting would also be enhanced by restoring surface disturbances.

Alternative A-This would put the lowest priority on restoring sagebrush habitat. This would provide the most areas available for motorized and mechanized recreation opportunities and the fewest opportunities for nonmotorized recreation in a more primitive setting.

Alternative B-This would put a lower priority on restoration than Alternative C but would put a higher priority on restoration than Alternatives A and D.

Alternative C-This would put the highest priority on restoration and so would provide the most opportunities for recreation in a primitive setting and the fewest opportunities for motorized and mechanized recreation.

Alternative D-This would put a higher priority on restoration of sagebrush habitat than Alternative A but a lower priority on restoration than Alternatives B and C.

Impacts from ACEC/Zoological Area Management on Recreation

Impacts on Recreation Outcomes and Settings and Recreation Opportunities

Preclusion of Surface Disturbance

Areas that are designated as ACECs would have greater impacts on recreation than those that are not. Management of ACECs to protect relevant and important values would likely decrease the access attribute of the operational setting for certain recreation activities, such as OHV and mountain bike trail riding; however, this could also increase the remoteness and naturalness attributes of the physical setting. Consequently, designated ACECs would likely create more primitive recreation settings, reducing opportunities for development-dependent recreation opportunities and increasing opportunities for primitive backcountry recreation.

Alternative A-This would recognize all of the existing ACEC designations. Alternative A has fewer impacts on recreation than Alternative C, which would make all PPH an ACEC.

Alternative B-This would also recognize all of the existing ACEC designations. Impacts from Alternative B are the same as impacts from Alternative A.

Alternative C-This would recognize all of the existing ACECs and would also make all PPH an ACEC. Alternative C would likely provide the most opportunities for recreation in a primitive setting and the fewest opportunities for motorized and mechanized recreation. No additional protections would be added by designating PPH an ACEC.

Alternative D-This alternative would recognize all of the existing ACECs but does not propose to designate any new ACECs. Impacts from Alternative D are the same as for Alternatives A and B.

4.12.4. Summary of Impacts on Recreation

Alternative A places the fewest restrictions on development and allows for the most modification of the landscape. Consequently, it would provide the most opportunities for recreation access,

especially for motorized and mechanized modes of travel. However, it would also reduce the naturalness and remoteness attributes of the physical setting for all types of recreation. Impacts would vary, based on each area's prescribed recreation management objectives and the nature of any development or surface disturbance. Recreation opportunities requiring less remote or natural settings would benefit, while more primitive backcountry opportunities would likely be diminished.

Alternative B would limit development and surface disturbance in GRSG habitat and would have more beneficial impacts for primitive backcountry recreation than Alternative A. It would allow fewer opportunities than Alternative A for recreation that depends on road and trail development.

Alternative C has the fewest areas available for surface- disturbing activities and so has impacts similar to those described for Alternative B; however, Alternative C would have greater benefit to primitive recreation settings and greater detriment to developed recreation.

Alternative D has impacts similar to Alternative B but with more potential for road and trail development and the associated recreation activities, experiences and outcomes.

4.13. Range Management

4.13.1. General Description

This section discusses impacts on range management from proposed GRSG management actions of other resources and resource uses. Existing conditions concerning range management are described in **Section 3.12**, Range Management. Impacts on range management are commonly the result of activities and management actions from other resources. Impacts on other resources and resource uses from applying range management actions can be found in those particular resource sections of this chapter.

This section also discusses the differences between alternatives for each impact to range management from other resources and resource uses.

4.13.2. Methodology and Assumptions

Indicators of impacts on range management and the measurements used to describe the impacts (where available or appropriate) are described below:

- Forage availability

Ability to support operations on individual allotments long term and the amount of AUMs available

Indirect impacts include loss of forage would be an adverse impact on range management; activities that increase forage availability would be beneficial

- Ability to develop, maintain, and use range improvement projects

Areas with restrictions on surface disturbance that would preclude range project construction and maintenance

Actions that allow continued maintenance or construction of infrastructure, such as water development, would be beneficial; actions that restrict maintenance or construction of livestock management structures would be adverse to range management

- Areas available for livestock grazing

Acres lost or gained that are available or not available for livestock grazing

Indirect impacts include closing areas for GRSG management would adversely affect permittees whose livestock graze within occupied habitat

- Ability to manage livestock allotments within permit

Ability of livestock operators to comply with permit or lease terms and conditions

Indirect impacts would include ability to manage within permit lease terms and conditions

Assumptions

The following list presents the basic assumptions related to range management that apply to the impacts assessment for Alternatives A through D.

- All new and existing leases and permits would be subject to terms and conditions determined by the authorizing officer to achieve the management and resource condition objectives for the public lands and to meet BLM Colorado Public Land Health Standards.
- Livestock permittees would work toward achieving the BLM Colorado Public Land Health Standards (BLM 1997) on all grazing allotments on BLM-administered lands.
- By definition in this plan, livestock grazing is not considered a surface-disturbing activity; however, in small isolated areas where livestock concentrate, some surface disturbance would occur.
- Grazing preference is attached to base property owned or controlled by a permittee or lessee. Increases in forage availability could increase permitted AUMs for livestock permittees, except when specifically prohibited by RMP or Forest Plan management actions.
- Adverse impacts on vegetation (forage) or rangeland health from other resources or resource uses would likely result in AUM reductions.
- Construction of range improvements (e.g., fences, pipelines, water wells, troughs, catchments, and reservoirs) would result in a localized loss of vegetation cover throughout their useful life. Vegetation would be reestablished through reclamation along water pipelines within 5 to 10 years, to the extent possible.
- Any change in type of livestock would result in management changes within the BLM and USFS and within the livestock operation.
- Loss of the ability to develop, maintain and use range improvements would result in loss of livestock distribution capabilities, which could decrease the ability to manage the rangelands (e.g., soils, vegetation, and water) to properly meet BLM Colorado Public Land Health Standards on lands administered by the BLM or Forest Plan standards and guidelines for National Forest System lands.

- New range improvements could be subject to limitations, as specified in the RMP or Forest Plan. Range improvements generally lead to improved livestock distribution and vegetation management, which in turn would support long-term vegetation objectives without changes to permitted AUMs or season of use.
- Implementation of particular livestock grazing management actions from other resources or resource uses may affect permittees by increasing their operational cost through more intensive livestock management, season-of-use changes, class of livestock changes, modified grazing systems, decreased AUMs, or other actions needed to meet GRSG objectives.
- All classes of livestock depend on the herbaceous component of a shrub/grass plant community.
- Increases in shrubs or pinyon/juniper are adverse to forage production; increases in grasses and forbs are beneficial to forage production.
- Vegetation treatments, such as prescribed burns or weed control, can enhance the plant community composition and forage availability.
- Overutilization, which could include more livestock than AUMs or improper season of use will adversely affect plant composition, plant succession, and ground cover.
- Water is vital to proper range management.
- Areas without available water will have less use than areas with water.
- Water developments can improve livestock distribution.
- Water developments can adversely affect such resources as rare plants and cultural sites if not properly located.
- In most cases, fences are necessary to confine grazing to within allotments, particularly where cattle and horses are involved .
- Fences are an important tool used to control areas, timing, and intensity of livestock use.
- Except where needed to control areas of neighboring cattle or horse grazing, fencing is less necessary on sheep allotments.
- Under Alternative C, where the management action is to close grazing in ADH, the assumption is that private land parcels with continued livestock grazing would be fenced to prevent livestock from occupying public lands in areas identified as GRSG habitat.

Implementing management actions for recreation and ACECs would have negligible or no impact on range management and are therefore not discussed in detail.

“Permit” in this section refers to all Section 3 grazing permits and Section 15 grazing leases.

“Permit” in this section refers to all Section 3 grazing permits and Section 15 grazing leases.

4.13.3. Direct and Indirect Impacts on Range Management

Impacts from Travel Management on Range Management

A variety of management actions for travel and transportation are currently being applied or are proposed to be applied under Alternatives B, C, and D to reduce adverse impacts on GRSG and their habitat. These have varying degrees of potential adverse impacts on range management. Depending on the amount of roads and trails and their level of use, transportation and travel management could result in both short- and long-term rangeland degradation, forage loss, and temporary livestock displacement. Impacts of route-based travel use include reduced availability of forage, reduced palatability because of dust on vegetation, disturbance and harassment of livestock, as well as hindrance or facilitation of livestock movements on the landscape.

Forage Availability

Alternative A-Under Alternative A, 574,100 acres in PPH and 412,100 acres in PGH would continue to be managed as open to cross-country motorized travel on BLM-administered lands. All travel is limited to designated routes in the Routt National Forest. This alternative has the most acres available for motorized travel, which results in the greatest potential for increased surface disturbance and the greatest impacts on vegetation cover. Alternative A therefore has the greatest impact on forage availability.

Alternative B-Under Alternative B, travel in PPH would be limited to designated routes. Increased limitations on surface disturbance associated with travel and transportation under Alternative B could increase forage availability due to decreased acres available for surface-disturbing activities. Limitations on upgrading existing routes could also increase forage availability by decreasing areas available for surface disturbance. Forage availability under Alternative B would be greater than under Alternative A.

Alternative C-Under Alternative C, cross-country travel would be limited to existing routes in ADH, and new roads would be prohibited within 4 miles of a lek. Alternative C would have the least amount of acres available for construction of routes and therefore would have the least impact on forage availability. The impacts are the same as the impacts described under Alternative B, but the impacts on forage availability under Alternative C are greater in scope because they apply to a larger area.

Alternative D-Restrictions on route construction are less restrictive under Alternative D than Alternatives B and C and would have greater impacts on forage availability than Alternatives B and C but less than under Alternative A.

Ability to Develop, Maintain, and Use Range Improvement Projects

Alternative A-Alternative A would allow the most ability to develop, maintain, and use range improvements since it puts the fewest restrictions on access.

Alternative B-Restrictions on access and route construction under Alternative B would apply to PPH, which could hinder the ability to develop, maintain, and use range improvements on 481 allotments.

Alternative C-Alternative C would restrict access in ADH, which could hinder the ability to develop, maintain, and use range improvements on 818 allotments.

Alternative D-Alternative D would allow for increased access and flexibility, compared to Alternatives B and C, in ADH to develop, maintain, and use range improvements, as long as they do not adversely affect GRSG.

Ability to Manage Livestock Allotments within Permit Terms and Conditions

Impacts on the ability to manage livestock allotments within permit terms and conditions are the same as the impacts described under ability to develop, maintain, and use range improvements.

Impacts from Lands and Realty Management, Wind Energy Development, and Industrial Solar Development on Range Management

Management actions related to lands and realty, wind energy development, and industrial solar development for protecting GRSG and their habitat could adversely affect the range management program through reduced ability to develop range improvement projects. There is also the potential to beneficially affect the range management program by restricting acres available for construction of projects that result in surface disturbance. Impacts from management actions associated with land tenure adjustments could increase forage availability through acquisition of additional public lands. Since wind and solar energy facilities require ROW authorizations, impacts are being considered with the impacts from management of lands and realty.

Forage Availability

Alternative A-Within the Northwest Colorado District, 24,200 acres are managed as exclusion area and 90,700 acres are managed as avoidance areas within GRSG habitat (ADH). This alternative includes the fewest restrictions to locations of ROW corridors and ROWs and the fewest restrictions for construction. There is no disturbance cap for construction of new ROWs.

Alternative A has the most acres available for land use authorizations and therefore has the greatest potential for surface disturbance associated with those authorizations. Alternative A has the greatest impact on forage availability. Acquisitions and disposals would be on a case-by-case basis throughout the planning area.

Alternative B-Under Alternative B, all PPH would be managed as exclusion areas. Those restrictions on surface-disturbing activities would be a benefit to forage availability. Prioritization of acquisitions in PPH would expand areas that could be made available for public land livestock grazing, thereby increasing forage availability, if those acquisitions were made available for livestock grazing.

Alternative C-Under Alternative C, ADH would be managed as exclusion areas for ROWs. Those restrictions on lands and realty actions would be the most beneficial to forage availability because they would exclude surface disturbance from the most acres. Exclusion areas for ROWs would apply to ADH under this alternative. The prioritization of acquisitions in ADH over easements under this alternative and the expansion of areas targeted for acquisition would also expand areas that could be made available for public land livestock grazing. This would increase forage availability, assuming that those acquisitions are made available for livestock grazing.

Alternative D-Under Alternative D, ADH would be managed as avoidance areas for ROWs. The restrictions on potential surface-disturbing activities associated with land use authorizations would be greater than Alternative A but less than Alternatives B and C. There would be more forage available, therefore, under Alternative D than Alternative A but less than under Alternatives B and C.

Impacts from Range Management on Range Management

Range management actions intended to benefit GRSG populations and their habitats described in **Chapter 2** include measures within a variety of categories. Depending on the specific alternative, these include incorporating GRSG habitat requirements into overall management of grazing allotments, prioritizing land health assessments in GRSG habitat, managing vegetation communities for the benefit of GRSG, and responding to drought conditions. In addition to these are restrictions related more specifically to managing riparian areas and wet meadows, implementing treatments to increase forage for livestock and wild ungulates (hoofed grazers), installing new structure range improvements and livestock management tools, such as water developments, removing or modifying existing structural improvements such as fences, and retiring grazing privileges.

Impacts from management actions designed to reduce the threat of West Nile virus are not expected to affect the range management program in Northwest Colorado because the vast majority of allotments there are found at elevations above where West Nile virus is commonly found (Naugle et al. 2005).

Impacts on the range program from range management actions described below by alternative are those on forage availability, ability to develop range improvement projects, and areas available for livestock grazing.

Alternative A-Alternative A is the least restrictive of all the alternatives. In general, current grazing management is geared toward meeting BLM Colorado Public Land Health Standards and Forest Plan standards and guidelines, but there are no specific management actions specifically for GRSG habitat. If BLM Colorado Public Land Health Standards and Forest Plan standards and guidelines are being met, then vegetation composition, vigor, and seed production is adequate for maintaining healthy vegetative communities. Management for riparian areas is based on riparian proper functioning condition and Forest Plan standards and guidelines, and there are no specific management actions for GRSG habitat.

Most GRSG habitat is currently used for livestock grazing in Northwest Colorado. Alternative A would provide the most benefit to forage availability when compared with the other alternatives because vegetation treatments would not be prioritized to benefit GRSG habitat; instead it would be targeted to increase forage for livestock and would result in increased forage for livestock.

Alternative A does not contain restrictions for construction of range improvement projects and allows for the greatest degree of flexibility for construction of infrastructure and therefore livestock.

Alternative B-Alternative B has moderate restrictions on grazing management within GRSG habitat. Management primarily focuses on completing integrated ranch planning to aid in improving GRSG habitat at a landscape level, completing land health assessments in ADH, creating livestock grazing objectives that aim at keeping vegetation composition consistent with ecological site descriptions, and managing livestock use to meet seasonal needs of GRSG. Areas without GRSG habitat would receive fewer vegetation treatments because treatments would be prioritized in GRSG habitat.

Timing and seasonal limitations, as well as drought-related adjustments geared toward improving habitat for GRSG, could reduce forage availability because permittees would be required to move livestock off range if necessary to protect GRSG. The potential for decreased availability of forage exists under this alternative throughout Northwest Colorado. Drought-related adjustments

would result in short-term reductions in forage but could sustain or increase forage availability in the long term.

New range improvements would be authorized only when the improvement would improve or enhance GRSG habitat. In PPH, range improvements would be restricted to only those that conserve, enhance, or restore GRSG habitat. This would reduce the ability to develop range improvements and the flexibility for distribution of livestock across 481 allotments in the planning area.

Alternative C-Alternative C would exclude livestock grazing in ADH. Forage on 1,702,800 acres of ADH would no longer be available for livestock grazing; this would eliminate approximately 337,000 AUMs on BLM-administered allotments. Livestock grazing operators would have to cease or greatly reduce their livestock operations.

Closing BLM-administered and National Forest System land to livestock grazing in ADH would require fencing along the boundary of ADH. However, it is not practical to assume that the BLM and USFS would fence along the entire perimeter of ADH, especially in those allotments that are only partially in ADH. There are 59 allotments, for example, that are less than 10 percent in ADH. It is more likely that fences would be constructed on a case-by-case basis, as determined by land patterns, topography, and impacts on GRSG. On private land portions of allotments, however, it is likely that many landowners would build fences along their property boundaries to ensure no livestock trespassed on BLM-administered or National Forest System lands in ADH that has been closed to livestock grazing.

In order to prevent trespass onto closed allotments on BLM-administered and National Forest System land, landowners could construct up to 4,955 miles of fence. The fences would follow property lines between the BLM and USFS and other landowners without any regard to existing leks, nesting habitat, or brood-rearing habitat. Impacts on GRSG due to increased fencing are addressed in **Section 4.4.2**, Greater Sage-Grouse.

Table 4.6, Livestock Grazing Management-Alternative C, represents acres per Colorado MZ that would be closed to grazing in Alternative C and miles of fence by MZ that could be built along private/public land boundaries.

Table 4.6. Livestock Grazing Management-Alternative C

Colorado Management Zone	Acres In ADH That Would Be Closed To Grazing	Miles of Fence Needed to Close Grazing in ADH
1	0	0
2	1,199,000	200
3	455,800	400
4	109,700	400
5	120,000	400
6	49,900	300
7	27,800	100
8	4,300	60
9	166,800	700
10	189,700	500
11	137,300	500
12	6,800	30

Colorado Management Zone	Acres In ADH That Would Be Closed To Grazing	Miles of Fence Needed to Close Grazing in ADH
13	63,700	300
14	43,600	200
15	3,100	30
16	11,300	0
17	112,500	300
18	13,000	30
19	63,200	300
20	2,100	20
21	2,200	10
Total	**1,702,800**	**5,000**

Under Alternative C, no new structural range developments would be allowed in ADH unless they had been shown to benefit GRSG. However, those restrictions would apply only for allotments within ADH, which would be closed under this alternative.

Closing grazing in ADH would add complexity to the ability to effectively manage both the remaining portions of allotments on BLM-administered or National Forest System lands that could remain open and the management of the private land portions of those allotments that are either closed or partially closed. The flexibility to manage livestock on those allotments would be greatly reduced, potentially to the point of infeasibility.

Alternative D-Under Alternative D, several management objectives provide more flexibility for actions to improve land health and manage riparian areas or vegetation treatments, but the objectives apply to a larger area (ADH). Management objectives are primarily targeted at managing the range within ADH to be consistent with ecological site descriptions, similar to Alternative B and C; however, there is increased flexibility for managing BLM-administered and National Forest System lands for other resource values.

Alternative D is less restrictive than Alternative B and C but is more restrictive than Alternative A.

Under Alternative D the ability to construct range improvements and livestock management tools is greater than under Alternatives B and C but slightly less than Alternative A. Under Alternative D, range improvement projects would be designed to both enhance livestock distribution across allotments and to protect GRSG habitat. This would provide more flexibility than Alternatives B and C but less flexibility than Alternative A.

Impacts from Wild Horse Management on Range Management

The following management actions are to protect GRSG and their habitats in relation to management of wild horses: keeping populations within appropriate management levels, prioritizing gathers to reduce impacts of wild horses on GRSG habitats, addressing potential impacts on GRSG in NEPA analyses for wild horse management activities, and considering GRSG habitat requirements in conjunction with HMAs.

Forage Availability

Alternative A-Under Alternative A, horses would continue to be managed within established HMAs and under established appropriate management levels. Existing competition between wild horses and livestock would continue at current levels.

Alternative B-Wild horse management areas, such as the Little Bookcliffs HMA, that do not contain any GRSG habitat would be categorized as a low priority for future gathers under Alternative B. Wild horse areas that have occupied habitat would be categorized a higher priority. For those allotments that overlap HMAs and that are categorized a low priority for gathers, forage availably would decrease due to growing populations of wild horses that have not been gathered due to the lower priority for gathers in that HMA.

HMAs that are identified as a high priority for gathers would stay within appropriate management levels, and forage would stay at stable levels.

Alternative C-Impacts from Alternative C are the same as those described under Alternative B.

Alternative D-Under this alternative, gathers would be prioritized, but other resource values would be taken into account during that prioritization. The Alternative D is similar to Alternatives A and B but gives more flexibility, depending on other management objectives of the BLM/USFS (e.g., listed plants).

Impacts from Fluid Minerals Management on Range Management

The development and maintenance of fluid minerals production facilities often impacts resources that livestock grazing operations rely on. Loss of forage through the direct disturbance of drilling and production pads, roads, compressor stations, and other structures has impacted numerous allotments throughout the affected area.

Unleased Fluid Minerals

Forage Availability

Alternative A-Alternative A would allow the most development of unleased minerals. This would have the greatest impacts on forage availability and would decrease forage availability over time as infrastructure associated with fluid minerals is developed.

Alternative B-For areas within PPH that are not currently leased, no new leases would be allowed, so forage loss would not occur and there would be no negative impacts on livestock management. Activities related to geophysical exploration are temporary, with very minor surface disturbances. The continuation of these activities would not result in impacts on forage availability.

Alternative C-Under this alternative, ADH would be closed to new fluid mineral leases. Impacts from this alternative are similar to the impacts from Alternative B, only it would apply to a larger area (ADH as opposed to PPH; see **Table 4.6**, Livestock Grazing Management-Alternative C); therefore, Alternative C would have a more beneficial impact on forage availability from decreased surface disturbance associated with fluid mineral development.

Alternative D-Under this alternative, PPH would be an NSO area for new fluid mineral leases. This alternative is similar to Alternative B. Minerals underlying PPH could be leased, but no development associated disturbance would be allowed in PPH. There would still be a potential for continued fluid mineral leasing along the periphery of PPH if directional drilling were feasible.

Development could occur outside PPH, possibly in PGH or linkage/connectivity habitat, which could decrease forage availability in those areas.

Areas Available for Livestock Grazing

Reductions in areas available for fluid mineral leasing would be a benefit to range management. Impacts are similar to those described under forage availability.

Leased Fluid Minerals

Forage Availability

Alternative A-Alternative A would allow the most development of leased fluid minerals. This would have the most impacts on forage availability and would decrease forage availability over time as infrastructure associated with fluid minerals is developed.

Alternative B-For areas within PPH that are currently leased, some level of fluid mineral development and associated impacts on forage would occur, albeit at diminished levels. For PPH, the implementation of an NSO (4 miles from leks) would result in fewer losses of forage from fluid mineral development. Where exceptions to the NSO would apply, a 3 percent disturbance cap would effectively reduce related impacts, though they are expected to continue to occur. Development under this alternative might force development to the most distant area of a lease if it were within 4 miles of a lek, which could impact forage availability on any associated allotments.

Alternative C-Impacts from this alternative are largely the same as Alternative B. However, where seasonal restrictions are applied to benefit GRSG, under Alternative C those restrictions would apply to ADH, thereby causing a greater benefit to forage availability under this alternative than under Alternative B.

Alternative D-Under this alternative, where exceptions apply to the NSO, a 5 percent disturbance cap would effectively reduce impacts on forage availability, albeit at a lower level than Alternative B. Development under this alternative is expected to be greater than under Alternatives B and C.

Areas Available for Livestock Grazing

Reducing areas available for fluid mineral leasing would be a benefit to range management. Impacts are similar to those described under forage availability.

Impacts from Solid Minerals–Coal Management on Range Management

Management actions for protecting GRSG and their habitats from coal mining projects include measures in Alternatives B and C that would prohibit new surface mines in PPH. Other measures under these alternatives would prohibit new subsurface mine leases in PPH, unless surface facilities would be located entirely outside PPH. These measures would limit expansion of existing leases unless new surface facilities were either located outside PPH or, if that is not possible, collocated with existing disturbances or otherwise kept to a minimum. Alternative D includes additional measures but is also aimed at limiting impacts on GRSG populations in both PPH and ADH by minimizing habitat loss and disruption of GRSG activities.

Impacts from solid minerals development on the range program are the same or similar to those discussed above in fluid minerals but will vary in scale, duration, and intensity.

Impacts from Locatable Minerals Management on Range Management

Alternatives analyzed in this EIS for protecting GRSG from developing locatable minerals are aimed at avoiding or minimizing new habitat loss and additional disruption of GRSG activities by prohibiting or limiting future mining in PPH.

Forage Availability

Alternative A-Under this alternative, the most acres are available for mineral entry, so it would have the highest potential to impact forage availability.

Alternative B-This alternative involves similar impacts on forage availability as described under *Impacts from Management of Fluid Minerals on Range Management*. Within PPH, the extraction of locatable minerals could continue at some level, but where mineral entries are withdrawn due to impacts on GRSG, the impacts on forage availability would be minimized. While some extractive activities could continue, the increased mitigations on operations would have relatively little effect, and localized losses of forage would still occur.

Alternative C-Impacts from this alternative are the same as for Alternative B.

Alternative D-Under this alternative, the impacts on forage availability are the same or similar to those described under Alternative B. However, there is a slightly higher potential for impacts on forage availability under this alternative as opposed to Alternatives B and C, due to the slightly higher potential for continued locatable mineral development.

Impacts from Nonenergy Leasable Minerals Management on Range Management

Measures to protect GRSG and their habitat from development of nonenergy leasable minerals (nahcolite) are aimed at avoiding or minimizing new habitat loss and additional disruption of GRSG activities by prohibiting or limiting future mining in PPH.

Impacts from nonenergy leasable mineral development on the range program are the same or similar to those discussed above under *Impacts from Management of Fluid Minerals on Range Management* but vary in scale, duration, and intensity.

Impacts from Salable Minerals Management on Range Management

As with the solid minerals addressed above, the alternative measures for protecting GRSG from development of salable minerals are aimed at avoiding or minimizing new habitat loss and additional disruption of GRSG activities by prohibiting or limiting future mining in PPH.

Impacts from salable minerals development on the range program are the same or similar to those described above under *Impacts from Management of Fluid Minerals on Range Management* but vary in scale, duration, and intensity.

Impacts from Fuels Management on Range Management

Management actions for protecting GRSG and their habitats from fuels management are described in detail in **Section 4.7**, Wildland Fire Ecology and Management, and in **Chapter 2**. These

measures focus on ensuring that activities related to fuels reduction to reduce the risk of future catastrophic fires do not significantly affect GRSG populations through either disruption of GRSG activities or destruction of occupied or suitable habitat.

Forage Availability

Alternative A-Under this alternative, no restrictions would be applied to fuels management in GRSG habitat. A greater number of acres would be treated under this alternative, potentially benefiting forage for livestock through increased herbaceous cover.

Alternative B-Under this alternative, forage availability would decrease over time due to a restricted ability to remove sagebrush through fire, mechanical, or chemical means to reduce fuel and increase herbaceous plants in PPH. No treatments would be allowed in winter range in PPH under this alternative, which would decrease the herbaceous understory and in turn decrease forage availability.

Alternative C-Impacts are the same as Alternative B, except that restrictions under Alternative C would be applied to ADH, thereby increasing the scope of the impact. No treatments would be allowed in winter range in ADH under this alternative, which would decrease the herbaceous understory over time, and in turn decrease forage availability to a greater degree than Alternatives A, B, and D.

Alternative D-Under this alternative, treatments in winter habitat would be allowed in ADH if 70 percent of ecological sites supporting sagebrush maintain 12 percent canopy cover of Wyoming big sagebrush or 15 percent cover of mountain big sagebrush. This would allow more flexibility for treatments, resulting in increased forage availability over Alternatives B and C but less than Alternative A.

Areas Available for Livestock Grazing

Alternative A-This alternative is the least restrictive for ability to implement sagebrush treatments and increase areas available for livestock grazing. There would be a short-term decrease in ability to use areas identified for treatments leading up to and following the treatment; however, in the long term there would be an increase in areas available for livestock grazing.

Alternative B-In PPH, restrictions on sagebrush treatments would decrease the ability to create or maintain areas in sagebrush habitat that are available for livestock grazing.

Alternative C-In ADH, restrictions on sagebrush treatments would decrease the ability to create or maintain areas in sagebrush habitat that are available for livestock grazing.

Alternative D-This alternative would allow more flexibility in terms of areas available for livestock grazing, due to the increased ability to maintain early to mid-seral sagebrush communities in winter range, which would allow for more areas available for livestock grazing.

Impacts from Fire Operations Management on Range Management

Management actions for protecting GRSG and their habitats from fire operations are described in detail in **Section 4.7**, Wildland Fire Ecology and Management, and in **Chapter 2**.

Forage Availability

Alternative A-Under Alternative A, after firefighter safety, prioritization of suppression would be considered for multiple resources. This would result in little change in forage availability in the short term, while in the long term, forage would decrease the most due to an overall increase in later seral stage sagebrush communities, with resulting decreases in herbaceous species used for forage.

Alternative B-Under this alternative, prioritization of suppression in PPH would result in little change in forage availability in the short term, while in the long term, forage would decrease due to an overall increase in later seral stage sagebrush communities, with resulting decreases in herbaceous species used for forage.

Alternative C-Impacts from Alternative C are the same as the impacts described above for Alternative B.

Alternative D-Impacts from Alternative D are similar to the impacts described under Alternative B, except that suppression would be prioritized in PPH, with preference given to GRSG habitat, unless site-specific circumstances warrant an exemption. This could increase herbaceous forage to a greater degree than in Alternatives A, B, and C.

Impacts from Emergency Stabilization and Rehabilitation on Range Management

ESR or burned area emergency response following a wildland fire would be focused on restoring habitat consistent with GRSG habitat needs, to the extent practicable. Depending on the alternative (see **Chapter 2**), this includes use of locally selected native seeds and of sagebrush where available, as well as temporary restrictions on grazing, motorized travel, and other uses.

Impacts from ESR or burned area emergency response on the range program are expected to be the same or similar to those discussed above under *Impacts from Management of Fuels on Range Management* but vary in scale, duration, and intensity.

Impacts from Habitat Restoration on Range Management

As with ESR or burned area emergency response treatments, general habitat restoration treatments would emphasize improving existing habitats with current or future potential for supporting GRSG through such measures as weed control and use of locally adapted native seeds in revegetation. Depending on the alternative, these measures would be variously applied in PPH or ADH areas (see **Chapter 2**).

Impacts from habitat restoration on the range program are the same or similar to those discussed above under *Impacts from Management of Fuels on Range Management* but vary in scale, duration, and intensity.

4.13.4. Summary of Impacts on Range Management

Alternative A-Alternative A would provide the most flexibility in management, the fewest impacts on forage availability, and the fewest restrictions on development of range improvements, which would benefit range management.

Alternative B-Alternative B would provide less flexibility than Alternatives A and D but would provide more flexibility than Alternative C for range management. Alternative B would put more restrictions on developing range improvements than Alternatives A and D but fewer restrictions than Alternative C, which could impact the range program.

Alternative C-Alternative C would close ADH to livestock grazing and would cause the need for additional infrastructure to implement that closure. Impacts on the range management program are greatest under Alternative C.

Alternative D-Alternative D would provide more flexibility in management than Alternatives B and C but less flexibility than Alternative A. Impacts on forage availability under this alternative are greater than Alternative A but are less than Alternatives B and C.

4.14. Wild Horse Management

4.14.1. General Description

The Wild and Free-Roaming Horses and Burros Act of 1971 and BLM policy state that wild horse populations will be managed as self-sustaining populations of healthy animals, in balance with other uses and the production capacity of their habitat. The goal is to protect and manage self-sustaining wild horse populations within established HMAs at appropriate management levels. Healthy, self-sustaining wild horse populations depend on forage, water, cover, and space as essential components.

4.14.2. Methodology and Assumptions

General Impacts on Wild Horse Management

Indicators of impacts on wild horse management and the measurements used to describe the impacts (where available or appropriate) are described below:

- Forage availability

Ability to support appropriate management levels long term

Indirect impacts include loss of forage Those activities which increase forage would be beneficial.

- Water Availability

Sufficient volume, quality, and distribution (location) of water sources to evenly use available habitat

Indirect impacts include home ranges without reliable water.

- Cover and Space Availability

Lack of obstacles, notably fences, that hinder the ability of horses to evenly use available habitat to access cover and space (in addition to the forage and water needs previously identified)

Indirect impacts include actions or lack of action that restricts free roaming wild horse access. Actions that allow free roaming and full access to habitat within HMAs are beneficial

- Ability to manage wild horses within the boundaries of established HMAs

Those wild horses that are included in the estimated population of an HMA are not straying outside of the boundaries of their HMA

Indirect impacts include management and resources of adjacent areas when wild horses become unauthorized users of allocated resources; it is beneficial when horses are using designated HMAs

- Reliable ability to prevent overpopulation within HMAs and restrict horse distribution to HMAs through gather operations or fertility control, conducted on schedule and at the planned number of horses removed or gathered

Ability to stay within appropriate management levels

Indirect impacts include periodic over populations of wild horses that are causing resource damage. Ability to remain within appropriate management levels and meeting BLM Colorado Public Land Health Standards is beneficial

Assumptions

The following list presents basic assumptions related to wild horse management that apply to the impacts assessment for Alternatives A through D.

- Horses depend on the herbaceous component of a shrub/grass plant community.
- Encroachment of shrubs or pinyon/juniper onto established rangelands is adverse; increases in grasses and forbs are beneficial.
- Vegetation treatments, such as prescribed burns or weed control, can enhance the plant community composition and forage availability.
- Heavy or poorly timed grazing will adversely affect plant composition, plant succession, and ground cover.
- Water is the primary resource associated with wild horse distribution. Furthermore, man-made water developments that employ some type of mechanical device (e.g., windmill or electric pump) can fail and cause horses to go without or go elsewhere for water.
- Areas without available water will be unused or used only when horses are required to trail extensive distances.
- Water developments can improve wild horse distribution.
- Distribution will vary by season, climatic conditions, and population.
- Snow can serve as a reliable winter water source for wild horses.
- Water development is not always beneficial because it can adversely affect seasonal distribution, rare plants, and cultural sites.
- Wild horse social band structure requires space.

- Climatic conditions in Colorado HMAs require access to cover.
- Fences and other disturbances can restrict wild horse movement and access.
- Fences are sometimes necessary to restrict horse distribution to areas inside HMAs or to protect sensitive resources within HMAs.
- Intensive livestock grazing management strategies (scheduled pasture rotation) that involve project infrastructure (fences) are not appropriate for wild horse management.
- HMAs should be designed to meet the four season habitat needs and allow for a self-sustaining herd at an appropriate management level.
- Areas outside HMAs have no forage allocated to wild horses and potential conflicts that have not been evaluated and addressed.
- The BLM has no authority to manage (except to remove) wild horses outside of HMAs.
- Wild horse gather operation scheduling is a product of a national priority process.
- Factors affecting gather priorities include determinations of excess horses and overpopulations, wild horse and range condition, funding, availability of contractors, adoption market, and long-term holding availability for unadoptable excess horses.
- Fertility control agents and sex ratio adjustments can aid in population control, but periodic gathers are still necessary to remove excess wild horses .
- The ability to implement fertility control independent of a gather operation varies by terrain and the ability of people to get in near enough to horses.

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

4.14.3. Direct and Indirect Impacts on Wild Horse Management

The impacts of GRSG management on wild horses are summarized in **Table 4.7**, Acreage by Wild Horse Management Unit and Alternative Affected by GRSG Management.

Impacts from Travel Management on Wild Horse Management

Restrictions on off-highway travel designed to protect GRSG habitat would also protect wild horse habitat but also may reduce some management options designed to benefit wild horses.

Forage Availability

Restrictions on travel designed to protect GRSG habitat would also protect wild horse habitat as anthropogenic disturbance caused by OHV travel removes forage from the habitat. Restrictions on surface disturbance will maintain forage availability, and retain the ability to support the appropriate management level. These restrictions on travel may adversely affect management of horses by restricting access to construct or maintain range improvements and restrict areas where traps may be needed to remove horses.

Alternative A-fewest restrictions on surface disturbance would result in the least protection to wild horse ranges. Current travel management designations within the HMAs are not affecting enough acreage to substantially change the appropriate management level. The potential exists for travel development to become a larger factor in the future.

Alternative B-Increased off highway travel restrictions on PPH would benefit wild horse forage available. Limited travel restrictions on PGH would also be beneficial. These travel restrictions may limit some wild horse management options.

Alternative C-The most travel restrictions in the largest acreage would have the most positive impact on forage availability. These same restrictions could result in the greatest restrictions on options to manage wild horses.

Table 4.7. Acreage by Wild Horse Management Unit andAlternative Affected by GRSG Management

Wild Horse Management Unit	Total Acres (All Surface ownership) *ADH (PPH, PGH, and Linkage Areas)*	Acres of PPH (Alternative B) *PPH only*	Acres of ADH (Alternatives A and C) *ADH (PPH, PGH, and Linkage Areas)*	Acres of Sagebrush within PPH (Alternative D)
Sand Wash Basin HMA	158,200 (153,130)[2]	93,500 (91,100)	158,200 (153,100)	73,600 (71,500)
Outside Sand Wash Basin Common Use Area	210,301 (172,200)	76,779 (56,748)	210,301 (172,200)	62,107 (46,300)
Piceance East Douglas HMA	33,700 (16,400)	8,500 (3,200)	33,700 (16,400)	2,600 (1,200)
Outside Piceance East Douglas HMA	24,900 (18,800)	10,400 (6,900)	25,900 (18,800)	5,500 (4,400)
North Piceance Herd Area	21,900 (14,000)	0	21,900 (14,000)	0
West Douglas Herd Area	8,400 (7,500)	0	8,400 (7,500)	0
Outside West Douglas Herd Area Common Use Area	1,900 (40)	0	1,900 (40)	0
Bookcliffs HMA	0	0	0	0
Bookcliffs outside HMA Common Use Area	0	0	0	0
Total Area Affected	**459,400 (382,000)**	**189,200 (158,900)**	**459,400 (382,900)**	**143,800 (123,400)**

[2]Numbers in parentheses denote acres administered by the BLM. Numbers not in parenthesis denote total of both acres administered by the BLM and acres not administered by the BLM.

Alternative D-Moderate restrictions on sagebrush habitat in PPH would offer limited protection from forage loss compared with Alternatives B and C. However the management of the anthropogenic disturbance cap would minimize this loss, and contain it at manageable level. Moderate restrictions on travel may result in limited management options for wild horses.

Water Availability

Reductions in disruptive activity associated with off highway travel and travel management would benefit wild horse access to water. Restrictions on travel designed to protect GRSG habitat would affect the ability to develop water sources and perform maintenance on water developments.

Alternative A-Fewest restrictions on off highway travel would result in the most disruption to wild horses and their ability to obtain water, forage and cover.

Alternative B-Increased restrictions on travel in PPH would reduce potential disruption to a limited degree. These restrictions may or may not restrict development and maintenance of water developments.

Alternative C-The most highly restrictive travel management on the largest acreage would have the most positive impact on wild horses by reducing disruption. This alternative could also result in the highest impacts on the development and maintenance of water developments.

Alternative D-Moderate travel restrictions on sagebrush habitat in PPH would potentially reduce disruptive activity. Moderate restrictions could restrict development and maintenance of water developments.

Cover and Space Availability

Restrictions on off highway travel could prohibit some types of authorizations (e.g., construction of fences) that might become obstacles to wild horse ability to seek appropriate habitat.

Alternative A-Fewest restrictions on off highway travel would result in the most disruption to wild horses and their ability to seek appropriate habitat.

Alternative B-Increased restrictions on off highway travel in PPH may reduce disruption to a limited degree. These restrictions could result in disruptions to wild horses and their ability to seek appropriate habitat.

Alternative C-Most restrictions on the largest acreage would have the most positive impact on wild horses and their ability to seek appropriate habitat.

Alternative D-Moderate restrictions on off highway travel in sagebrush habitat within PPH would potentially reduce disruptive activity. Moderate restrictions could result in disruptions to wild horses and their ability to seek appropriate habitat.

Ability to Manage Wild Horses within Established Herd Management Areas

Impacts would be similar to the impacts discussed under *Water Availability*. Restrictions on off-highway travel could preclude the construction of fencing necessary to confine wild horses to HMAs.

Reliable ability to prevent overpopulation within HMAs and restrict horse distribution to HMAs through gather operations or fertility control, conducted on schedule and at the planned number horses removed or gathered-establishment of priority for gather operations in GRSG habitat would put areas outside GRSG habitat at risk for overpopulations. The Little Bookcliffs Wild Horse Range contains no habitat while the North Piceance and West Douglas Herd Areas contain little habitat. These areas would be most at risk within the planning area.

Impacts from Recreation Management on Wild Horse Management

Restrictions on recreation which are designed to protect GRSG habitat would also protect wild horse habitat. Examples of recreation permits that could become obstacles; hunting guide permits or competitive event permits. With the current restrictions in place there seems to be

little disturbance to wild horses from recreation. Future restrictions put on recreation could affect the ability of the public, to observe and study wild horses in their natural habitat as many of the public consider the ability to observe wild horses their recreation, with the exception of foot and horseback travel.

Forage Availability

Restrictions on recreation designed to protect GRSG habitat would also protect wild horse habitat by reducing disturbances which could reduce forage availability. Restrictions on surface disturbance would maintain forage availability, and retain the ability to support the appropriate management level.

Alternative A-fewest restrictions on surface disturbance would result in the least protection to wild horse ranges.

Alternative B-Increased restrictions on PPH would benefit wild horse forage availability. Limited restrictions on PGH would also be beneficial.

Alternative C-Most restrictions to the largest acreage would have the most positive impact on forage availability. These same restrictions would have the greatest restrictions on individuals to observe wild horses.

Alternative D-Moderate restrictions on sagebrush habitat in PPH would offer limited protection from forage loss compared with Alternatives B and C. However management of the anthropogenic disturbance cap would minimize any forage loss due to recreation.

Water Availability

Reductions in disruptive activity associated with recreation and recreation development would benefit wild horse access to water. Some recreational activities restrict or eliminate some water sources from wild horse use for short periods of time.

Alternative A-Fewest restrictions on recreation would likely result in the most disruption to the ability of wild horses to obtain water.

Alternative B-Increased restrictions on recreation development in PPH would reduce potential disruption to a limited degree.

Alternative C-Most restrictions on the largest acreage would have the most positive impact on wild horse by reducing disruption.

Alternative D-Moderate restrictions on sagebrush habitat in PPH would potentially reduce disruptive activity.

Cover and Space Availability

Restrictions on recreational permits would preclude authorizations that might become obstacles to wild horse's ability to find cover and enough space to continue normal behavior.

Alternative A-Fewest restrictions on recreation would result in the most disruption to wild horses and the ability to seek cover and may restrict the availability of required space.

Alternative B-Increased restrictions on recreation in PPH may reduce potential disruption to a limited degree. These restrictions may or may not result in disruptions to wild horses and the ability to seek cover and may restrict the availability of required space.

Alternative C-Most restrictions on the largest acreage would have the most positive impact on wild horse ability to seek cover and provide the space for a natural free roaming behavior within the HMAs.

Alternative D-Moderate restrictions on sagebrush habitat in PPH would potentially reduce disruptive activity. Moderate restrictions may or may not restrict development of water projects and maintenance on water developments.

Ability to Manage Wild Horses within Established Herd Management Areas

Protections afforded to GRSG under the varying alternatives would be expected to benefit wild horses whose HMAs overlap with PPH or PGH.

Reliable Ability to Prevent Overpopulation within HMAs and Restrict Horse Distribution to HMAs through Gather Operations or Fertility Control, Conducted on Schedule and at the Planned Number Horses Removed or Gathered

Establishment of priority for gather operations in GRSG habitat would put HMAs that do not contain PPH (Spring Creek and Little Bookcliffs) at risk for overpopulations.

Impacts from Lands and Realty Management on Wild Horse Management

Protections afforded to GRSG under the varying alternatives would be expected to benefit wild horses whose HMAs overlap with PPH or PGH. Restrictions on lands and realty designed to protect GRSG habitat would also protect wild horse habitat, but could reduce some management options that would benefit wild horses. Areas with high potential for lands and realty development would be most affected both adversely and beneficially.

Forage Availability

Restrictions on lands and realty designed to protect GRSG habitat would also protect wild horse habitat by reducing disturbance which removes forage from the habitat. Restrictions on surface disturbance would maintain forage availability, would help support the appropriate management level.

Alternative A-fewest restrictions on surface disturbance would result in the least protection to wild horse ranges.

Alternative B-Increased restrictions on PPH would increase forage availability. Limited restrictions on PGH would also be beneficial.

Alternative C-Most restrictions the largest acreage would result in the most forage availability.

Alternative D-Moderate restrictions on sagebrush habitat in PPH would offer the limited protection from forage loss compared with Alternatives B and C. - Restrictions on lands and reality development designed to protect GRSG habitat would also protect wild horse habitat by reducing disturbances which could reduce forage availability.

Water Availability

Reductions in disruptive activity associated with lands and realty would benefit wild horse access to water.

Alternative A-Fewest restrictions on lands and realty would result in the most disruption to wild horses and their ability to obtain appropriate habitat.

Alternative B-Increased restrictions on lands and realty development in PPH would reduce potential disruption to a limited degree.

Alternative C-Most restrictions on the largest acreage would have the greatest positive impact on wild horse by reducing disruption.

Alternative D-Moderate restrictions on sagebrush habitat in PPH would result in the least reduction in disruptive activity.

Cover and Space Availability

Restrictions on lands and realty designed to protect GRSG habitat would also protect wild horse habitat. Disturbances would be reduced allowing wild horses the ability to seek natural habitat.

Alternative A-Fewest restrictions on Lands and Realty would result in the most disruption to wild horses may impact their ability to find appropriate habitat.

Alternative B-Increased restrictions on Lands and Realty in PPH may reduce potential disruption. These restrictions may or may not improve the horse's ability to find appropriate habitat.

Alternative C-Most restrictions on the largest acreage would have the most positive impact on the horse's ability to seek appropriate habitat.

Alternative D-Moderate restrictions on sagebrush habitat in PPH would potentially reduce disruptive activity. Moderate restrictions may or may not restrict development of water projects and maintenance on water developments.

Ability to Manage Wild Horses within Established Herd Management Areas

Protections afforded to GRSG under the varying alternatives would be expected to benefit wild horses whose HMAs overlap with PPH or PGH.

Reliable Ability to Prevent Overpopulation within HMAs and Restrict Horse Distribution to HMAs through Gather Operations or Fertility Control, Conducted on Schedule and at the Planned Number Horses Removed or Gathered

Occasionally high levels of lands and realty activities conflicts with BLM wild horse operations. This activity can affect options such as access to preferred trap site locations. While this situation could vary somewhat by alternative the conflict only occurs in localized situations. More restrictive alternatives would theoretically reduce this potential conflict, but the conflict would most like arise from existing operations associated with valid existing rights.

Impacts from Wind Energy Development on Wild Horse Management

Restrictions on wind energy development designed to protect GRSG habitat would also protect wild horse habitat. Protections afforded to GRSG under the varying alternatives would be expected to benefit wild horses whose HMAs overlap with PPH or PGH.

Forage Availability

Restrictions on Wind Energy Development designed to protect GRSG habitat would also protect wild horse habitat because of reductions in anthropogenic disturbance which removes forage from the habitat. Restrictions on surface disturbance will maintain forage availability, and retain the ability to support the appropriate management level. This loss would be short term in any one location, but could be cumulative in some areas.

Alternative A-fewest restrictions on surface disturbance would result in the least protection to wild horse ranges. Wind energy development operations are not currently affecting enough acreage to substantially alter forage availability. The potential exists for wind energy development to become a larger factor in the future.

Alternative B-Without a proposed action the result is the same as no-action.

Alternative C-Most restrictions on disturbance would have the most positive impact on wild horse forage availability.

Alternative D-Without a proposed action the result is the same as no-action.

Water Availability

Restrictions on Wind Energy Development designed to protect GRSG habitat may affect the ability to develop water. However reductions in disruptive activity associated with wind energy development would benefit wild horse access to water, and would improve distribution. In most cases wild horses tend to acclimate to this type of disturbance, this disruptive reduction would be short term.

Alternative A-Fewest restrictions on surface disturbance would result in the most disruption to wild horses.

Alternative B-Without a proposed action the result is the same as no-action.

Alternative C-Most restrictions on the ADH would have the most positive impact on wild horses by reducing disruption.

Alternative D-Without a proposed action the result is the same as no-action.

Cover and Space Availability

Disruptive activates associated with Wind Energy Development may affect the horse's ability to seek appropriate habitat.

Ability to Manage Wild Horses within Established Herd Management Areas

The disruptive activity associated with wind energy development within HMAs may result in movement of horses away from home range within the HMAs. Once horses move they sometimes relocate outside HMAs. There would be a decrease in the avoidance behavior of wild horses to human presence, vehicles, structures, and other project components as wind energy is developed.

Reliable Ability to Prevent Overpopulation within HMAs and Restrict Horse Distribution to HMAs through Gather Operations or Fertility Control, Conducted on Schedule and at the Planned Number Horses Removed or Gathered

Occasionally high levels of wind energy activities have the potential for conflicts with BLM implementation of population control activities.

Impacts from Industrial Solar Development on Wild Horse Management

Impacts from management of industrial solar are expected to be the same as the impacts described in the impacts from management of wind energy development on wild horse management.

Impacts from Range Management on Wild Horse Management

Restrictions on range management designed to protect GRSG habitat would also protect wild horse habitat, while reducing some management options designed to benefit wild horses. Areas with high need for livestock grazing developments could be adversely affected by restrictions. These restrictions would be affected both adversely and beneficially. Projects that restrict free movement of horses (fences) are adverse and projects that enhance forage and water availability production are beneficial.

Forage Availability

Restrictions on livestock grazing designed to protect GRSG habitat would also protect wild horse habitat because of reductions in anthropogenic disturbance which removes forage from the habitat. Restrictions on surface disturbance will maintain forage availability and retain the ability to support the appropriate management level.

Alternative A-Fewest restrictions on surface disturbance would result in the least protection to wild horse ranges.

Alternative B-Limited restrictions on disturbance would have limited protection of forage availability.

Alternative C-More restrictions on disturbance would have a more positive impact on wild horse forage availability.

Alternative D-Most restrictions on disturbance would have the most positive impact on wild horse forage availability.

Water Availability

Restrictions on Range designed to protect GRSG habitat may affect the ability to develop water. However reductions in disruptive activity associated with livestock grazing would benefit wild horse access to water.

Alternative A-Fewest restrictions on surface disturbance would result in the least protection to wild horse ranges.

Alternative B-Limited restrictions on disturbance would have limited protection of water availability.

Alternative C-More restrictions on disturbance would have a more positive impact on wild horse water availability.

Alternative D-Most restrictions on disturbance would have the most positive impact on wild horse water availability.

Cover and Space Availability

Disruptive activities associated with range management may affect the horses' ability to seek appropriate habitat. Restrictions on livestock grazing activities could preclude installation of barriers that restrict wild horse access to HMA acreage.

Ability to Manage Wild Horses within Established Herd Management Areas

The disruptive activity associated with livestock grazing sometimes results in movement of horses away from home range within the HMAs. Horses may relocate outside HMAs.

Reliable Ability to Prevent Overpopulation within HMAs and Restrict Horse Distribution to HMAs through Gather Operations or Fertility Control, Conducted on Schedule and at the Planned Number of Horses Removed or Gathered

More restrictive alternatives would theoretically reduce this potential conflict, but the conflict would most likely arise from existing operations associated with valid existing rights.

Impacts from Fluid Minerals Management on Wild Horse Management

Restrictions on Fluid Minerals designed to protect GRSG habitat would also protect wild horse habitat, while reducing some management options designed to benefit wild horses. Areas with high potential for fluid mineral development would be most affected both adversely and beneficially.

Forage Availability

Restrictions on Fluid Minerals designed to protect GRSG habitat would also protect wild horse habitat because of reductions in anthropogenic disturbance which removes forage from the habitat. Restrictions on surface disturbance will help maintain forage availability, and retain the ability to support the appropriate management level.

Alternative A-fewest restrictions on surface disturbance would result in the least protection to wild horse ranges. Fluid Mineral operation is not currently affecting enough acreage to substantially alter the appropriate management level. The potential exists for energy development to become a larger factor in the future especially in the Piceance East Douglas HMA. The acreage affected would be the same as Alternative C, but the restrictions on that acreage are much less.

Alternative B-Increased restrictions on PPH would benefit wild horse forage available. Limited restrictions on PGH would also be beneficial.

Alternative C-Most restrictions on the largest acreage would have the most positive impact on wild horse forage availability.

Alternative D-Moderate restrictions on sagebrush habitat in PPH would offer the limited protection from forage loss compared with Alternatives B and C. However the management of the anthropogenic disturbance cap would minimize this loss, and contain it at manageable level.

Water Availability

Restrictions on Fluid Minerals designed to protect GRSG habitat would not affect the ability to develop water. However reductions in disruptive activity associated with energy development would benefit wild horse access to water and would improve distribution.

Alternative A-Fewest restrictions on surface disturbance would result in the most disruption to wild horses.

Alternative B-Increased restrictions in PPH would reduce potential disruption to a limited degree.

Alternative C-Most restrictions on the largest acreage would have the most positive impact on wild horse reducing disruption.

Alternative D-Moderate restrictions on sagebrush habitat in PPH would potentially reduce disruptive activity.

Cover and Space Availability

Disruptive activities associated with fluid minerals development could affect wild horses from seeking appropriate habitat. Restrictions placed on Fluid Minerals Development would protect needed cover and space. Under all of the action alternatives, many activities considered disruptive to wild horses would be restricted, and therefore the disruption to wild horses would be reduced under those alternatives.

Ability to Manage Wild Horses within Established Herd Management Areas

The disruptive activity associated with Fluid Minerals sometimes results in movement of horses away from their home ranges. Horses may relocate outside HMAs.

Reliable Ability to Prevent Overpopulation within HMAs and Restrict Horse Distribution to HMAs through Gather Operations or Fertility Control, Conducted on Schedule and at the Planned Number Horses Removed or Gathered

Occasionally high levels of Fluid Mineral activities conflicts with BLM gather operations. This activity can affect options such as access to preferred trap site locations. More restrictive alternatives would theoretically reduce this potential conflict.

Impacts from Solid Minerals–Coal Management on Wild Horse Management

Restrictions on Solid Minerals-Coal designed to protect GRSG habitat would also protect wild horse habitat. Areas with high potential for Solid Minerals-Coal development would be most affected both adversely and beneficially.

Forage Availability

Restrictions on Solid Minerals-Coal designed to protect GRSG habitat would also protect wild horse habitat because of reductions in anthropogenic disturbance which removes forage from the

habitat. Restrictions on surface disturbance will maintain forage availability, and retain the ability to support the appropriate management level.

Alternative A-fewest restrictions on surface disturbance would result in the least protection to wild horse ranges. Solid Minerals-Coal operation is not currently affecting enough acreage to substantially alter the appropriate management level.

Alternative B-Increased restrictions on PPH would benefit wild horse forage available. Limited restrictions on PGH would also be beneficial.

Alternative C-Most restrictions the largest acreage would have the most positive impact on wild horse forage availability.

Alternative D-Moderate restrictions on sagebrush habitat in PPH would offer the limited protection from forage loss compared with Alternatives B and C. However the management of the anthropogenic disturbance cap would minimize this loss, and contain it at manageable level.

Water Availability

Restrictions on Solid Minerals-Coal designed to protect GRSG habitat would not affect the ability to develop water. However reductions in disruptive activity associated with Solid Minerals (Coal) development would benefit wild horse access to water, and would improve distribution.

Alternative A-Fewest restrictions on surface disturbance would result in the most disruption to wild horses.

Alternative B-Increased restrictions in PPH would reduce potential disruption to a limited degree.

Alternative C-Most restrictions on the largest acreage would have the most positive impact on wild horse reducing disruption.

Alternative D-Moderate restrictions on sagebrush habitat in PPH would potentially reduce disruptive activity.

Cover and Space Availability

Disruptive activities associated with Solid Minerals-Coal minerals development would affect Cover and Space in the same manner described for Water Availability. Restrictions on fluid mineral activities could preclude installation of barriers that restrict wild horse access to HMA acreage.

Ability to Manage Wild Horses within Established Herd Management Areas

The disruptive activity associated with Solid Minerals (Coal) sometimes results in movement of horses away from their home ranges. Once horses move they sometimes relocate outside HMAs.

Reliable Ability to Prevent Overpopulation within HMAs and Restrict Horse Distribution to HMAs through Gather Operations Or Fertility Control, Conducted on Schedule and at the Planned Number Horses Removed or Gathered

Occasionally high levels of coal mining activities conflict with BLM gather operations. This activity can affect options such as access to preferred trap site locations. More restrictive alternatives would theoretically reduce this potential conflict.

Impacts from Locatable Minerals Management on Wild Horse Management

Restrictions on Locatable Minerals designed to protect GRSG habitat would also protect wild horse habitat. All impacts from Locatable Minerals are expected to be the same as the impacts described under Impacts from Management of Solid Minerals (Coal) on Wild Horse Management.

Impacts from Nonenergy Leasable Materials Management on Wild Horse Management

Restrictions on Nonenergy Leasable Materials designed to protect GRSG habitat would also protect wild horse habitat. All impacts from Management of Nonenergy Leasable Minerals are expected to be the same as the impacts described under Impacts from Management of Solid Minerals (Coal) on Wild Horse Management.

Impacts from Salable Minerals Management on Wild Horse Management

Restrictions on Salable Materials designed to protect GRSG habitat would also protect wild horse habitat. All impacts from Management of Salable Minerals are expected to be the same as the impacts described under Impacts from Management of Solid Minerals (Coal) on Wild Horse Management.

Impacts from Fuels Management on Wild Horse Management

Restrictions on Fuels Management designed to protect GRSG habitat would in most cases protect wild horse habitat. Reseeding projects that plan on limiting grazing by livestock and wild horses for specific time frames could reduce available lands within HMAs. Closures within HMAs would remove forage, may restrict available waters, prevent natural movement and restrict migration routes, and prevent wild horses from seeking cover. Planned fires have the potential to displace wild horses outside of the HMAs.

Forage Availability

Restrictions on Fuels Management designed to protect GRSG habitat would also protect wild horse habitat. Areas of prescribed burns may temporarily reduce available forage. Actions that increase shrubs or Pinyon/Juniper are adverse; actions that increase grasses and forbs are beneficial.

Alternative A-fewest restrictions on surface disturbance would result in the least protection to wild horse ranges.

Alternative B-Increased restrictions on PPH would benefit wild horse forage available. Limited restrictions on PGH would also be beneficial.

Alternative C-Most restrictions the largest acreage would have the most positive impact on wild horse forage availability.

Alternative D-Moderate restrictions on sagebrush habitat in PPH would offer the limited protection from forage loss compared with Alternatives B and C.

Water Availability

Some restrictions on Fuels Management projects designed to protect or increase GRSG habitat may restrict available waters for wild horses. Restricting access to treated and reseeded areas from livestock and wild horse use may eliminate critical available waters from use.

Alternative A-Fewest restrictions on surface disturbance would result in the most disruption to wild horses.

Alternative B-Increased restrictions in PPH would reduce potential disruption to a limited degree.

Alternative C-Most restrictions on the largest acreage would have the most positive impact on wild horse reducing disruption.

Alternative D-Moderate restrictions on sagebrush habitat in PPH would potentially reduce disruptive activity.

Cover and Space Availability

Disruptive activities associated with Fuels Management such as prescribed burns and reseeding projects may prevent wild horses from seeking appropriate habitat.

Ability to Manage Wild Horses within Established Herd Management Areas

The disruptive activity associated with fuels management sometimes results in movement of horses away from home ranges. Horses may relocate outside of their HMA. This situation would occur by alternative in the same manner described under *Water Availability*.

Reliable Ability to Prevent Overpopulation within HMAs and Restrict Horse Distribution to HMAs through Gather Operations or Fertility Control, Conducted on Schedule and at the Planned Number Horses Removed or Gathered

Occasionally high levels of Fuels Management activities conflicts with BLM gather operations. This activity can affect options such as access to preferred trap site locations. While this situation could vary somewhat by alternative the conflict only occurs in localized situations. More restrictive alternatives would theoretically reduce this potential conflict.

Impacts from Fire Operations on Wild Horse Management

Managing Fire Operations to maintain and enhance large blocks of continuous sagebrush habitat would also protect habitat for wild horses.

Forage Availability

Priorities on Fire Operations designed to protect GRSG habitat would also protect wild horse habitat. Areas of prescribed burns may temporarily reduce available forage. Juniper encroachment is adverse; actions that increase grasses and forbs are beneficial.

Alternative A-fewest restrictions on surface disturbance and fire suppression priorities would result in the least protection to wild horse ranges.

Alternative B-Increased fire suppression on PPH would benefit wild horse forage habitat. Prioritizing general habitat that threatens PPH would also protect wild horse habitat.

Alternative C-Same as Alternative B.

Alternative D-Would allow the potential for same actions as Alternative A while allowing for consideration of other resource priorities.

Water Availability

Priorities on Fire Operations designed to protect or increase GRSG habitat may also protect access to available waters.

Alternative A-fewest restrictions on surface disturbance and fire suppression priorities would result in the least protection to wild horse ranges.

Alternative B-Increased fire suppression on PPH may benefit wild horse water availability. Prioritizing general habitat that threatens PPH may also protect wild horse water availability.

Alternative C-Same as Alternative B.

Alternative D-Would allow the potential for same actions as Alternative A while allowing for consideration of other resource priorities.

Cover and Space Availability

Prioritizing Fire Operation suppression for GRSG habitat has the potential of sacrificing important cover for wild horses if that cover is outside of GRSG habitat. Also if large areas within HMAs are allowed to burn because they are not priority suppression areas may leave wild horses without the space needed for normal behavior within HMAs. Alternative D would allow resources to prioritize suppression.

Ability to Manage Wild Horses within Established Herd Management Areas

Any fire or fire suppression activity has the potential to displace wild horses outside of HMAs.

Reliable Ability to Prevent Overpopulation within HMAs and Restrict Horse Distribution to HMAs through Gather Operations or Fertility Control, Conducted on Schedule and at the Planned Number Horses Removed or Gathered

Any fire or fire suppression activity within HMAs may lead to emergency gathers of wild horses.

Impacts from Emergency Stabilization and Response on Wild Horse Management

ESR operations designed to restore GRSG habitat post-wildfire would also restore wild horse habitat.

Forage Availability

ESR operations designed to restore GRSG habitat post-fire would also restore wild horse habitat.

Alternative A-Without ESR plans to stabilize and rehabilitate habitat post-wildfire would have the longest and most negative impact on wild horse available forage.

Alternative B-ESR operation plans to restore GRSG habitat would also restore habitat for wild horses.

Alternative C-Same as Alternative B.

Alternative D-Would allow the potential for same actions as Alternative A while allowing for consideration of other resource priorities.

Water Availability

ESR plans to restore areas of habitat for GRSG and excluding grazing by fencing out livestock may fence wild horses out of critical available waters.

Alternative A-fewest restrictions on area closures would have the least restrictions on wild horses access to water.

Alternative B-Closures of areas to all grazing after fire events may require the gather and removal of wild horse from areas for an undermined amount of time before releasing of wild horses back into the closed area.

Alternative C-Same as Alternative B.

Alternative D-Same as Alternative B.

Cover and Space Availability

The closure of areas for grazing after fire events by fencing may reduce availability of appropriate habitat.

Ability to Manage Wild Horses within Established Herd Management Areas

Required removal of all grazing animals from areas may require the partial or total removal of wild horses from the HMA.

Reliable Ability to Prevent Overpopulation within HMAs and Restrict Horse Distribution to HMAs through Gather Operations or Fertility Control, Conducted on Schedule and at the Planned Number Horses Removed or Gathered

Disturbance activities associated with ESR activities has the potential to interfere with gather or fertility control operations, if those ESR activities were to take place at the same time as planned gather or fertility control operation.

Impacts from Habitat Restoration on Wild Horse Management

The impacts of Habitat Restoration are expected to be the same as the impacts described above under Impacts from ESR on Wild Horse Management.

4.14.4. Summary of Impacts on Wild Horse Management

Alternative A provides the most opportunity for development and land uses. It puts very few restrictions on development, which could result in the most development and human activity on the landscape and, consequently, the most impacts on wild horses. Alternative A would provide the most flexibility in managing wild horses.

Alternative B provides a greater level of protection for wild horses than Alternative A but less protection than Alternative C. Alternative B would also prioritize wild horse gathers in PPH, which could negatively impact herd areas and HMAs that are not within habitat and could hamstring flexibility in managing wild horses.

Alternative C would place the most restrictions on development, recreation, and travel and transportation. It would benefit horses the most due to an expected decrease in human activity and therefore a decrease in disruptions to wild horses.

Alternative D would be more beneficial for wild horses than Alternative A but less beneficial than Alternatives B and C. More flexibility for development is built into Alternative D, which could result in higher levels of development and associated disruption of horses than Alternatives B and C.

4.15. Special Designations

4.15.1. Areas of Critical Environmental Concern

General Description

This analysis identifies impacts of proposed management decisions for other resources and resource uses to prevent irreparable damage to the values associated with each ACEC. It also discusses the impacts on existing ACECs from proposed management actions that would designate a new Sage-Grouse Habitat ACEC within PPH.

The analysis of impacts on ACECs is necessarily an analysis of impacts on the relevant and important values that are given special management attention through the designation of ACECs. A complete evaluation of impacts on these values is incorporated into the appropriate impact analysis sections addressing Fish and Wildlife (**Section 4.3**), Special Status Species (**Section 4.4**), Vegetation Management (**Section 4.6**), Soil and Water Resources (**Section 4.16**), Visual Resources (**Section 4.19**), Cultural Resources (**Section 4.22**), and Paleontological Resources (**Section 4.23**). Rather than reiterating those discussions here, the impacts analysis for ACECs focuses on how proposed management decisions would interact with the management decisions in place for ACECs. Focusing on how proposed management decisions interact with existing management decisions is appropriate and necessary since, in order to be designated as an ACEC, "an area must require special management attention to protect the important and relevant values" (BLM 1988).

The degree to which a proposed management decision would affect a particular ACEC depends largely on the extent of the area that would be subject to those decisions. Since ACECs have been designated for a variety of reasons, there are some that are completely within PPH and others that have minimal overlap. **Table 3.62**, ACECs within GRSG Habitat on BLM-Administered Lands, identifies the extent of overlap with GRSG habitat types for each ACEC in the GRSG habitat decision area.

Methodology and Assumptions

General Impacts on ACECs

Indicators of impacts on ACECs and the measurements used to describe the impacts (where available or appropriate) are described below:

- Degradation of relevant and important values included in ACEC designations
  - Plant communities-Important biologically diverse plant communities; listed, candidate, and proposed plant species; BLM/USFS sensitive plant species; remnant vegetation associations; riparian habitats; rare plants
  - Wildlife-Bald eagle roosts; critical habitat for Colorado pikeminnow; Colorado River cutthroat trout habitat; peregrine falcon nests
  - Cultural resources
  - Paleontological resources
  - Soil resources-Fragile soils, erosive soils
  - Scenic values
  - Natural processes
- Threat of irreparable harm to the relevant and important values

Indicators of beneficial impacts on ACECs are reduced risk of degradation and irreparable harm to relevant and important values, as described above.

Assumptions

The analysis is based on the following assumptions:

- The relevant and important values for which an ACEC was designated are not necessarily uniformly distributed across the entire ACEC.
- Management actions designed to protect GRSG habitat by reducing surface disturbance and human activity would benefit those relevant and important values that also occur within sagebrush communities.
- Not all relevant and important values within an ACEC have the same level of protection due to variation in specific management decisions. This is the case both within an individual LUP and among different LUPs. Management actions designed to protect GRSG habitat by reducing surface disturbance and human activity may result in impacts on relevant and important values that occur outside of sagebrush communities if 1) activity shifts to locations outside of sagebrush communities, and 2) those values that occur outside of sagebrush communities either do not have specific management decisions or protections identified in existing LUPs or those decisions allow for some level of impact on those values.
- The designation of an ACEC does not prevent appropriate land uses so long as they are not detrimental to the relevant and important values.
- Proposed management decisions would not replace existing decisions that are more restrictive.

Designation of all PPH as the Sage-Grouse Habitat ACEC would not replace existing ACEC designations; GRSG habitat would be added to existing ACECs as another reason for designation and special management attention.

Direct and Indirect Impacts on ACECs/Zoological Areas

Impacts from Travel Management on ACECs/Zoological Areas

Degradation of and Irreparable Harm to Relevant and Important Values of the ACECs

Many of the relevant and important values within ACECs are sensitive to increased human visitation to an area (e.g., wildlife habitat and cultural resources), noxious weeds (e.g., wildlife and special status plant habitats), and fugitive dust (e.g., special status plant habitats). The extent of negative impacts depends on the location of the road networks, the level and season of use, and the road surface type.

Alternative A-The ACECs that are currently managed with designated routes year-round are Blacks Gulch, Deer Gulch, Raven Ridge, South Cathedral Bluffs, and Yanks Gulch/Upper Greasewood Creek. The assumption is that proposed management decisions would not replace existing decisions that are more restrictive and that ACECs that are currently closed to motorized vehicles would remain closed (e.g., Bull Gulch and Moosehead Mountain).

Alternative B-Alternatives B, C, and D would limit motorized travel to existing roads within PPH; this would not change management direction for those ACECs that are currently managed with designated routes year-round, but it would increase protection for those ACECs that currently lack such restrictions (e.g., approximately 800 acres of PPH in East Douglas Creek) by decreasing impacts associated with off-road travel. New route construction would also be limited under Alternatives B, C, and D, but to different degrees. Alternative B would limit route construction to realignments of existing designated routes within PPH. This would increase protection for approximately 5,000 acres within the 6 ACECs that contain PPH and would allow motorized vehicles (see **Table 3.62**, ACECs within GRSG Habitat on BLM-Administered Lands).

Alternative C-This would limit new route construction within ADH, which would apply to approximately 24,300 acres within the 15 ACECs that allow motorized vehicles (**Table 3.62**, ACECs within GRSG Habitat on BLM-Administered Lands). Restrictions on upgrading existing routes and limiting route construction within GRSG habitat would be beneficial for those relevant and important values that occur within GRSG habitat. However, it is possible that restrictions on road development in GRSG habitat may result in routing roads through non-sagebrush habitat. The following ACECs have substantial acreage of non-sagebrush vegetation types in GRSG habitat; they are most likely to be affected by routing roads through non-sagebrush habitat: Trapper/Northwater Creek, East Fork Parachute Creek, Yanks Gulch/Upper Greasewood Creek, and Deer Gulch. This could increase impacts, such as habitat loss, increased spread of noxious weeds, and fugitive dust, on relevant and important values that do not occur exclusively in sagebrush vegetation types (e.g., special status plant species and remnant vegetation associations).

Alternative D-Impacts from Alternative D are similar to Alternative B in that Alternative D limits new route construction within PPH. However, it is less restrictive than Alternative B because it would allow for up to 5 percent of a Colorado MZ to be impacted by surface disturbance (compared to only 3 percent in Alternative B).

Impacts from Recreation Management on ACECs/Zoological Areas

Degradation of and Irreparable Harm to Relevant and Important Values of the ACECs

Many of the relevant and important values within ACECs are sensitive to increased human visitation to an area (e.g., wildlife habitat and cultural resources) and noxious weeds (e.g., wildlife and special status plant habitats). The extent of negative impacts depends on the type of recreation (motorized versus nonmotorized), the location of use, the season of use, and the number of participants.

Alternative A-Issuing SRPs within ACECs is currently considered on a case-by-case basis under Alternative A, which is the least restrictive of all the alternatives.

Alternative B-This would allow SRPs in PPH only if they have neutral or beneficial impacts on PPH areas. This could restrict the number of SRPs that are issued within the seven ACECs that contain PPH and could reduce impacts associated with human visitation.

Alternative C-This would manage SRPs the same as Alternative B. In addition, camping and nonmotorized recreation would be seasonally prohibited within 4 miles of active GRSG leks, which could push recreationists to use other sites. The extent of any impact associated with displacing recreationists from preferred sites depends on the level of use by recreationists, whether they relocate to another campsite within the ACEC, and the time of year they want to camp. In offices where ACECs are not the focus of recreation or where fall big game hunting is the primary recreation (e.g., the WRFO), there would be no impacts.

Alternative D-This is similar to Alternative B but would allow SRPs, so long as they would not adversely affect GRSG populations due to habitat loss or disruptive activities. More SRPs would likely be issued in PPH under Alternative D than Alternative B, which could result in increased impacts associated with human visitation.

Impacts from Lands and Realty Management on ACECs/Zoological Areas

ROW grants may be issued for either commercial or residential users and can include such linear features as roads, pipelines, and power lines, as well as non-linear facilities, such as gas plants, communication sites, and well pads. Wind energy and solar facilities are also types of ROW grants.

Degradation of and Irreparable Harm to Relevant and Important Values of the ACECs

Many of the relevant and important values within ACECs are sensitive to increased human visitation (e.g., wildlife habitat and cultural resources). Initial installation of ROWs typically involves surface disturbance, which can increase erosion, spread noxious weeds, and generate fugitive dust. These can negatively impact such values as wildlife and special status plant habitats. The extent of impacts associated with each ROW varies widely, depending on such factors as the amount of initial surface disturbance associated with a site, the length of time required for construction, the amount of activity required for routine operations, maintenance requirements, and proximity to other infrastructure.

Alternative A-Some of the ACECs are currently managed as ROW exclusion areas-Blacks Gulch, Bull Gulch, Irish Canyon, Moosehead Mountain, South Cathedral Bluffs, and Raven Ridge. The assumption is that these management decisions would remain in place regardless of which decisions were adopted under this planning effort. Other ACECs are currently managed as ROW avoidance areas-Blue Hill, Deer Gulch, East Douglas Creek, White River Riparian, and Yanks Gulch/Upper Greasewood Creek. The assumption is that the most protective management

decision would be applied. The Kremmling Cretaceous Ammonite, North Park Natural Area, Anvil Points, and East Fork of Parachute Creek ACECs currently do not have specific decisions restricting placement of ROWs.

Alternative B-Approximately 800 acres (2 percent) of the East Douglas Creek ACEC, which is currently managed as an avoidance area, would receive increased protection if PHs were managed as ROW exclusion areas. Since the Kremmling Cretaceous Ammonite and North Park Natural Area ACECs are entirely within PPH, these ACECs would receive a substantial increase in protection as they would be managed as exclusion areas.

Alternative C-Alternative C would manage ADH as ROW exclusion areas, which would provide increased protection for approximately 16,700 acres within the 10 ACECs that are currently not managed as exclusion areas. The Deer Gulch and Yanks Gulch/Upper Greasewood Creek ACECs would receive the greatest increase in protection under Alternative C. This is because over 90 percent of both of these ACECs is mapped as ADH. However, since exclusion areas are "not available for location of ROWs under any conditions" and avoidance areas are "areas to be avoided but may be available for location of ROWs with special stipulations" (*BLM Land Use Planning Handbook* H-1601-1), there may be increased pressure to approve ROWs for linear features, such as pipelines and power lines, within portions of ACECs that fall outside of GRSG habitat and that are currently managed as avoidance areas (e.g., East Douglas Creek and White River Riparian). Locating ROWs in these areas to avoid GRSG habitat could impact habitat for bald eagles and Colorado River cutthroat trout.

The proposed management decision to prohibit industrial solar projects in ACECs would be consistent with the October 2012 ROD for the Solar PEIS which amended all of the LUPs in the planning area to state that all lands would be excluded from utility-scale solar development (20-megawatts or greater).

Proposed decisions that would prohibit siting wind energy developments within occupied habitat or within 5 miles of active GRSG leks would provide increased protection of resources that occur within these areas. It would accomplish this by limiting both direct and indirect habitat loss and human activity. Most of the ACECs are currently managed as ROW exclusion or avoidance areas, and these management decisions would have no impact on management of those resources. However, this decision would provide increased protection for the Kremmling Cretaceous Ammonite, North Park Natural Area, Anvil Points, and East Fork of Parachute Creek ACECs. This is because these areas currently do not have specific decisions restricting placement of ROWs and occur either wholly or partially within ADH.

Alternative D-Alternative D would manage PPH as avoidance areas. The Kremmling Cretaceous Ammonite and North Park Natural Area ACECs currently do not have specific decisions restricting placement of ROWs. Both of these ACECs are wholly within GRSG PPH and would receive increased protection from proposed management decisions under Alternative D to manage PPH as avoidance areas; however, this protection would be less than Alternative B's proposal to manage these same areas as exclusion areas.

Land Tenure Adjustments May Transfer Important Resources Outside of Federal Management

The ACECs and their relevant and important values receive additional protection under federal management compared to the protections on private land afforded by law. Through the land use planning process, the BLM/USFS may place restrictions on travel management, mineral

development, and placement of ROWs. During a site-specific NEPA review of a proposal, additional mitigation may also be required to further minimize impacts.

Alternative A-In the GJFO, KFO, and LSFO, parcels to be included in land exchanges are evaluated on a case-by-case basis. Within the CRVFO, lands atop the Roan Plateau (i.e., Trapper/Northwater Creek ACEC and East Fork Parachute Creek ACEC) would be retained. In the WRFO, all ACECs are identified as Category III lands to be retained in federal ownership.

Alternative B-Alternatives B, C, and D would retain PPH in federal ownership. This may provide additional protection to those seven ACECs that contain PPH, although in practice, it is highly unlikely that ACECs would be proposed for disposal after review of site-specific proposals.

Alternative C-This is the same as Alternative B.

Alternative D-This is similar to Alternatives B and C, but it would allow for the disposal of isolated federal parcels that are not capable of altering GRSG populations. This management is less restrictive than Alternatives B and C; however, in practice it is highly unlikely that portions of an ACEC would be proposed for disposal after review of site-specific proposals. Relevant and important values would be prioritized for protection and retention, regardless of whether they overlap with GRSG habitat.

Proposed Land Withdrawals would Limit Future Actions that Could Occur on a Site. The Extent of Limitations Varies with each Withdrawal

Mineral withdrawals and other withdrawals that would restrict all future development and surface disturbance would benefit ACECs and their relevant and important values by reducing disturbance and associated impacts (e.g., human activity, erosion, weeds, and dust). Withdrawals that would preclude one type of disturbance (e.g., construction of facilities) in favor of another type of disturbance or land use (e.g., military training range) could negatively impact ACECs. The extent of such impacts would depend on such factors as the type and scope of disturbance and the frequency of use of the site.

Alternative A-The Colorado River Valley, Grand Junction, Kremmling, and Little Snake RMPs have no similar action. There are some existing withdrawals and reserves within the WRFO that limit the availability of lands for entry.

Alternative B-Both Alternatives B and C would propose lands within PPH for mineral withdrawal. This would eliminate another source of surface disturbance and resultant impacts (e.g., increased erosion, spread of noxious weeds, and habitat loss) within ACECs that contain PPH (i.e., Bull Gulch, Kremmling Cretaceous Ammonite, North Park Natural Area, Moosehead Mountain, East Douglas Creek, and South Cathedral Bluffs). There would be no change in management for the Irish Canyon ACEC since it is already proposed for mineral withdrawal. Alternative B would consider only other nonmineral withdrawals in PPH if they were consistent with GRSG conservation. This would provide increased protection for those relevant and important values that occur within sagebrush communities in the seven ACECs with PPH.

Alternative C-Alternative C is similar to Alternative B, except that nonmineral withdrawal proposals in ADH would be considered only if they were consistent with GRSG conservation. This would provide increased protection for those relevant and important values that occur in sagebrush communities within the 16 ACECs that have GRSG habitat.

Alternative D-Alternative D does not provide any direction for proposed land withdrawals.

Impacts from Range Management on ACECs/Zoological Areas

Degradation of and Irreparable Harm to Relevant and Important Values of the ACECs

Many of the relevant and important values within ACECs, including cultural resources, special status plants, and wildlife habitat, can be negatively impacted by livestock concentration areas, trailing, and trampling. The extent of negative impacts depends on the location of any areas of concentrated use (e.g., water developments and locations of mineral supplements), the season of use, the duration of use, the stocking rate, and the class of livestock.

Alternative A-GRSG are currently a BLM/USFS sensitive species, and the influence of grazing operations on BLM Colorado Public Land Health Standard #4 are considered during site-specific NEPA reviews of grazing permits. For this reason, most of the proposed management decisions in Alternatives B, C, and D would have negligible influence on current management of ACECs . Specifically, these decisions are to consider specific GRSG habitat requirements when evaluating livestock grazing operations, to manage livestock use of riparian areas and wet meadows in the context of GRSG habitat, and to evaluate treatments to increase forage for livestock and wild ungulates in consideration of GRSG.

Alternative B (Livestock Grazing)-Alternative B would retire grazing privileges within ADH if the current permittee is willing to retire all or part of an allotment. The impacts associated with a retired grazing privilege are the same as in Alternative C, which would exclude livestock grazing. However, due to the voluntary nature of the management proposed in Alternative B, the assumption is that a considerably smaller area of ADH would be removed from livestock grazing; thus, the scale of the change in management is substantially different between the two alternatives.

Alternative B (Range Improvements)-Designing structural range improvements and the location of supplements to "conserve, enhance, or restore GRSG habitat" would have negligible influence on the management of ACECs . Alternative B would authorize only new water developments from seeps or springs in PPH if they would benefit GRSG. If there were inadequate distribution of livestock within an allotment or pasture due to the constraints of available water or topography, focusing solely on what may benefit GRSG could impact implementation of allotment management plans. It could also indirectly influence important values managed for in ACECs, such as special status plant species, other wildlife habitat, and remnant vegetation associations.

Alternative C (Livestock Grazing)-Alternative C would exclude livestock grazing from ADH. This would be a substantial change in management of those ACECs where most of the acreage is classified as GRSG habitat-East Fork Parachute Creek, Trapper/Northwater Creek, a portion of the Kremmling Cretaceous Ammonite, North Park Natural Area, Yanks Gulch/Upper Greasewood Creek, Moosehead Mountain, and Deer Gulch. Eliminating livestock grazing would remove impacts on cultural resources, special status plants, and wildlife habitat associated with livestock concentration areas, trailing, and trampling.

Alternative C (Range Improvements)-Avoiding all structural range developments, including fences and exclosures, within ADH could negatively impact management of ACECs . Fences and exclosures can be long-term cost-effective means of minimizing impacts from livestock grazing on important values within an ACEC. As such, other alternatives provide more flexibility for a site-specific analysis of all resources. For example, there is currently an exclosure within the Trapper/Northwater Creek ACEC that is used to manage livestock trailing damage to habitat for Colorado River cutthroat trout. Other possible reasons to use fences or exclosures within ACECs may be to minimize damage to important cultural sites or to special status plant habitats. The

ACECs that would be influenced the greatest by this type of decision are those where ADH is most of the acreage within the ACEC (i.e., East Fork Parachute Creek, Trapper/Northwater Creek, Kremmling Cretaceous Ammonite, North Park Natural Area, Yanks Gulch/Upper Greasewood Creek, Moosehead Mountain, and Deer Gulch).

Alternative C would not permit the use of salt or supplements within occupied habitat or the creation of new water developments from spring or seep sources. Rather than abandon the use of mineral supplements or water developments, livestock operators would be forced to place these range improvements outside of ADH, which could result in a less efficient grazing management system. ACECs could be affected if they contain pastures that are both within and outside of GRSG habitat.

Alternative D (Livestock Grazing)-Alternative D is similar to Alternative B in that it relies on a permittee to voluntarily relinquish grazing preference. However, in contrast to Alternative B, which would retire those grazing privileges, Alternative D would consider converting them to reserve pastures (grass banks). This could help to meet resource objectives elsewhere and may benefit ACECs that require rest or deferment due to fire, reclamation, or habitat treatments. Alternative B would benefit only ACECs if those areas that were retired from livestock grazing were within the ACEC; however, Alternative D could provide benefit to numerous ACECs over the long term.

Alternative D (Range Improvements)-Alternative D would design range improvement projects to enhance livestock distribution and to control the timing and intensity of utilization; in contrast to Alternative B, there is no requirement to focus solely on what might benefit GRSG. This allows the BLM/USFS the flexibility to consider other important resources, such as those for which ACECs were designated. Mineral and salt supplements would be placed away from water sources and leks but could still be used within occupied GRSG habitat to enhance livestock distribution. Similarly, new water developments could be authorized if it has been determined that the project would not adversely impact GRSG from habitat loss.

Impacts from Wild Horse Management on ACECs/Zoological Areas

Wild horse management decisions would have minimal impact on those ACECs that overlap with herd areas or HMAs (i.e., South Cathedral Bluffs and White River Riparian) and would have no impact on those ACECs that are outside of those areas.

Impacts from Fluid Minerals Management (including split-estate) on ACECs/Zoological Areas

Degradation of and Irreparable Harm to Relevant and Important Values of the ACECs

Development of fluid minerals requires not only well pads, access roads, and pipelines but also associated field infrastructure, such as gas plants, compressor stations, and power lines. Once drilled and completed, wells are assumed to be in production for decades before being abandoned, which means that associated field infrastructure will also be in place for decades.

Many of the relevant and important values within ACECs are sensitive to increased human visitation to an area (e.g., wildlife habitat and cultural resources), noxious weeds and habitat loss (e.g., wildlife and special status plant habitats), and fugitive dust (e.g., special status plant habitats). Resources can also be directly impacted or destroyed during construction (e.g., cultural and paleontological resources). The extent of negative impacts depends on the location of surface disturbance, the amount of initial surface disturbance associated with a site, the length of time

required for construction, the amount of activity required for routine operations, maintenance requirements, and proximity to other infrastructure.

Alternative A (Unleased Fluid Minerals)-The Bull Gulch and Irish Canyon ACECs are closed to fluid mineral leasing. Most of the other ACECs are managed with NSO stipulations across the entire ACEC (East Fork Parachute Creek, Trapper/Northwater Creek, Kremmling Cretaceous Ammonite, North Park Natural Area, Blacks Gulch, Deer Gulch, Yanks Gulch/Upper Greasewood Creek, Moosehead Mountain, South Cathedral Bluffs, and Raven Ridge). The White River Riparian and East Douglas Creek ACECs are managed with CSU stipulations, although there may be specific resources within these areas that are managed with NSO stipulations, such as bald eagle roosts along the river. The Anvil Points ACEC is managed with a combination of NSO and CSU stipulations for specific resources. The Blue Hill ACEC is not managed with either NSO or CSU stipulations.

Alternative A (Leased Fluid Minerals)-Alternative A is the least restrictive in regard to placement of aboveground facilities for leased fluid minerals. Existing NSO stipulations provide protection from 0.25 to 0.6 mile around a lek. The Little Snake RMP would allow up to 5 percent disturbance, and the White River RMP would allow for up to 10 percent disturbance within 2 miles of a lek.

Alternative B (Unleased Fluid Minerals)-Alternative B would close PPH to fluid mineral leasing. This would provide more protection than existing NSO or CSU stipulations in Alternative A since there would be no opportunity for exceptions to the NSO stipulations. In practice, this would make the Kremmling Cretaceous Ammonite and North Park Natural Areas closed to leasing but would close only from 2 to 67 percent of the remaining ACECs that have PPH and are currently open for leasing (East Douglas Creek, 800 acres; South Cathedral Bluffs, 300 acres; and Moosehead Mountain, 6,200 acres).

Alternative B (Leased Fluid Minerals)-Most of the proposed management actions associated with leased fluid minerals, including seasonal restrictions, master development plans, unitization, and GRSG mitigation, would have negligible impact on management of ACECs. As discussed above, most PPH within ACECs is currently either closed to oil and gas operations or is managed with NSO stipulations, so management actions designed to cap surface disturbance within PPH (3 percent in Alternatives B and C and 5 percent in Alternative D) are also not expected to influence management of ACECs. The one exception would be the 800 acres (2 percent) of East Douglas Creek, which is PPH that is currently managed with a CSU stipulation.

Alternative C (Unleased Fluid Minerals)-Alternative C would close ADH to fluid mineral leasing, which would provide more protection to a larger area and also would eliminate the possibility of exceptions being granted to the NSO stipulations. There would be no difference between Alternatives B and C for Bull Gulch, Irish Canyon, Kremmling Cretaceous Ammonite, and North Park Natural Area ACECs, but Alternative C would provide more protection for approximately 25,500 acres within the other 12 ACECs. However, while from 4 to 95 percent of those 12 ACECs would be closed, those areas that are not within GRSG habitat would remain open to leasing and may experience increased development pressure.

Alternative C (Leased Fluid Minerals)-As discussed in Alternative B, caps on surface disturbance within PPH are not expected to substantially influence management of ACECs since most of these areas are already managed with NSO stipulations. However, limiting surface disturbance to 3 percent per section within ADH could reduce surface disturbance in those ACECs that are managed with CSU stipulations or no stipulations (i.e., Anvil Points, Blue Hill, White River Riparian, and East Douglas Creek). However, GRSG habitat represents only a portion of these

ACECs (from 3 to 14 percent) and, in order to remain within the 3 percent disturbance cap, it is possible that development will shift to other areas of the ACEC and result in impacts on other values that are managed either with no lease stipulations or CSU stipulations (e.g., rare plant habitat). A shift in development could be expected for any ACEC that is currently managed with no lease stipulations or CSU stipulations, regardless of whether it overlaps with Colorado MZs.

Alternative D (Unleased Fluid Minerals)-PPH areas would be managed with an NSO stipulation that provides for an exception if development would not adversely affect GRSG populations. Only the Kremmling Cretaceous Ammonite, North Park Natural Area, and Moosehead Mountain ACECs have most of their acreage mapped as PPH, but these areas are already managed with NSO stipulations under existing LUPs.

The expectation is that managing PPH with NSO stipulations would push oil and gas development into other areas of the ACECs. All of the ACECs that have more than 2 percent of their acreage identified as PPH are either currently closed to oil and gas operations (i.e., Irish Canyon and Bull Gulch) or are already managed with NSO stipulations (i.e., South Cathedral Bluffs, Moosehead Mountain, Kremmling Cretaceous Ammonite, and North Park Natural Area). Considering the extent of ACECs that are already managed with NSO stipulations, Alternative D provides only a minor increase in protection compared to Alternative A (applies to 800 acres of East Douglas Creek ACEC).

Alternative D (Leased Fluid Minerals)-Alternative D provides allowances for up to 5 percent surface disturbance within PPH, which is less restrictive than the 3 percent proposed in Alternatives B and C. This would affect only the East Douglas ACEC since the other ACECs that contain PPH are either closed to leasing or managed with NSO stipulations.

Impacts from Solid Minerals Management on ACECs/Zoological Areas

Degradation of and Irreparable Harm to relevant and important values of the ACECs

Development of solid minerals, including coal, locatable minerals, nonenergy leasable minerals, and salable mineral materials, results in increased human activity and surface disturbance at a site.

Many of the relevant and important values within ACECs are sensitive to increased human visitation to an area (e.g., wildlife habitat and cultural resources) and impacts associated with surface disturbance such as habitat loss, erosion, spread of noxious weeds, and fugitive dust. The extent of impacts associated with each type of solid mineral development depends on such factors as the amount of initial surface disturbance associated with a site, the length of time required for construction, the amount of activity required for routine operations, maintenance requirements, and proximity to other infrastructure.

Alternative A-There would be no change in management for the Bull Gulch and Irish Canyon ACECs since they are currently recommended for withdrawal from mineral location and are closed to nonenergy leasable minerals and mineral material sales.

Alternative B-Alternatives B and C would restrict both surface and subsurface coal mines within PPH. The only ACECs within the Colorado MZs that contain areas suitable for coal mining are the Raven Ridge and White River Riparian ACECs. Neither of these ACECs contains PPH, so management decisions that would prohibit or limit mining in PPH are irrelevant.

Proposed withdrawals from mineral entry within PPH (Alternatives B and C) and closing PPH to nonenergy leasable mineral leasing and mineral material sales (Alternatives B and

C) would provide increased protection from surface-disturbing activities within ACECs that contain substantial amounts of PPH (South Cathedral Bluffs, Moosehead Mountain, Kremmling Cretaceous Ammonite, and North Park Natural Area).

Alternative C-Impacts are the same as Alternative B.

Alternative D-Limiting surface disturbance in ADH associated with coal mining to less than 5 percent of any Colorado MZ could reduce surface disturbance within the White River Riparian ACEC. While most of the acreage identified in the Raven Ridge ACEC that is suitable for coal mining does not overlap GRSG habitat, the proposed cap on surface disturbance would not result in any shifts in mine plan locations. This is because the ACEC is currently managed with an NSO stipulation. (In accordance with the 1997 White River RMP, coal leases are subject to the same lease stipulations as oil and gas leases.)

Alternative D does not propose any withdrawals from mineral entry for locatable minerals. Rather than close PPH to nonenergy leasable mineral leasing and mineral material sales, as in Alternatives B and C, Alternative D would limit permitted disturbances to less than 5 percent in any Colorado MZ; this would provide increased protection from surface-disturbing activities within ACECs that contain substantial amounts of PPH, compared to Alternative A, but is less restrictive than Alternatives B and C.

Impacts from Fuels Management, Fire Operations, Emergency Stabilization and Response, and Habitat Restoration on ACECs/Zoological Areas

Reduced Risk of Degradation of and Irreparable Harm to Relevant and Important Values

The reality of limited resources (including budgets, personnel, equipment, and supplies) requires that the BLM/USFS prioritize which areas or resources to focus on when planning for fire and fuels management. Some of the relevant and important values within ACECs are sensitive to wildfire: cultural resources, special status plant habitat, and remnant vegetation associations. Irreparable harm could be done if wildfire destroyed irreplaceable resources, such as wickiup villages or remnant vegetation associations.

Alternative A-Impacts from Alternative A are negligible on management of ACECs from proposed fuels management and most fire operations decisions, with the exception of fuels suppression, native seed allocation, and livestock exclosures.

Alternative B-Alternative B would prioritize fire suppression in GRSG habitat and within PGH if wildfires threatened PPH. Prioritizing suppression across a minimum of 923,200 acres (federal surface only) affects decisions about where to position fire-fighting resources. ACECs are already recognized to contain important resources and could be negatively impacted if fire-fighting resources were diverted to suppress fires within PPH, regardless of what other values may be at risk elsewhere in the planning area. It is important to remember that not all of the ACECs within the planning area are listed in **Table 3.62**, ACECs within GRSG Habitat on BLM-Administered and National Forest System Lands, and this management action in particular is more likely to influence those ACECs that are farther removed from GRSG habitat.

Many of the ACECs contain important vegetation, such as federally listed plant species, BLM sensitive plant species, remnant vegetation associations, and rare plants; reclamation within these areas may be limited to using only local native species. Proposed management decisions could prioritize native seed allocation for use in GRSG habitat (1,744,100acres on federal surface) in

years when preferred native seed is in short supply. In this case, this may unintentionally hinder reclamation in plant habitats that have been identified as important values within ACECs but that do not occur within GRSG habitats.

Alternative C-Alternative C is similar to Alternative B, except that it would prioritize suppression only in PPH and not in PGH. Impacts from Alternative C are very similar to Alternative B because GRSG habitat would receive priority for suppression over other resources and for native seed allocation.

Excluding livestock from burned areas until woody and herbaceous plants achieve GRSG habitat objectives would benefit any burned areas within ACECs that are within GRSG habitat (32,900 acres). This is because this management approach would likely reduce erosion. Alternatives B and D do not provide any similar management guidance.

Alternative D-Alternative D acknowledges the BLM and USFS' multiple-use mandate and considers GRSG habitat requirements in conjunction with all other resource values. GRSG habitat would be given preference for fire suppression, but site-specific circumstances could warrant an exemption and allow the BLM/USFS to focus on protecting other important values. This would be the case should there be a time when managers must choose between protecting GRSG habitat and irreplaceable resources within ACECs. Alternative D is similar to Alternatives B and C in that it would require the use of native plant seeds within ADH. However, when native seed availability is low, Alternative D would allow for the use of other species so long as they meet GRSG habitat objectives. This would afford the BLM/USFS the ability to prioritize native seed for use in areas where other species would not meet resource objectives (e.g., habitat for listed plant species).

Impacts from Habitat Restoration on ACECs/Zoological Areas

Impacts would be negligible on management of ACECs from proposed habitat restoration decisions.

Impacts from Designation of All PPH as the Sage-Grouse Habitat ACEC on Other ACECs

Reduced Risk of Degradation of and Irreparable Harm to Relevant and Important Values

ACEC designations highlight areas where special management attention is needed to protect resources. The designation indicates to the public that the BLM recognizes that an area has important values and also serves as a reminder that these values must be considered when evaluating future proposals.

In order to be considered as a potential ACEC, an area must meet the relevance and importance criteria (43 CFR, Part 1610.7-2). The BLM evaluated PPH (Alternative C) and determined that it did meet the required criteria. PPH was considered to be relevant as a fish and wildlife resource because GRSG are a candidate species under the ESA, as well as a BLM sensitive species and a state species of special concern. PPH was considered to meet the importance criteria for the following reasons:

- The Colorado portion of PPH has special worth in that it is the southeastern-most edge of the range of GRSG
- PPH in Colorado is considered a fragile ecosystem that is vulnerable to adverse change and supports all life stages of GRSG, including lekking, brood-rearing, and winter range

- GRSG land use planning has been identified as a national priority

Alternative A-No new ACECs are proposed, and there would be no change in the reasons for designation of the existing ACECs.

Alternative B-Same as Alternative A.

Alternative C-Designation of all PPH as the Sage-Grouse Habitat ACEC would not replace existing ACEC designations; rather PPH would simply be added as another reason for designation within the Bull Gulch, Kremmling Cretaceous Ammonite, North Park Natural Area, Irish Canyon, Moosehead Mountain, East Douglas Creek, and South Cathedral Bluffs ACECs. Potential impacts on and changes to management of existing ACECs resulting from proposed management decisions within PPH have been discussed above. Approximately 1 percent (11,200 acres) of PPH on federal surface is within an existing ACEC.

The remaining 912,000 acres of PPH on federal surface would become the Sage-Grouse Habitat ACEC. Expansion of the area managed as an ACEC would increase protection for those resources that may exist both within and outside of existing ACECs. For example, surveys conducted after the designation of existing ACECs may have located new cultural sites, paleontological sites, and special status plant populations that occur outside of ACECs but are the same relevant and important values that are managed for within the ACECs. If these resources were to occur within PPH, they would receive increased protection by being included in the proposed Sage-Grouse Habitat ACEC.

Alternative D-Same as Alternative A.

Summary of Impacts on ACECs/Zoological Areas

Alternative A-Alternative A would recognize all of the existing ACEC designations, but no new ACECs are proposed. Alternative A puts very few restrictions on surface uses. This could result in the most modification of the landscape and consequently the most impacts on those ACECs with the following characteristics:

- Do not already have strict restrictions on travel management (e.g., East Douglas Creek)
- Are not managed as ROW exclusion areas (i.e., Anvil Points, Blue Hill, East Fork of Parachute Creek, Kremmling Cretaceous Ammonite, North Park Natural Area, White River Riparian, and East Douglas ACEC)
- Have NSO stipulations (i.e., Blue Hill, White River Riparian, and East Douglas Creek)

Alternative B-Alternative B would recognize all of the existing ACEC designations, but no new ACECs are proposed. Alternative B provides a greater level of protection for ACECs than Alternative A since additional restrictions would be in place to protect GRSG habitat. However, Alternative B would provide a lower level of protection than Alternative C. Both Alternatives B and C would prioritize management of GRSG. This could result in indirect negative impacts on the relevant and important values in the ACECs, especially for those values that do not occur within sagebrush communities.

New route construction would be limited within seven of the ACECs (8,300 acres). The Kremmling Cretaceous Ammonite, North Park Natural Area, and a portion of the East Douglas Creek ACEC would receive increased protection and would be managed as ROW exclusion areas.

Grazing permittees could voluntarily retire grazing privileges. This could provide benefits to ACECs if those areas were retired, but this benefit would not be localized.

Alternative B would authorize new water developments only from seeps or springs in PPH if they would benefit GRSG. This could negatively influence other important values outside of PPH if there were inadequate distribution of livestock due to the constraints of available water. Alternative B would close approximately 7,700 acres within five ACECs to fluid mineral leasing. PPH would be a priority for fire suppression, as well as any areas within PGH where a fire could threaten PPH. While this could benefit the ACECs that contain GRSG habitat, it could result in irreparable damage to other ACECs; this would be the case if fire-fighting resources were diverted to suppress fires within GRSG habitat regardless of other irreplaceable resources that may be at risk. Additionally, native seed allocation would be prioritized for use within GRSG habitats, which could limit the availability of seed to be used in special status plant habitats.

Alternative C-Alternative C would recognize all of the existing ACECs. Approximately 11,200 acres of PPH are within an existing ACEC: Bull Gulch, Kremmling Cretaceous Ammonite, North Park Natural Area, Irish Canyon, Moosehead Mountain, East Douglas Creek, or South Cathedral Bluffs. GRSG habitat would be added to the other reasons for designating those ACECs. The remaining 912,000 acres of PPH would become the Sage-Grouse Habitat ACEC. Alternative C would provide the most protection to the largest area; however, due to the focus on GRSG habitat without regard for other resources, Alternative C is also the most likely to cause resource conflicts and impacts on some relevant and important values within ACECs.

New route construction would be limited within 16 of the ACECs (32,900 acres) but it is possible that restrictions on road development in GRSG habitat would result in routing roads through non-sagebrush habitat, particularly within the Trapper/Northwater Creek, East Fork Parachute Creek, Yanks Gulch/Upper Greasewood Creek, and Deer Gulch ACECs.

Alternative C would provide increased protection for approximately 16,700 acres within 10 ACECs since these areas would be managed as ROW exclusion areas. However, this could result in more pressure to place ROWs within areas outside of GRSG habitat that are managed as avoidance areas (e.g., East Douglas and White River Riparian ACECs). Grazing would be excluded within the seven ACECs that contain PPH, which would be an increase in protection for those areas. Restrictions on range improvements, such as fences and the location of water developments and supplements, could negatively affect ACECs. They would do this by hampering the ability to construct exclosures to protect sensitive resources and also by reducing the effectiveness of grazing management systems.

Alternative C would close 25,500acres to fluid mineral leasing within 12 ACECs; however, those areas that are not within GRSG habitat would remain open for leasing and may experience increased development pressure. Alternative C is similar to Alternative B in regard to GRSG habitat receiving priority for fire suppression resources and native seed allocation.

Alternative D-Alternative D would recognize all of the existing ACEC designations, but no new ACECs are proposed. Alternative D would provide more protection for ACECs than Alternative A but would provide less protection than Alternatives B and C.

Alternative D acknowledges the BLM/USFS multiple-use mandate and considers GRSG habitat requirements in conjunction with all other resource values. Rather than a 3 percent cap on surface disturbance (which would include new route construction), Alternative D would allow up to 5 percent surface disturbance within a MZ. Both PPH and PGH would be managed as avoidance

areas. This would still provide an increase in protection compared to Alternative A for the Kremmling Cretaceous Ammonite, North Park Natural Area, Anvil Points, and East Fort of Parachute Creek ACECs.

Similar to Alternative B, Alternative D would allow grazing permittees to voluntarily retire grazing privileges; however, under Alternative D these areas could be used as grass banks, which could benefit numerous ACECs that require rest due to fire, reclamation, or habitat treatments. In contrast to Alternative C, Alternative D would allow range improvements to enhance livestock distribution and to manage utilization for the benefit of other resources, in addition to GRSG.

Rather than close areas to fluid mineral leasing, Alternative D would manage PPH with NSO stipulations. This is very similar to Alternative A, given the extent of ACECs that are currently managed with NSO stipulations. Similar to Alternatives B and C, Alternative D would prioritize fire suppression within GRSG habitat; however, it would also allow for exemptions, which would allow the BLM and USFS to focus on protecting other important resources in addition to GRSG habitat. Alternative D would also allow the use of other species in reclamation, so long as they met GRSG habitat objectives. This would afford the BLM and USFS the ability to prioritize use of native seeds in other areas when native seed is in short supply (e.g., habitat for listed plant species).

4.15.2. Wilderness Study Areas

Impacts on USFS Special Interest Areas, Research Natural Areas, and Inventoried Roadless Areas would be the same as those described in this section; there is no separate discussion for these areas.

General Description

The analyses contained in this section are designed to portray possible impacts that could result from the management actions described in **Chapter 2**. Analyses for ranching operations, water quality, and wildlife rely on data for areas larger than the wilderness and WSAs themselves. However, the data used for these analyses should not be considered precise forecasts, but rather what may occur. The professional judgment of specialists has been used to augment sparse data and to portray a realistic picture of what the future may hold.

Designated wilderness is managed in accordance with the Wilderness Act, which states that these areas shall be administered to “preserve wilderness character.” The Wilderness Act describes a variety of physical and social conditions that are desirable characteristics of wilderness. This includes characteristics such as being a natural area where the imprint of humans is substantially unnoticeable, being in a place where there are opportunities for solitude, and the ability to enjoy primitive and unconfined recreation.

For WSAs, FLPMA mandates that the BLM “not impair the suitability” of areas that have been identified as “having wilderness characteristics.” All surface-disturbing activities, regardless of the alternative or management action, would be subject to the management objectives of the area where the activity takes place. Any surface-disturbing activities would be on a case-by-case basis, and all proposals for uses and facilities within WSAs would be reviewed by the BLM to ascertain if the proposal would impair the suitability of the WSA for preservation as wilderness. All uses and facilities must meet the nonimpairment standard (i.e., must be both temporary and not create surface disturbance), unless the use or facility meets one of the seven classes of allowable exceptions to the nonimpairment standards (one of which is to recover a threatened, endangered or candidate species).

Methodology and Assumptions

General Impacts on Wilderness and WSAs

Indicators of impacts on wilderness and WSAs and the measurements used to describe the impacts (where available or appropriate) are described below:

- Grandfathered uses (pre-FLPMA), which include grazing, mining, and mineral leases (would not include other uses such as recreational activities)
- Construction of structures, such as livestock developments, oil and gas facilities, recreation sites, communication sites, and water storage facilities
- Construction of roads and trails
- Restoration of roads and trails
- Earthwork construction, such as roads, trails, ROW development, oil and gas development, mineral development, and reclamation/restoration
- Vegetation treatments or wildland fire, such as range improvements, habitat improvements, and fuel treatments
- Recreation where areas are used frequently for such activities as camping, hiking, and climbing
- Acquisition of inholdings within Wilderness and WSAs

Assumptions

The analysis includes the following assumptions:

- All WSAs will be managed in accordance with BLM Manual 6330, *Management of Wilderness Study Areas* (BLM 2012d) until Congress either designates or releases all or portions of the WSA from further consideration.
- Management of WSAs is subject to valid existing rights and grandfathered uses under all alternatives, as consistent with BLM Manual 6330 (BLM 2012d).
- Maintenance of existing facilities and construction of new facilities necessary to manage permitted AUMs would be conducted in accordance with BLM Manual 6330 (BLM 2012d).
- 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 (BLM 2012d)
    - Emergencies such as suppression activities associated with wildfire or search and rescue operations
    - Reclamation activities designed to minimize impacts on wilderness values created by Interim Management Policy violations and emergencies
    - Uses and facilities that are considered grandfathered or valid existing rights under the Interim Management Policy

  - 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
  - Reclamation of pre-FLPMA impacts

- All activities approved in WSAs would be closely managed to ensure that they would not impair the area's wilderness characteristics and thus its suitability for designation as wilderness. Preservation of wilderness characteristics within WSAs is paramount and should be the primary consideration when evaluating any proposed action or use.
- Only those authorized uses that would result in negligible impacts would be authorized. Allowable uses in WSAs are permitted if they meet the "nonimpairment" standard.
- WSAs, if released by Congress, would still contain wilderness characteristics, and BLM management could impact those characteristics.
- Wilderness and WSAs are managed as ROW exclusion areas and are closed to new oil and gas leasing.

Implementing management actions for the following resources would have negligible or no impact on WSAs and are therefore not discussed in detail: recreation, wind energy development, industrial solar development, and wild horse management.

Direct and Indirect Impacts on WSAs

Human activities are the primary agents of change that could impact the management goals for WSAs. Indicators of whether these management goals are being met include whether these areas remain in a natural condition, whether they are free of significant evidence of permanent human-caused changes, whether they have nonconforming uses, such as motorized vehicle use, and whether they offer opportunities for solitude and primitive recreation.

Recreation use and grazing use are the primary resource uses that affect WSA resources. Recreation management actions tend to limit impacts on WSAs to small disturbances, distributed across the landscape, such as identifying different Recreation Management Zones. Grazing use is managed to minimize changes to species composition or vegetative cover in these areas through allotment management.

As preferences for recreation change over time, recreation use of WSAs would change, and the rate or direction of that change is highly unpredictable. Some low to minute level of negative impacts would continue to accrue over time on soils, vegetation, and wildlife from high levels of use in popular areas. The management actions that would continue under all alternatives are not likely to cause cumulative impacts on WSAs.

Impacts from Travel Management on WSAs

<u>Grandfathered Uses, including Use of Existing Routes of Travel</u>

Motorized travel on primitive roads and trails, unless specifically prohibited, would still be allowed but limited to designated routes. Administrative motorized use would be permitted, along with motorized use associated with grandfathered uses and valid existing rights, such as permitted livestock grazing. Closing WSAs to public motorized and mechanized use would

protect the wilderness characteristic by restricting activities that could impact natural appearance and opportunities for solitude and primitive or unconfined recreation. There is the potential for degradation of wilderness characteristics from motorized and mechanized travel on designated routes. Such travel could impact natural appearance and opportunities for solitude and primitive or unconfined recreation.

Alternative A-Alternative A would have the most areas open to motorized travel; however, the proposed management decisions would not replace existing decisions that are more restrictive and that WSAs currently closed to motorized vehicles would remain closed, unless Congress released the WSAs from wilderness study.

Alternative B-Alternative B, along with Alternatives C and D, would limit motorized travel to existing roads and trails within PPH; this would not change management direction for those WSAs that are currently managed with designated routes year-round.

Alternative C-Alternative C has the same level of beneficial impacts as Alternatives B and D.

Alternative D-Alternative D has the same level of beneficial impacts as Alternatives B and C.

Construction of Roads and Trails

Surface-disturbing activities would be authorized depending on the degree and types of development, the date of the mineral right or activity, the date associated with the WSA designation, or valid existing rights. Pre-FLPMA developments may not have more physical or visual impact than they did when they were originally permitted.

Alternative A-Alternative A would have the most areas open to surface-disturbing activities; however, the proposed management decisions would not replace existing decisions that are more restrictive within WSAs, unless Congress released the WSAs from wilderness study.

Alternative B-Alternatives B, C, and D would limit new route construction within ADH. Restrictions on upgrading existing routes and limiting route construction within GRSG habitat would be beneficial for those relevant and important values that occur within GRSG habitat.

Alternative C-Alternative C has the same level of beneficial impacts as Alternatives B and D.

Alternative D-Alternative D has the same level of beneficial impacts as Alternatives B and C.

Restoration of Roads and Trails

Beneficial impacts on restoring roads and trails would be that all disturbances must be restored as soon as possible after they occur, and all restoration should be to a level as close as possible to, or better than, that which existed at the site before the disturbance.

Alternative A-Alternative A would put the lowest priority on restoration and so would have the lowest beneficial impact on WSAs. However, the proposed management decisions would not replace existing decisions that are more restrictive within WSAs, unless Congress released the WSAs from wilderness study.

Alternative B-Alternative B's impact is the same as the other alternatives.

Alternative C-Alternative C's impact is the same as the other alternatives.

Alternative D-Alternative D's impact is the same as the other alternatives.

Impacts from Lands and Realty Management on WSAs

Rights-of-Way

Construction of Structures. Existing ROWs in WSAs may be renewed if they are still being used for their authorized purpose. However new, additional, or modified terms and conditions to minimize impacts on wilderness characteristics would be considered. Surface-disturbing activities and construction would be authorized to the extent that they meet the nonimpairment standard. The reason for the use or facility would have to be for a defined period to respond to a temporary need and would be terminated and removed before or on designation of the area as Wilderness.

Alternative A-WSAs are managed as ROW exclusion areas, so these management decisions would remain in place regardless of which decisions were adopted under this planning effort, unless Congress released the WSAs from wilderness study.

Alternative B-Alternative B's impact is the same as the other alternatives.

Alternative C-Alternative C's impact is the same as the other alternatives.

Alternative D-Alternative D would manage all PPH as avoidance areas. Because WSAs are managed as exclusion areas and are "not available for location of new ROWs under any conditions," the proposed management decisions would not replace existing decisions that are more restrictive within WSAs and that would provide increased protection for GRSG habitat.

Construction of Roads and Trails. Surface-disturbing activities and construction of structures would be authorized only to the extent that they meet the nonimpairment standard. ROWs could be authorized for seasonal access only or limited to 1 or 2 years, and they would have to be terminated if the area is designated as a wilderness.

Alternative A-Alternative A would have the most areas available for ROWs and so would have the greatest impact on lands bordering WSAs. However, WSAs are managed as ROW exclusion areas, these management decisions would remain in place, regardless of which decisions were adopted under this planning effort unless Congress released the WSAs from wilderness study.

Alternative B-Alternative B's impact is the same as the other alternatives.

Alternative C-Alternative C's impact is the same as the other alternatives.

Alternative D-Alternative D would manage PPH as avoidance areas. However, since WSAs are ROW exclusion areas, the proposed management decisions would not replace existing decisions that are more restrictive and, therefore, provide increased protection for GRSG habitat.

Land Tenure Adjustment

Acquisition of Inholdings in Wilderness Areas and WSAs. Retaining lands in public ownership would be encouraged. Land exchanges involving public and nonfederal lands that would benefit wilderness values or improve wilderness management would be considered if lands were within the same WSA or in two or more WSAs. Acquisition of nonfederal inholdings, consistent with LUP decisions, should be considered as an alternative to a potential access authorization.

Alternative A-Alternative A encourages retaining public ownership of public lands. It also encourages the acquisition of state and private lands and conservation easements more so than the other alternatives; therefore, it would have the greatest benefit on WSAs.

Alternative B-Alternative B has the same benefits as Alternative A. However, under Alternative B, prioritization of acquisitions in PPH, regardless of whether that PPH overlapped a WSA could impact future acquisitions of inholdings in WSAs.

Alternative C-Alternative C has the same benefits as Alternative A. However, under Alternative C, prioritization of acquisitions in ADH, regardless of whether that ADH overlapped a WSA could impact future acquisitions of inholdings in WSAs.

Alternative D-Alternative D has fewer benefits than the other alternatives. Under Alternative D, the BLM/USFS would consider GRSG habitat values when evaluating land acquisitions in ADH, but would not prioritize acquisitions in PPH or ADH. Acquisitions in WSAs would be more likely to occur under Alternative D.

Impacts from Range Management on WSAs

Earthwork and Vegetation Disturbance

Impacts associated with livestock management associated with WSAs would include surface-disturbing activities and structure construction. These activities would be authorized only if they meet the nonimpairment standard or one of the exceptions, such as protecting or enhancing wilderness characteristics, or if Congress were to release the area from wilderness study.

Alternative A-Under Alternative A, earthwork and vegetation disturbance are more likely to occur near a WSA, because there are fewer restrictions under Alternative A on such activities than under Alternatives B, C, and D.

Alternative B-Under Alternative B, impacts from earthwork and vegetation disturbance would be less than those for Alternative A. Under Alternative B, structural range improvements and location of supplements (salt or protein blocks) would be placed in PPH to conserve, enhance, or restore GRSG habitat through an improved grazing management system relative to GRSG objectives. Important WSA values would benefit from this restriction.

Alternative C-Alternative C would exclude livestock grazing from ADH and would be a substantial change in management of the WSAs. Eliminating livestock grazing would remove impacts on cultural resources, special status plants, and wildlife habitat associated with livestock concentration areas, trailing, and trampling. Beneficial impacts to WSAs would be the greatest under Alternative C.

Also under Alternative C, avoidance of all structural range developments, including fences and exclosures, within ADH could negatively impact management of WSAs. Fences and exclosures can be long-term cost-effective means of minimizing impacts from livestock grazing on important values. Without fences in place, livestock could damage important WSA values.

Alternative C would not permit the use of salt or supplements within occupied habitat or the creation of new water developments from spring or seep sources. Rather than abandon the use of mineral supplements or water developments, livestock operators would be forced to place these range improvements outside of ADH, which could result in a less efficient grazing management

system. WSAs could be affected if they were to contain pastures that are both within and outside of GRSG habitat.

Alternative D-Alternative D would require design of range improvement projects to enhance livestock distribution and to control the timing and intensity of utilization. In contrast to Alternative B, there is no requirement to focus solely on what might benefit GRSG. Alternative D allows the BLM and USFS the flexibility to consider other important resources, such as those for which WSAs were designated. Mineral and salt supplements would be placed away from water sources and leks but could still be used within occupied GRSG habitat to enhance livestock distribution. Similarly, new water developments could be authorized if the project would not adversely impact GRSG from habitat loss and if the project were to meet the nonimpairment standard.

Impacts from Fluid Minerals Management on WSAs

Construction of Structures

The degree and types of development allowed depend on the date of the mineral right or activity and the date associated with the WSA designation and if there is legal access to an existing lease. Surface-disturbing activities and construction of structures would be authorized only if they were to meet the nonimpairment criteria.

Alternatives A, B, C, and D-WSAs are managed as closed to oil and gas operations, and these management decisions would remain in place regardless of which decisions were adopted under this planning effort unless Congress released the WSAs from wilderness study. WSAs are closed to fluid mineral leasing, so there would not be potential for construction of structures associated with extracting fluid mineral resources. Therefore, there would be no difference in impacts between the alternatives.

Construction of Roads and Trails

Surface-disturbing activities authorizations would depend on the degree and types of development, the date of the mineral right or activity, the date associated with the WSA designation, or valid existing rights. Pre-FLPMA developments may not have more physical or visual impact than they did when they were originally permitted. If there is no legal access to a pre-FLPMA lease, the lease may not be developable. Surface-disturbing activities and construction of roads and trails would be authorized only if they were to meet the nonimpairment criteria.

Alternatives A, B, C, and D-WSAs would continue to be managed as closed to oil and gas operations, so these management decisions would remain in place regardless of which decisions were adopted under this planning effort unless Congress released the WSAs from wilderness study. WSAs are closed to fluid mineral leasing, so there would not be potential for construction of roads and trails associated with extracting fluid mineral resources. Therefore, there would be no difference in impacts between the alternatives.

Earthwork Construction

Surface-disturbing activities and earthwork construction and vegetation disturbance would be authorized only if the use or facility would not create new surface disturbance; that is, there would be no new disruption of the rock, soil, or vegetation, including vegetative trampling, that would necessitate reclamation, rehabilitation, or restoration in order for the site to appear and function as

it did before the disturbance. Surface-disturbing activities and structure construction would be authorized only if they were to meet the nonimpairment criteria.

Alternatives A, B, C, and D-WSAs would continue to be managed as closed to oil and gas operations, so these management decisions would remain in place regardless of which decisions were adopted under this planning effort, unless Congress released the WSAs from wilderness study. WSAs are closed to fluid mineral leasing, so there would not be potential for earthwork construction associated with extracting fluid mineral resources. Therefore, there would be no difference in impacts between the alternatives.

Vegetation Disturbance

Surface-disturbing activities and vegetation disturbance would be authorized only if the use or facility would not create new surface disturbance; that is, in cases where there would be no new disruption of the rock, soil, or vegetation, including vegetative trampling, that would necessitate reclamation, rehabilitation, or restoration in order for the site to appear and function as it did before the disturbance. Surface-disturbing activities and structure construction would be authorized only if they were to meet the nonimpairment criteria.

Alternatives A, B, C, and D-WSAs would continue to be managed as closed to oil and gas operations, so these management decisions would remain in place regardless of which decisions were adopted under this planning effort, unless Congress released the WSAs from wilderness study. WSAs are closed to fluid mineral leasing, so there would not be potential for vegetation disturbance associated with extracting fluid mineral resources. Therefore, there would be no difference in impacts between the alternatives.

Impacts from Solid Minerals, Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on WSAs

Impacts from management actions associated with these resource uses are the same as the impacts described under the impacts from fluid minerals management on WSAs.

Impacts from Fuels Management on WSAs

Vegetation Disturbance

Surface-disturbing activities and vegetation disturbance would be authorized only if the fuel treatment makes conditions possible for natural wildfire regimes to return to the WSA or to protect site-specific resources, and meets the nonimpairment standard or one of the exceptions.

Wildland fire can cause great contrast to the natural landscape, removing large swaths of vegetation and leaving behind visible scars. However, these impacts (when stemming from a natural fire regime) are generally short term; over the long term, fires allow for the regrowth of native or appropriate adapted vegetation and improved ecological health. This could benefit natural successional processes that have been disrupted by past human activity.

Alternative A-Impacts under Alternative A are negligible to management of WSAs from proposed fuels management and most fire operation decisions, with the exception of fuels suppression, native seed allocation, and livestock exclosures. Whenever possible, natural processes (e.g., fire, insect outbreaks, and droughts) would be relied on to maintain native vegetation and to influence natural fluctuations in populations. However, exceptions that may pertain to vegetative treatment would be actions taken to recover a federally listed threatened, endangered, or candidate species.

Alternative B-Alternative B would prioritize fire suppression in GRSG habitats and within PGH if wildfires were to threaten PPH. Prioritizing suppression affects decisions about where to position fire-fighting resources in advance of a fire. WSAs are already recognized to contain important resources and could be negatively impacted if fire-fighting resources were diverted to suppress fires within PPH, regardless of what other values may be at risk.

Alternative C-Alternative C is similar to Alternative B, except that it would prioritize suppression only in PPH and not in PGH. Impacts from Alternative C are very similar to Alternative B because GRSG habitat would receive priority for suppression over other resources and for native seed allocation. Excluding livestock from burned areas until woody and herbaceous plants achieve GRSG habitat objectives would benefit any burned areas within WSAs that are within GRSG habitat. This is because this management approach would likely reduce erosion. Alternatives B and D do not provide any similar management guidance.

Alternative D-Alternative D acknowledges the BLM and USFS multiple-use mandate and considers GRSG habitat requirements in conjunction with all other resource values. GRSG habitat would be given preference for fire suppression, but site-specific circumstances could warrant an exception. This would be to allow the BLM and USFS to focus on protecting other important values should there ever arise a time when managers must choose between protecting GRSG habitat and irreplaceable resources within WSAs. Alternative D is similar to Alternatives B and C in that it would require the use of native plant seeds within ADH. However, when native seed availability is low, Alternative D would allow for the use of other species, so long as they were to meet GRSG habitat objectives. Manipulation within WSAs would occur only when restoration by natural forces is no longer attainable and only to restore or maintain vegetative communities to the closest approximation of the natural range of conditions. All activities must meet the nonimpairment standard.

Impacts from Fire Operations Management on WSAs

Impacts from fire operations management on Wilderness and WSAs are the same as for fuels management.

Impacts from Emergency Stabilization and Rehabilitation on WSAs

Impacts from ESR on WSAs are the same as for fuels management (see *Impacts from Fuels Management on WSAs*).

Impacts from Habitat Restoration on WSAs

Impacts from habitat restoration on WSAs are the same as for fuels management (see *Impacts from Fuels Management on WSAs*). The BLM's goal is to immediately restore the impact caused by any unauthorized action to at least the condition that existed before the impact or that which existed in October 1976, the designation date for Section 202 WSAs not reported to Congress.

Summary of Impacts on WSAs

Alternative A-Alternative A puts very few restrictions on surface uses, which could result in the most indirect impacts on WSAs due to the most modification of the landscape. However, the proposed management decisions would not replace existing decisions that are more restrictive, and the nonimpairment standards for WSAs would be strictly adhered unless Congress released the WSAs from wilderness study.

Alternative B-Alternative B would put more restrictions on development than Alternative A, which would have an overall beneficial effect on WSAs.

Alternative C-Alternative C puts the most restrictions on development. This alternative would have the most beneficial impacts on WSAs.

Alternative D-Alternative D would put more restrictions on development than Alternative A but fewer than Alternatives B and C. This alternative would have a beneficial effect on WSAs, but it would be less of a beneficial effect than Alternatives B and C.

4.15.3. Wild and Scenic Rivers

General Description

This section discusses the impacts on wild and scenic rivers from proposed management actions of other resources and resource uses. Existing conditions concerning wild and scenic rivers are described in **Section 3.14**, Special Designations.

The potential impact on each stream segment depends on the outstandingly remarkable values identified for the segment and the tentative classification of the segment. Segments classified as recreational would allow for the greatest level of development in the study corridor, while segments classified as wild must remain relatively undeveloped; segments classified as scenic fall in between. Management actions that prohibit surface-disturbing activities in the wild and scenic river study corridor would provide some amount of protection for the tentative classification and a number of outstandingly remarkable values, including cultural, vegetation, fish, scenic, wildlife, and geological. Restrictions on surface-disturbing activities may have the indirect benefit of additional protection for the wild and scenic river study corridor.

Methodology and Assumptions

General Impacts on Wild and Scenic Rivers

Indicators of impacts on wild and scenic rivers and the measurements used to describe the impacts (where available or appropriate) are described below:

- Any change to the outstandingly remarkable values, tentative classification (i.e., wild, scenic, or recreational), or free-flowing nature of the river segment or corridor area from its current state
- Restoration of surface disturbance
- Construction of roads and trails
- Earthwork construction and vegetation disturbance
- Preclusion of surface disturbance

The preliminary classification and identified outstandingly remarkable values for each segment are summarized in **Chapter 3**.

Documentation of the process used to determine suitability and eligibility can be found in the draft or final wild and scenic river suitability/eligibility reports within the LUPs for each respective field office. The analysis examined a 0.25-mile study corridor (or modified suitable boundary) on BLM-administered and National Forest System land to analyze impacts.

Assumptions

The analysis was based on the following assumptions:

- All eligible and suitable stream segments under consideration for wild and scenic river designation will be managed under interim protective measures required by the Wild and Scenic Rivers Act and BLM Manual 6400, *Wild and Scenic Rivers – Policy and Program Direction for Identification, Evaluation, Planning, and Management* (BLM 2012). This procedure and the interim protective measures would ensure that the values for which these river segments were found eligible or suitable are not compromised until Congress makes a decision regarding wild and scenic river designation.

- The BLM/USFS would not permit any actions that would adversely affect the free-flowing nature, outstandingly remarkable values, or tentative classification of any eligible or suitable segments. As such, implementing management actions in this EIS would not adversely impact these segments; adverse impacts will not be discussed for any of the alternatives.

Based on BLM and USFS specialist input, implementing management actions for the following resources would have negligible or no impact on wild and scenic rivers and are therefore not discussed in detail: wind energy development, industrial solar development, range management, wild horse management, fluid minerals, solid minerals, locatable minerals, salable minerals, nonenergy leasable minerals, ESR, and habitat restoration.

Direct and Indirect Impacts on Wild and Scenic Rivers

Impacts from Travel Management on Wild and Scenic Rivers

Any Change to the Outstandingly Remarkable Values, Tentative Classification (i.e., Wild, Scenic, or Recreational), or Free-flowing Nature of the River Segment or Corridor Area from its Current State

Limiting cross-country travel would limit soil sedimentation and erosion into the river segments, increasing water quality for related outstandingly remarkable values. In addition, this would minimize scarring from new route creation in the river corridor. New route creation could negatively impact all outstandingly remarkable values if the creation was unauthorized. Outstandingly remarkable values that would be most affected include recreational, wildlife, scenic, and fish.

Alternative A-Alternative A would have the most areas open to motorized travel, which would have the most impacts on wild and scenic rivers.

Alternative B-Alternative B would limit motorized travel to existing roads and trails within PPH and would require the use of existing roads or realignments for access to valid existing rights in PPH, which would benefit wild and scenic river segment outstandingly remarkable values within PPH.

Alternative C-Alternative C would limit motorized travel to existing roads and trails within PPH and would limit route construction in ADH. No upgrading of routes would be allowed in ADH. Alternative C would have the greatest benefit on wild and scenic river segment outstandingly remarkable values.

Alternative D-Alternative D would allow upgrades to existing routes in PPH if those upgrades were shown to not have adverse impacts on GRSG habitats. Alternative D would also apply a 5-percent disturbance cap to new road construction in each Colorado MZ. Route construction would also be limited in PPH until travel management plans have been completed. Alternative D would have greater benefits on wild and scenic river segment outstandingly remarkable values than Alternative A, but would have fewer benefits than Alternatives B and C.

Restoration of Surface Disturbance

Beneficial impacts on restoring roads and trails include limiting soil sedimentation and erosion in the river segments and increasing water quality for related outstandingly remarkable values. In addition, this would minimize scarring and allow regrowth, which would benefit other outstandingly remarkable values. Outstandingly remarkable values that would be most affected are recreational, wildlife, scenic, fish, botanical, and biodiversity.

Alternative A-Alternative A would put the lowest priority on restoration and so would have the lowest beneficial impact on wild and scenic rivers.

Alternative B-Alternative B would put a lower priority on restoration than Alternative C but would put a higher priority on restoration than Alternative D.

Alternative C-Alternative C would put the highest priority on restoration and would have the highest beneficial impact.

Alternative D-Alternative D would put a higher priority on restoration of roads and trails than Alternative A but would put a lower priority on restoration than Alternatives B and C.

Impacts from Recreation Management on Wild and Scenic Rivers

Any Change to the Outstandingly Remarkable Values, Tentative Classification (i.e., Wild, Scenic, or Recreational), or Free-flowing Nature of the River Segment or Corridor Area from its Current State

SRPs that are in or near PPH that are not neutral or beneficial to GRSG may be terminated or changed under Alternative B. Recreational outstandingly remarkable values associated with eligible or suitable wild and scenic rivers stream segments include float boating, trout fishing, and scenic driving. Any commercial competitive event or organized group permit or authorization that relates to this outstandingly remarkable value enhances recreational opportunities for the public. If these were cancelled, this would impact more than 50 outfitters, organized groups, and competitive event organizers. The largest impact would be along the Colorado River, North Platte River, Yampa River, and Blue River.

Alternative A-Alternative A would have the least impact, with no change in current management.

Alternative B-Alternatives B and C would have the greatest impact from terminating the most permits and authorizations, which would impact the level of use on wild and scenic rivers.

Alternative C-Alternatives C and B would have the greatest impact from terminating the most permits and authorizations, which would impact the recreational outstandingly remarkable value.

Alternative D-Alternative D is not as restrictive as Alternatives B and C, but it has a greater impact than Alternative A. Alternative D still has the likelihood to impact significant numbers of current permit or authorization holders.

Camping along river corridors that benefit the recreational outstandingly remarkable values, specifically those of the Colorado River, North Platte River, Yampa River and Blue River, may be seasonally prohibited if they are within 4 miles of active GRSG leks. This would be a negative impact on the recreational outstandingly remarkable values. This potential stipulation does not take into account other developments between the lek and the river corridor, such as roads and railroads, which would be barriers between the lek and the dispersed or developed recreation.

Alternative A-Alternatives A, B, and D would have the least impact, as this stipulation would not move forward under any of these alternatives.

Alternative B-Alternatives B, A, and D would have the least impact, as this stipulation would not move forward under any of these alternatives.

Alternative C-Alternative C would have the greatest negative impact.

Alternative D-Alternatives D, A, and B would have the least impact, as this stipulation would not move forward under any of these alternatives.

Impacts from Lands and Realty Management on Wild and Scenic Rivers

Any Change to the Outstandingly Remarkable Values, Tentative Classification (i.e., Wild, Scenic, or Recreational), or Free-flowing Nature of the River Segment or Corridor Area from its Current State

Surface-disturbing activities and construction of structures would be authorized only if there were no negative impact on the free-flowing nature, outstandingly remarkable values, or tentative classification of the river segments. However, if the surface disturbance were to enhance the associated outstandingly remarkable value or if the impacts of all impacted outstandingly remarkable values were fully mitigated, the project may be allowed. This would most likely occur with projects that enhance the recreational outstandingly remarkable value, often in cooperation with other agencies or partners.

Alternative A-Alternative A would have the most areas available for ROWs and also construction of structures, with no restrictions in place to protect GRSG habitat specifically; therefore, Alternative A would have the greatest potential impact on wild and scenic rivers.

Alternative B-Alternative B would have fewer areas available for ROWs and also construction of structures, through restrictions to protect GRSG habitat. Therefore, benefits to wild and scenic rivers would be greater than Alternatives A and D but would be less than Alternative C.

Alternative C-Alternative C would have the fewest areas available for ROWs and also construction of structures, so it would have the most potential benefit to wild and scenic rivers.

Alternative D-Alternative D would have fewer impacts than Alternative A, but more impacts than Alternatives B and C.

Construction of Roads and Trails

Surface-disturbing activities and road and trail construction would only be authorized if there were no negative impact on the free-flowing nature, outstandingly remarkable values, or tentative classification of the river segments. However, if the surface disturbance enhanced the associated outstandingly remarkable value or if it were mitigated, this would be allowed. This would most likely occur with the recreational outstandingly remarkable value in cooperation with other agencies or partners.

Alternative A-Alternative A would have the most areas available for ROWs and also construction of structures, with no restrictions in place to protect GRSG habitat specifically; therefore, Alternative A would have the greatest impact on wild and scenic rivers through possible disruption of outstandingly remarkable values.

Alternative B-Alternative B would have fewer areas available for ROWs and also construction of structures, through restrictions to protect GRSG habitat; therefore, benefits to wild and scenic rivers would be more than Alternative A and D but would be less than Alternative C. Alternative B would have a greater probability of preservation of outstandingly remarkable values than Alternatives A and D. Alternative B would have a smaller probability of preservation of outstandingly remarkable values than Alternative C.

Alternative C-Alternative C would have the fewest areas available for ROWs and also construction of structures; therefore, Alternative C would have the most benefit to wild and scenic rivers. Alternative C would have the greatest probability of preservation of outstandingly remarkable values due restrictions on surface-disturbing activities, when compared to Alternatives A, B, and D.

Alternative D-Alternative D would have more benefits than Alternative A, but fewer benefits than Alternatives B and C. Alternative D would have a greater probability of preservation of outstandingly remarkable values than Alternative A, but would have less probability of preservation of outstandingly remarkable values than Alternatives B and C.

Earthwork Construction and Vegetation Disturbance

Surface-disturbing activities, earthwork construction, and vegetation disturbance would be authorized only if there were no negative impact on the free-flowing nature, outstandingly remarkable values, or tentative classification of the river segments. However, if the surface disturbance were to enhance the associated outstandingly remarkable value or if it were mitigated, this would be allowed. This would most likely occur with the recreational outstandingly remarkable value in cooperation with other agencies or partners.

Alternative A-Alternative A would have the most areas available for earthwork construction and vegetation disturbance; therefore, Alternative A would have the greatest impact on wild and scenic rivers through possible disruption of outstandingly remarkable values.

Alternative B-Alternative B would have fewer areas available for earthwork construction and vegetation disturbance through restrictions to protect GRSG habitat; therefore, benefits to wild and scenic rivers would be more than Alternative A and D but less than Alternative C. Alternative B would have a greater probability of preservation of outstandingly remarkable values than Alternatives A and D, and a smaller probability of preservation of outstandingly remarkable values than Alternative C.

Alternative C-Alternative C would have the fewest areas available for earthwork construction and vegetation disturbance; therefore, Alternative C would have the most benefit to wild and scenic rivers. Alternative C would have the greatest probability of preservation of outstandingly remarkable values due to restrictions on surface-disturbing activities, when compared to Alternatives A, B, and D.

Alternative D-Alternative D would have more benefits than Alternative A, but fewer benefits than Alternatives B and C. Alternative D would have a greater probability of preservation of outstandingly remarkable values than Alternative A, but would have less probability of preservation of outstandingly remarkable values than Alternatives B and C.

Impacts from Fuels Management on Wild and Scenic Rivers

Vegetation Disturbance

Surface-disturbing activities and vegetation disturbance would be authorized only if there were no negative impact on the free-flowing nature, outstandingly remarkable values, or tentative classification of the river segments.

Wildland fire can cause great contrast to the natural landscape, removing large swaths of vegetation and leaving behind visible scars. However, these impacts are generally short-term as over the long-term, fires allow for the regrowth of native or appropriate adapted vegetation as improved ecological health. This could benefit botanical and biodiversity outstandingly remarkable values. However, any negative impact on associated scenic outstandingly remarkable values would have to be balanced out by the benefits in order for the project to be authorized.

Alternative A would not prioritize fuels projects in GRSG habitat, and therefore would have the most potential for vegetation disturbance to benefit outstandingly remarkable values.

Alternative B would prioritize fuels projects in PPH only. Impacts on wild and scenic rivers would be less beneficial than Alternative A, and D, but would be greater than Alternative C.

Alternative C is would prioritize fuels projects in ADH, and therefore would have the fewest benefits on wild and scenic rivers.

Alternative D would have fewer benefits than Alternative A, but greater benefits than Alternative C and Alternative B, because it would prioritize fuels projects.

Impacts from Fire Operations Management on Wild and Scenic Rivers

Vegetation Disturbance

Outstandingly remarkable values prioritized for suppression would have fewer impacts on scenic outstandingly remarkable values and associated river segments than areas prioritized lower or not prioritized. Wildland fire can cause great contrast to the natural landscape, removing large swaths of vegetation and leaving behind visible scars. However, these impacts are generally short-term as over the long-term, fires allow for the regrowth of native or appropriate adapted vegetation and improved ecological health. This can benefit the botanical and biodiversity outstandingly remarkable values and associated river segments. Fire suppression techniques have the potential to impact scenic outstandingly remarkable values if fire lines are placed directly up slopes where they are visible for long distances.

Alternative A would not prioritize suppression of fire in GRSG habitat, and therefore would have the most potential for vegetation disturbance outside of GRSG habitat. Alternative A would have the most negative impacts on scenic outstandingly remarkable values.

Alternative B would prioritize suppression in PPH only. Wild and scenic river segments that overlap PPH would benefit from this prioritization. Benefits from Alternative B would be greater than Alternatives A and D but less than Alternative C.

Alternative C would also prioritize suppression in PPH only; therefore, Alternative C would have the same impacts on scenic, botanical, and biodiversity outstandingly remarkable values as Alternative B.

Alternative D would prioritize suppression in PPH immediately after firefighter and public safety. GRSG habitat requirements would be considered in conjunction with all resource values managed by the BLM and USFS, and preference would be given to GRSG habitat unless site-specific circumstances warranted an exemption. Alternative D would benefit wild and scenic river segment outstandingly remarkable values more than Alternative A but less than Alternatives B and C.

Impacts from Habitat Restoration on Wild and Scenic Rivers

Restoration of Surface Disturbance

Any increase in restoration is expected reduce the levels of sedimentation, erosion and vegetation loss. This would benefit water quality and associated outstandingly remarkable values, plus scenic, botanical and biodiversity outstandingly remarkable values.

Alternative A would put the lowest priority on restoration of sagebrush habitat and therefore would have the lowest beneficial impact on outstandingly remarkable values in the planning area.

Alternative B would put a lower priority on restoration than Alternative C, but would put a higher priority on restoration than Alternative D.

Alternative C would put the highest priority on restoration of sagebrush habitat, which would have the highest beneficial impact on outstandingly remarkable values in the planning area.

Alternative D would put a higher priority on restoration of sagebrush than Alternative A, but would put a lower priority on restoration of sagebrush than Alternatives B and C.

Summary of Impacts on Wild and Scenic Rivers

Management of wild and scenic rivers can often find benefits for one outstandingly remarkable value, while negative impacts simultaneously occur to another outstandingly remarkable value. Because of this, resource impacts cannot be consistently summarized as beneficial or negative throughout the alternatives. Each alternative has its own merits for beneficial and adverse impacts on wild and scenic rivers depending on the river segments and associated outstandingly remarkable values. Actions can only be authorized in eligible or suitable wild and scenic river areas if there is no negative impact to the free flowing nature, outstandingly remarkable values, or tentative classification of the river segments.

Alternative A has greater adverse impacts from travel and transportation and habitat restoration because more areas are open to cross-country travel and restoration is not prioritized. These management actions would negatively impact most associated outstandingly remarkable

values, including wildlife, scenic, fish, botanical and biodiversity. Alternative A would see greater beneficial impacts from recreation, lands and realty, and fuels management because those segments which contained the recreational outstandingly remarkable value would most likely benefit from recreation and lands and realty actions which allow for more options for development. Management actions associated with fuels management could benefit botanical and biodiversity outstandingly remarkable values because there would be the most potential for short-term vegetation disturbance, which would allow for long-term vegetation regrowth.

Alternative B would likely result in greater adverse impacts from recreation because restricting SRPs would negatively impact the recreational outstandingly remarkable value. Alternative B would also likely result in greater beneficial impacts from the potential PPH ACEC because most associated outstandingly remarkable values such as botanical and biodiversity would benefit.

Alternative C would have greater impacts on wild and scenic rivers from restrictions on recreation. Restrictions on land use authorizations would benefit wild and scenic rivers by reducing potential impacts on outstandingly remarkable values. Alternative C would have greater beneficial impacts on wild and scenic rivers from travel and transportation from restrictions on route construction and upgrades. These restrictions would benefit wild and scenic rivers by reducing potential impacts on outstandingly remarkable values.

Alternative D would have fewer restrictions on surface-disturbing activities that could impact outstandingly remarkable values than Alternative B and C, but would have more restrictions than Alternative A. Restrictions on recreation use would be less under Alternative D than under Alternatives B and C.

4.15.4. National Trails and Byways

General Description

This section describes potential impacts on national trails and byways within the planning area that could result from the implementation of the management decisions proposed under the 4 alternatives in relation to other resources and resource uses.

Currently, there is one designated national trail on BLM-administered or National Forest System lands within the planning area: the Continental Divide National Scenic Trail. Portions of the Colorado River Headwaters National Scenic Byway and the Cache la Poudre-North Park National Scenic Byway are on BLM-administered lands within the planning area. The Continental Divide National Scenic Trail, Colorado River Headwaters National Scenic Byway and Cache la Poudre-North Park National Scenic Byway all are within the KFO in north-central Colorado. The Continental Divide National Scenic Trail is aligned on or along the Continental Divide and runs along the Colorado border north to south. The 69-mile Colorado River Headwaters National Scenic Byway traverses the KFO planning area from east to west along the Colorado River corridor in Grand and Eagle counties. The 101-mile Cache la Poudre-North Park National Scenic Byway begins east of Walden on Colorado Highway 14 and extends east to downtown Fort Collins.

The Continental Divide National Scenic Trail is a congressionally designated trail that follows the Continental Divide corridor through several states, including Colorado. A final location for the trail in the Muddy Pass area of Grand and Jackson counties has not yet been chosen. Currently, visitors hike along US Highway 14 between Rabbit Ears Pass and Indian Creek Road

which crosses BLM-administered lands. This includes traveling over Muddy Pass. It is assumed that in the foreseeable future a corridor and alignment away from US Highway 14 may cross additional BLM-administered lands, including those in GRSG habitat. Alternatives for potential trail corridors to the north or south of private lands adjacent to the Continental Divide have been considered; however, the pattern of diverse land ownership has made it difficult to identify where the route would be established. The Colorado River Headwaters National Scenic Byway is a National Scenic Byway that passes through several communities within the KFO planning area, including Grand Lake, Granby, Hot Sulphur Springs, Parshall, and Kremmling. The majority of the Cache la Poudre-North Park National Scenic Byway runs along the Cache la Poudre River passing through the small communities of Gould, Kinikinik, Rustic, and Indian Meadows. Portions of the Colorado River Headwaters National Scenic Byway and the Cache la Poudre-North Park National Scenic Byway are within GRSG habitat.

This analysis identifies the impacts of management decisions across the alternatives in relation to the BLM/USFS ability to protect and prevent damage to the objectives, goals, and values associated with national trails and byways.

Methodology and Assumptions

Indicators

- BLM guidance for management of trails within the National Trail System is outlined in the BLM Manual Section 6280 (BLM 2012) and may have a specific management plan planned between partnering agencies. The Continental Divide National Scenic Trail Comprehensive Plan contains guidelines for trail management, completion of new segments of trail, and trail monitoring. Consideration is given to carrying capacity of the trail, motorized vehicle use, cultural sites, budget constraints, physical environment and resources (including wildlife and wildlife habitat, soil, vegetation, water quality, and air quality), existing ROWs, private landownership, and public safety hazards. The impacts on visual resources and quality recreational experiences, as well as the indirect impacts on the local economies, are relevant impact indicators for national trails and byways.

Assumptions

- The BLM, along with other agencies or interest groups, will cooperatively identify, plan, implement, and manage existing, potential or proposed national trails and byways within the planning area.

- BLM-administered or National Forest System lands within the planning area may be used for alignments of national trail and byway corridors, where appropriate.

- If BLM-administered or National Forest System lands are included, or are considered for inclusion, in national trail management corridors, those lands may be managed in order retain or improve the integrity of the associated settings and scenic values for which the National Scenic Trail was designated and to safeguard the nature and purposes of the Continental Divide National Scenic Trail.

- If BLM-administered or National Forest System lands are within corridors along BLM Byways including Backcountry Byways, All-American Roads, and National Scenic Byways those lands may be managed in order to retain their physical, social, and operational settings

and to support the conservation, protection, restoration, enjoyment, and appreciation of the resources, qualities, and values of those corridors.

- Agreements will be pursued with the Continental Divide Society, private landowners, and other land management agencies in order to facilitate the routing of the Continental Divide National Scenic Trail and provide appropriate recreational experiences along the trail corridor.
- If an approved route or portion of the Continental Divide National Scenic Trail crosses BLM-administered lands, or lands overlying federal mineral estate, the BLM will implement the Continental Divide National Scenic Trail Comprehensive Plan in order to enhance recreational opportunities, and to protect the setting within the corridor.
- COAs, BMPs, and standard operating procedures may be applied to actions proposed in national trail and byways corridors where such stipulations are in place.
- The impacts on visual resources and quality recreational experiences, as well as the indirect impacts on the local economies, are relevant impact indicators for scenic trails and byways.
- Use of designated national or state trails and byways will increase over time.

Implementing management actions for the following resources would have negligible or no impact on national trails and byways and are therefore not discussed in detail: range management, wild horse and burro management, emergency stabilization and rehabilitation.

Direct and Indirect Impacts on National Trails and Byways

Impacts from Travel Management on National Trails and Byways

The objectives of managing travel and transportation for the protection of the GRSG are to reduce the mortality from vehicle collisions; limit the change in GRSG behavior; avoid, minimize, and mitigate habitat fragmentation; limit the spread of noxious weeds; and limit disruptive activity associated with human access. Development or restriction of roads and trails and the associated human activity may have an impact on the setting and management of national trails and byways. Management plans for national trails and byways may provide guidance for resource development and the development of transportation systems to manage and mitigate impacts associated with resource management. In areas with high potential for surface disturbance and development, creation of roads and trails would have a greater impact on management corridors of national or state trails and byways than in areas with low potential for surface disturbance and development. Travel and transportation systems can cause visual intrusions in the form of vegetation removal, soil compaction, and linear disturbances across the landscape. The management and use of transportation systems by motorized modes of travel can also impact the physical, social, and administrative settings of national trail and byway corridors.

Management under Alternative A would have the greatest area available for the development of roads and trails with the least restrictions, and, therefore, would have the greatest impact on national or state trail and byway corridors.

Under Alternative B, management of travel and transportation would have fewer impacts than Alternatives A and D since existing roads or limited realignments would be utilized when possible, but would have greater impacts than Alternative C.

Management under Alternative C would result in impacts similar to Alternative B but with greater protection for leks by providing a four4-mile buffer. The fewest areas would be available for surface-disturbing activities; therefore, management under this alternative would have the fewest impacts on visual resources. Conversely, there could be an adverse impact on the National Trails program if a national trail or scenic byway existed or was proposed within the 4-mile buffer because there could be restrictions placed on activities authorized.

Management under Alternative D would have fewer impacts than Alternative A, but greater impacts than Alternatives B and C. Road development may occur if there would be less than 5 percent total disturbance for the priority area or if there is effective mitigation that offsets the loss of GRSG habitat. Additional development may occur under specific disturbance exception criteria as defined in **Appendix E**, Stipulations Applicable to Fluid Mineral Leasing and Other Surface-Disturbing Activities.

Impacts from Recreation Management on National Trails and Byways

The objective of managing recreation for the protection of the GRSG is to manage BLM SRPs and USFS recreational SUAs to avoid activities that disrupt GRSG, fragment GRSG habitat, or spread noxious weeds. SRPs and recreational SUAs are discretionary authorizations that are issued for a variety of recreational activities on BLM-administered or National Forest System lands to ensure public health and safety, protect recreation and natural resources, and ensure the public receives a fair monetary return for certain recreation uses. SRPs and recreational SUAs are often required for commercial activities, competitive events, certain organized group activities, and in some designated special areas. SRPs or recreational SUAs may be issued within national trails and byways corridors and often include stipulations to protect physical, social, and administrative setting, and other natural resources. Since SRPs and recreational SUAs are discretionary, each proposal is evaluated on case-by-case basis.

Management under Alternative A would have no impacts on national trails and scenic byways from recreation since authorizations are discretionary and evaluated on its own merits.

Under Alternative B, the BLM and USFS would limit SRPs and recreational SUAs in PPH to those that have a neutral or beneficial effect on PPH areas. There is a potential impact on the National Trail System program through restrictions on recreational opportunities.

Under Alternative C, management would require the same limitations on SRPs and recreational SUAs as Alternative B. There is a potential impact on the National Trail System program through restrictions on recreational opportunities.

Under Alternative D, the BLM and USFS would limit SRP and recreational SUA to those proposals that would not adversely affect GRSG populations through habitat loss or disruptive activities. There is a potential impact on the National Trail System program through restrictions on recreational opportunities.

Impacts from Lands and Realty Management on National Trails and Byways

The objective of managing lands and realty for the protection of the GRSG is to avoid, minimize, and mitigate the loss of habitat and habitat connectivity through the authorizations of ROWs, land tenure adjustments, proposed land withdrawals, agreements with partners, and incentive programs.

Management under Alternative A would have the fewest restrictions or actions to protect landscapes from BLM ROWs or USFS SUAs, land tenure adjustments, and other lands and

realty management authorizations. Under this alternative, there would be the greatest impacts on existing or future national trails and byways.

Under Alternative B, management actions would require new BLM ROWs or USFS SUAs associated with valid existing rights within PPH to be collocated with existing ROWs or SUAs where it best minimizes impacts on GRSG. Existing roads or limited realignments would be utilized to access valid existing rights that are not yet developed. PPH would be managed as exclusion areas for new ROWs or SUAs. Actions outline land tenure adjustments for the retention, acquisition, and land exchange guidance, providing for more contiguous federal ownership within PPH. Lands within PPH would also be recommended for mineral withdrawal or managed with GRSG conservation measures. These actions would have beneficial impacts on existing or future national trails and byways because there would be more acres protected from surface-disturbing and disruptive activities than Alternatives A or D; however, management under this alternative would protect fewer acres than Alternative C.

Under Alternative C, management would take actions similar to those outlined in Alternative B but would apply ROW and SUA exclusion to .ADH. Additional actions to acquire important habitat on private lands, amending ROWs to require features to enhance habitat security. Under this alternative, there would be more actions to protect existing or future national trail and byway corridors from impacts than under Alternatives A, B, and D.

Alternative D would make PPH avoidance areas for new ROW. ROWs would only be issued if they would not adversely affect GRSG populations and they were in compliance with the National Scenic Trail law, policy, and management plan. Both general and linkage/connectivity habitat would be managed as avoidance areas for new ROWs or SUAs. Isolated federal parcels would be considered for disposal for tracts that are not capable of altering GRSG populations and that would not negatively impact the National Scenic Trail, if disposed. Under this alternative, there would be more actions to protect existing or future national trail and byway corridors from impacts than Alternative A, but fewer than Alternatives B and C.

Impacts from Wind Energy Development on National Trails and Byways

Actions related to wind energy development are to minimize or avoid GRSG habitat loss and disruption. Development requires ROWs or SUAs and typically involves large structures and access routes that can fragment habitat and impact landscapes. Wind energy development can have impacts on national trails or byway corridors by altering landscapes that are within the viewshed. Not all occupied habitat areas would have the potential for wind energy development due to topography and other natural factors. These areas, and any associated national trails or byways, would not be impacted due to limited potential for development.

Management under Alternative A would have the fewest restrictions or actions to protect landscapes from wind energy development. There would be the greatest impacts on existing or future national trails and byways under this alternative.

Under Alternative B, management would have no specific actions related to the protection of GRSG, resulting in impacts the same as or similar to those under Alternatives A and D.

Management under Alternative C would have protective actions to prevent siting of wind energy development in ADH or within 5 miles of leks, providing greater protections to the landscape. Under this alternative there would be more actions to protect existing or future national trail and byway corridors from impacts than Alternatives A, B, and D.

Under Alternative D, management would have no specific actions related to the protection of GRSG, resulting in impacts the same as or similar to those under Alternatives A and B.

Impacts from Industrial Solar Development on National Trails and Byways

Actions related to industrial solar development are to minimize or avoid GRSG habitat loss and disruption. Development requires ROWs or SUAs and typically involves large structures and access routes that can fragment habitat and impact landscapes. Industrial solar development can have impacts on national trails or byway corridors by altering landscapes that are within the viewshed. Not all occupied habitat areas would have the potential for industrial solar development due to topography and other natural factors. These areas, and any associated national trails or byways, would not be impacted due to limited potential for development.

Management under Alternative A would have the fewest restrictions or actions to protect landscapes from industrial solar development. Management under this alternative would result in the greatest impacts on existing or future national trails and byways.

Under Alternative B, management would have no specific actions related to the protection of GRSG and would have impacts the same as or similar to those under Alternative A and D.

Under Alternative C, protective actions would prohibit industrial solar projects in ACECs and occupied habitat. Under this alternative, there would be more protections for existing or future national trail and byway corridors from impacts than under Alternatives A, B, and D.

Management under Alternative D would include no specific actions to protect GRSG, resulting in impacts the same as or similar to those under Alternatives A and B.

Impacts from Fluid Minerals Management on National Trails and Byways

The objectives of actions related to fluid minerals management are to avoid, minimize, and mitigate direct disturbance, displacement, or mortality of GRSG; to prevent loss of habitat, or loss of effective habitat through fragmentation; and to minimize cumulative landscape-level impacts. Development typically requires ROWs or SUAs and involves structures and access routes that can fragment habitat and impact landscapes. Linear features, such as primitive roads or trails, could potentially be improved impacting the dispersed and unimproved nature of the existing transportation system. Maintenance requirements for such development also creates additional disturbance and impacts if they were to occur within national trail or byway corridors.

Management under Alternative A would have the fewest restrictions or actions to protect landscapes from fluid minerals management actions that may alter national trail or byway corridors or have direct impacts. Management under this alternative would result in the greatest impacts on existing or future national trails and byways.

Under Alternative B, management would close PPH to fluid mineral leasing and would not entertain opening areas where leases expire or terminate. Geophysical exploration would be permitted in areas under existing leases with protective stipulations. Additional mitigation and stipulations such as applying a 4-mile NSO around leks, limiting disturbances to one per section with no more than 3 percent disturbance for the area, and COAs provide additional protections to landscapes. Under this alternative, there would be more protections for existing or future national trail and byway corridors from impacts than under Alternatives A and D but fewer than under Alternative C.

Under Alternative C, management would close ADH to fluid mineral leasing and would not entertain opening areas where leases expire or terminate. Geophysical exploration would be permitted in areas where existing leases with protective stipulations greater than those in Alternative B, including seasonal restrictions. Additional mitigation and stipulations for leased fluid minerals within ADH, such as seasonal restrictions for exploratory drilling, limiting disturbances to no more than 3 percent for the area, and exploring options to amend, cancel, or buy out leases in ACECs and occupied habitats provide the greatest protections for landscapes. PDFs and RDFs would also apply. Management under this alternative would result in the greatest protections for existing or future national trail and byway corridors.

Management under Alternative D would manage PPH as NSO areas for fluid mineral leasing. Exception criteria would allow BLM/USFS Authorized Officers to authorize disturbance in excess of the 5 percent under certain conditions with the concurrence of CPW. Additional mitigation and stipulations are proposed for leased fluid minerals within Alternative D, which are similar to those under Alternative B. However, under Alternative D, additional exceptions are provided, and the disturbance cap is increased to 5 percent. Under this alternative there would be more protections for existing or future national trail and byway corridors from impacts than Alternative A but less than Alternatives B and C.

Impacts from Solid Mineral Management on National Trails and Byways

The objective of actions related to solid mineral management is to manage solid mineral programs to avoid, minimize, and mitigate adverse impacts on GRSG habitat to the extent practical under the law and BLM/USFS jurisdiction. Similar to fluid minerals management, development of solid minerals typically requires ROW's or SUA's and typically involves structures and access routes that can fragment habitat and impact landscapes. Linear features such as primitive roads or trails could potentially be improved impacting the dispersed and unimproved nature of the existing transportation system. Maintenance requirements for such development also creates additional disturbance and impacts if they were to occur within national trail or byway corridors.

Management under Alternative A would include the fewest restrictions or actions to protect landscapes from solid mineral management actions that may have direct impacts on national trail or byway corridors. Under this alternative, there would be the greatest impacts on existing or future national trails and byways.

Under Alternative B, management would find all surface mining unsuitable within PPH under criteria set forth in 43 CFR 3461.5. Within plans of operations, additional effective mitigation for conservation would be required and seasonal restrictions would be considered. New nonenergy leasable minerals would not be leased and there would be no authorization to expand existing mines. Salable minerals within PPH would also be closed. Under this alternative, there would be more protections for existing or future national trail and byway corridors from impacts than under Alternatives A and D. Impacts would be similar to those in Alternative C.

Management actions under Alternative C would be the same as or similar to those Alternative B. PDFs and RDFs would also apply. Impacts would be the same as or similar to those under Alternative B.

Under Alternative D, management would allow for greater development of solid minerals than Alternatives B and D. Actions for PPH and ADH related to CFRs would be put in place to mitigate for disturbance up to 5 percent of an area. If disturbance was to exceed 5 percent, additional effective mitigation to offset such disturbance would be required. Under this alternative, there

would be more protections for existing or future national trail and byway corridors from impacts than under Alternative A but fewer than under Alternatives B and C.

Impacts from Locatable Mineral Management on National Trails and Byways

Similar to fluid and solid mineral management, locatable mineral management typically requires ROWs or SUAs and involves structures and access routes that can fragment habitat and impact landscapes. Linear features such as primitive roads or trails could potentially be improved, impacting the dispersed and unimproved nature of the existing transportation system. Maintenance requirements for such development also creates additional disturbance and impacts if they were to occur within national trail or byway corridors.

Management under Alternative A would have the fewest restrictions or actions to protect landscapes from locatable mineral management actions that may directly impact national trail or byway corridors. Under this alternative, there would be the greatest impacts on existing or future national trails and byways.

Under Alternative B, management would withdraw PPH from mineral entry based on risk to GRSG. Existing claims would be subject to validity exams or buy out including claims to be found null and void. Under this alternative there would be more protections for existing or future national trail and byway corridors from impacts than under Alternatives A or D. Impacts would be similar to those under Alternative C.

Management under Alternative C would include actions the same as or similar to Alternative B. PDFs and RDFs would also apply. Impacts would be the same as or similar to Alternative B.

Under Alternative D, management would not propose withdrawal within PPH but would require validity exams, including effective mitigation measures and potential seasonal restrictions, as deemed necessary. Under this alternative, there would be more protections for existing or future national trail and byway corridors from impacts than under Alternative A but fewer than under Alternatives B and C.

Impacts from Nonenergy Leasable Minerals Management on National Trails and Byways

Similar to fluid, solid, and locatable mineral management, nonenergy leasable minerals development typically requires ROWs or SUAs and involves structures and access routes that can fragment habitat and impact landscapes. Linear features such as primitive roads or trails could potentially be improved impacting the dispersed and unimproved nature of the existing transportation system. Maintenance requirements for such development also create additional disturbance and impacts if they occur within national trail or byway corridors.

Management under Alternative A would have the fewest restrictions or actions to protect landscapes from nonenergy leasable minerals actions that may have direct impacts on national trail or byway corridors. Under this alternative, there would be the greatest impacts on existing or future national trails and byways.

Under Alternative B, management would withdraw PPH from mineral entry based on risk to GRSG. Existing claims would be subject to validity exams or buy out including claims to be found null and void. PDFs and RDFs would also apply as outlined for fluid and solid minerals. Impacts would be the same as or similar to those under Alternative C but fewer than under Alternatives A and D.

Management under Alternative C would include actions the same as or similar to Alternative B. PDFs and RDFs would also apply. Impacts would be the same as or similar to those under Alternative B but fewer than under Alternatives A and D.

Under Alternative D, management would consider allowing expansion of existing nonenergy mineral leases up to 5 percent disturbance for the area. If disturbance were to exceed 5 percent, then additional effective mitigation to offset such disturbance would be required. PDFs and RDFs would also apply. Under this alternative, there would be more protections for existing or future national trail and byway corridors from impacts than under Alternative A but fewer than under Alternatives B and C.

Impacts from Salable Minerals Management on National Trails and Byways

Similar to fluid, solid, and locatable mineral management and nonenergy leasable minerals, salable minerals development typically requires ROWs or SUAs and involves structures and access routes that can fragment habitat and impact landscapes. Linear features such as primitive roads or trails could potentially be improved impacting the dispersed and unimproved nature of the existing transportation system. Maintenance requirements for such development also creates additional disturbance and impacts if they occur within national trail or byway corridors.

Management under Alternative A would have the fewest restrictions or actions to protect landscapes from salable minerals actions that may directly impact national trail or byway corridors. Under this alternative, there would be the greatest impacts on existing or future national trails and byways.

Under Alternative B, management would close PPH to mineral material sales and salable mineral pits would be restored to meet GRSG habitat conservation objectives. Impacts would be the same as or similar to those under Alternative C but less than under Alternatives A and D.

Management under Alternative C would include actions the same as or similar to Alternative B. PDFs and RDFs would also apply. Impacts would be the same as or similar to Alternative B but fewer than under Alternatives A and D.

Under Alternative D, management would consider allowing existing mineral material sale sites to continue operations and possibly expand up to 5 percent disturbance for the area. If disturbance was to exceed 5 percent, then additional effective mitigation to offset such disturbance would be required. Within ADH, salable mineral pits no longer in use would be restored to meet GRSG habitat conservation objectives. Under this alternative, there would be more protections for existing or future national trail and byway corridors from impacts than under Alternative A but fewer than Alternatives B and C.

Impacts from Mineral Split-Estate Management on National Trails and Byways

The objective of mineral split-estate for GRSG conservation is to utilize federal authority to protect GRSG habitat on split-estate lands to the extent provided by law. Limited control of private lands can occur, however, stipulations related to leases for minerals owned by the federal government can be used as a condition of leases or sales. Similar to fluid, solid, and locatable mineral management and nonenergy leasable and salable minerals development, mineral split-estate typically requires ROWs or SUAs and involves structures and access routes that can fragment habitat and impact landscapes. Linear features such as primitive roads or trails could potentially be improved impacting the dispersed and unimproved nature of the existing

transportation system. Maintenance requirements for such development also creates additional disturbance and impacts if they occur within national trail or byway corridors.

Management under Alternative A would have the fewest restrictions or actions to protect landscapes from mineral split-estate that may impact national trail or byway corridors. Under this alternative, there would be the greatest impacts on existing or future national trails and byways.

Under Alternative B, management would require the conservation measures that would be applied to public lands when the federal government owns the mineral estate and the surface is in nonfederal ownership. Where the federal government owns the surface and the mineral estate is in non-federal ownership, the appropriate fluid mineral PDFs would be applied to surface development. Impacts would be the same as or similar to those under Alternative C but fewer than under Alternatives A and D.

Management under Alternative C would have the same actions as Alternative B. Impacts would be the same as or similar to those under Alternative B but less than Alternatives A and D.

Under Alternative D, management would apply conservation measures within PPH to the developer (lessee) of the mineral as allowable when the federal government owns the mineral estate and the surface is in nonfederal ownership. Where the federal government owns the surface and the mineral estate is in nonfederal ownership, the appropriate PDFs to surface development would be applied. Under this alternative, there would be more protections for existing or future national trail and byway corridors from impacts than under Alternative A and slightly less than under Alternatives B and C.

Impacts from Wildfire Suppression, Fuels Management, and Fire Rehabilitation on National Trails and Byways

The objective of managing the fuels program is to avoid GRSG habitat loss and restore damaged habitat. Fire can have an impact on landscapes but often is a part of natural succession. Areas that are prioritized for suppression efforts would be impacted less than those that are of lower priority. Prescribed fire or mechanical treatments to reduce fuel loads may mimic fuel reduction from natural causes. Natural prescribed fires and mechanical treatments allow for the healthy reestablishment of forested and vegetated areas. While there may be impacts on national trail and byway corridors, they are often short-term disturbances.

Management under Alternative A would have the fewest protections for naturally occurring landscapes and would have the greatest impacts on existing or future national trail and byway corridors.

Under Alternative B, fuels management actions and guidance would provide protections within PPH while allowing for promoting area health. Treatments would be allowed when actions would meet strategic protection and preservation of habitat, including seasonal restrictions, reseeding with native seed, monitoring and controlling invasive species, and not reducing the sagebrush canopy to less than 15 percent unless objectives require additional reductions to protects habitat. Suppression would be prioritized immediately after life and property to conserve PPH and also within PGH if it was to threaten PPH areas. Impacts would be less than those under Alternatives A and D but would be greater than under Alternative C.

Management under Alternative C would include actions the same as or similar to Alternative B but would be applied to ADH. Impacts would be less than those under Alternatives A and D. Impacts would be the same as or similar to Alternative B over a greater portion of habitat.

Under Alternative D, management would include actions the same as or similar to Alternatives B and C but would be applied to a mix of PPH and ADH. Fuels management projects may involve spatially arranging new vegetation treatments to constrain potential fire spread and growth. During suppression efforts, prioritization would consider GRSG habitat requirements in conjunction with all resource values and may limit prioritization of GRSG habitat when site-specific circumstances warrant an exemption. Under this alternative, there would be fewer impacts than Alternative A, but greater impacts than Alternatives B and C since there would be greater flexibility for fuels management projects and take into account all resource values.

Impacts from Habitat Restoration on National Trails and Byways

The objectives of habitat restoration for the GRSG are to create and maintain landscapes that benefit GRSG and to use integrated vegetation management to control, suppress, and eradicate, where possible, noxious and invasive species per BLM Handbook H-1740-2. Habitat restoration would primarily benefit national trail and byway corridors by returning impacted landscapes to a more natural state.

Management under Alternative A would place the least priority on the restoration of sagebrush habitat with nonnative vegetation and impacts from other resource objectives. Under this alternative, there would be the greatest impacts on existing or future national trail and byway corridors.

Under Alternative B, management would have actions and guidance to prioritize restoration for PPH and ADH to restore desirable native plants and create landscape patterns which most benefit GRSG. Under this alternative, there would be a greater priority in restoration of GRSG habitat and fewer impacts on national trail and byway corridors than under Alternatives A and D, but lower priority and more impacts than under Alternative C.

Management under Alternative C would include actions the same as or similar to Alternative B but would be applied over ADH. Efforts would be made to recover declining sagebrush habitat in areas to expand occupied habitat. Sagebrush reduction and treatments would be avoided to increase forage for livestock and big game to reduce grazing impacts on sagebrush. Under this alternative, there would be the greatest priority on restoration of GRSG habitat and the fewest impacts on national trail and byway corridors compared with Alternatives A, B, and D.

Under Alternative D, management would include actions the same as or similar to Alternatives B and C, but these would be applied to a mix of PPH and ADH. GRSG habitat requirements would be considered in conjunction with all resource values managed by the BLM/USFS and would be given priority unless site-specific requirements warrant an exemption. Certain criteria would count against the 5 percent disturbance cap, including mappable stands of cheatgrass and pinyon-juniper encroachment. Under this alternative, there would be low priority in restoration of GRSG habitat and greater impacts on national trail and byway corridors than under Alternatives B and C, but fewer impacts than under Alternative A.

Impacts from ACECs/Zoological Areas Management on National Trails and Byways

The objective of managing lands as ACECs is to designate special management areas to protect significant historic, cultural, or scenic values; fish and wildlife resources; natural process or systems; and/or natural hazards. Designating habitat as an ACEC for the protection and management of the GRSG would provide additional constraints on other resources uses in such areas. Prohibition of surface-disturbing activities would have a beneficial impact on the protection of national trail and byway corridors.

Management under Alternative A would not designate an ACEC for the GRSG and its habitat. Under this alternative, there would be the least protections and beneficial impacts on national trail and byway corridors.

Under Alternative B, management would not designate an ACEC for the GRSG and its habitat. Under this alternative, on national trail and byway corridors would be the same as or similar to those under Alternatives A and D, with greater impacts than Alternative C.

Management under Alternative C would make all PPH an ACEC for protection of sagebrush habitat and GRSG. Beneficial impacts would be the greatest for national trail and byway corridors since this would provide the most protection to the most areas. Under this alternative, there would be fewer impacts than under Alternatives A, B, and D.

Management under Alternative D would not designate an ACEC for the GRSG and its habitat. Under this alternative, impacts on national trail and byway corridors would be the same as or similar to Alternatives A and B, with greater impacts than Alternative C.

Summary of Impacts on National Trails and Byways

Management under Alternative A would continue with the current conditions and existing plans and would have the least restrictions on changes that may occur across the landscape which could impact national trails and byways. National trails and byways often are designated to provide opportunities for activities such as recreation and education dependent on physical settings. With fewer protections for landscapes within national trail and byway corridors, experiences could also be diminished.

Under Alternative B, management would provide a greater level of protection for the landscape, which would benefit existing or future national trail and byway corridors. Under this alternative, there would be greater benefits and fewer impacts than under Alternatives A and D, but fewer benefits than under Alternative C.

Management under Alternative C would provide the greatest level of protection for the landscape, which would benefit existing or future national trail and byway corridors. Under this alternative there would be greater benefits and fewer impacts than under Alternatives A, B, and D.

Under Alternative D, management would provide protections for the landscape that would benefit existing or future national trail and byway corridors while allowing greater flexibility for managing multiple resources. Under this alternative, there would be greater benefits and fewer impacts than Alternatives A, but fewer benefits than under Alternatives B and C.

4.16. Soil and Water Resources

4.16.1. General Description

This section discusses impacts on soil and water resources from proposed management actions of other resources and resource uses. Existing conditions concerning soils and water are described in **Section 3.15**, Water Resources, and **Section 3.16**, Soil Resources.

4.16.2. Methodology and Assumptions

General Impacts on Soils and Water Resources

Data in **Appendix F**, Disturbance Cap Management, was used to compare impacts on soil and water resources across all alternatives. Calculations were made, where possible, to capture the maximum potential number of acres that could be disturbed under each alternative.

Indicators of impacts on soil and water resources and the measurements used to describe the impacts (where available or appropriate) are described below:

- Impacts on Water Quality

Miles of river and stream segments meeting state and federal water quality standards

Miles of river and stream segments meeting BLM Colorado Public Land Health Standard #55 or Routt National Forest Plan Standards and Guidelines

- Impacts on Soil health

Ability of soils to support vegetation and crust and to meet site potential based on ecological site conditions (e.g., vegetation type, diversity, density, and vigor)

Acres meeting BLM Colorado Public Land Health Standard #1 or Routt National Forest Plan Standards and Guidelines

Changes to erosion rates when compared to natural conditions based on ecological site descriptions

- Impacts on Water Quantity

Changes to the availability of water resources

Assumptions

The analysis includes the following assumptions:

- Soil and water resources would be managed to meet Standards 1 (upland soils) and 5 (water quality) of the BLM Colorado Public Land Health Standards (BLM 1997) and Routt Forest Plan Water and Aquatic and Soils Standards and Guidelines (USFS 1997).
- Where impacts may be shifted outside of GRSG habitat, the BLM would still be required to meet BLM Colorado Public Land Health Standards and Routt Forest Plan Standards. These

standards would apply to project design and may require additional BMPs or other mitigations to ensure compliance with these standards.

- Methods and projects (e.g., vegetation treatments, grazing systems, and prescribed and natural fire use) that help restore watersheds, desirable vegetation communities, or wildlife habitats would benefit soil and water over the long term.
- Soils would be managed to minimize erosion (relative to natural erosion rates) and to maintain soil productivity.
- The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors; these are proximity to drainages and existing groundwater wells, location within the watershed, time of year and extent of disturbance, reclamation potential of the affected area, existing vegetation, precipitation, and mitigating actions applied to the disturbance.
- Transportation facilities and infrastructure would be properly designed to meet BLM and USFS standards for transportation systems.
- At higher risk for erosion from surface-disturbing activities are areas of low reclamation potential, such as sensitive soils, including those described as "fragile," "steep slopes," and "saline," and those with landslide potential, or those in sensitive areas, such as stream channels, floodplains, and riparian habitats. Such actions as range improvements and construction that require water use, dust abatement, or reclamation irrigation would deplete water in the Colorado River and North Platte River Basins.
- All current soil and water protections (e.g., NSO and CSU) would remain in place.

Implementing management for the following resources would have negligible or no impacts on soil and water quality and are therefore not discussed in detail: wind energy development, industrial solar, habitat restoration, and ACECs.

4.16.3. Direct and Indirect Impacts on Soil and Water Resources

General Impacts from Surface Disturbance on Soil and Water Resources

Impacts on Water Quality and Soil Health

Impacts on soil health and water quality from this EIS are largely a result of surface disturbance. Management actions that minimize, preclude, or stipulate surface disturbance would help maintain or improve soil and water quality conditions.

Soil resources, especially soils on steep slopes, saline soils, or Mancos Shale areas, are susceptible to impacts from surface disturbance and compaction, which can lead to accelerated erosion, soil loss, and reduced productivity. Increased erosion leads to increased sedimentation of area streams, which decreases water quality and contributes to morphologic instability. In addition, soils on steep slopes or those soils identified as fragile or saline can be more difficult to reclaim once disturbed. Nonpoint source contribution of sediment and associated mineral constituents (e.g., selenium) to area streams through natural erosional processes can be magnified and accelerated as a result of surface disturbance.

Surface-disturbing activities in areas of low reclamation potential or in sensitive areas, such as stream channels, floodplains, and riparian habitats, are at higher risk for erosion. Disturbance in these areas creates greater potential for erosion and sediment delivery to surface waters, thereby degrading water quality.

No disturbance caps currently exist under Alternative A. This would allow for potential surface disturbance across all 4,148,500 acres of GRSG habitat. As a result, impacts on water quality and soil health would be greater under Alternative A than under the other alternatives.

Alternative B would apply a 3 percent disturbance cap within PPH, leaving a maximum of 71,000 acres available for surface disturbance in these habitats. The application of this disturbance cap would provide greater protection to soil and water than Alternative A.

Alternative C would also apply the same 3 percent disturbance cap as Alternative B, allowing for a maximum of 71,000 acres available for surface disturbance in PPH. However, under Alternative C this disturbance cap would also apply to ADH. As a result, this alternative would prevent more surface disturbance than Alternative B and would provide greater protection to soil and water than Alternative B.

Alternative D would apply a 5 percent disturbance cap to PPH that support sagebrush communities, allowing a maximum of 84,500 acres of surface disturbance. Alternative D would be more protective of soil and water than Alternative A, but less protective than Alternatives B and C.

Impacts from Travel Management on Soil and Water Resources

Impacts on Water Quality and Soil Health

Decommissioning roads or trails, re-routing roads away from streams and riparian areas, and maintaining or improving road/stream crossings have direct benefits to water quality by reducing sediment transport to water bodies. Minimizing road density in a watershed (e.g., reclamation of routes or clustering route development) can help to maintain or improve hydrologic function by reducing surface compaction and surface runoff, which benefit water quality over time.

Reductions in route density also have benefits for soil health due to reductions in soil displacement, compaction, erosion, and vegetation loss.

Under Alternative A there is no prioritization established for restoration or maintenance of travel routes within GRSG habitat. Restoration of travel routes would continue to be within existing authorities.

Alternatives B, C, and D would reduce the acreage open to cross-country travel, which would protect water quality and soil health to a greater extent than Alternative A. These three alternatives would also require travel management planning and potential reductions in miles of routes and route traffic. Alternatives B, C, and D equally call for restoring undesignated routes in PPH, which would improve hydrologic function and water quality over time.

New road construction would be limited within the planning area under Alternatives B, C, and D, but particularly under Alternatives B and C. In some cases, this could shift road development to areas outside of GRSG habitat. Depending on the nature of the areas to which this development would be shifted, this could increase routes across areas of low reclamation potential.

Impacts from Recreation Management on Soil and Water Resources

Impacts on Water Quality and Soil Health

Recreation actions authorized under BLM SRPs or USFS recreation SUPs can result in adverse impacts on soil and water through surface disturbance from motorized and mechanized travel and large group activities, such as hiking, biking, and camping. See discussion under general impacts from surface disturbance on soil and water regarding the impacts of surface disturbance on water quality and soil health. On the other hand, SRPs and SUPs can benefit soil and water by establishing areas where these disturbances can occur and by providing public education about land stewardship.

Water quality can also be degraded from land uses associated with SRPs and SUPs, such as improper garbage and human waste disposal. The extent of these impacts would depend on the proximity to water resources (surface and ground), the type of activity authorized, and the number of recreationists associated with the permitted activity.

Alternatives B, C, and D all would reduce SRPs and SUPs within GRSG habitat to a greater extent than Alternative A, thus indirectly benefitting soil resources by reducing surface disturbance. Alternatives B, C, and D also would provide indirect protection to soil health and water quality by limiting the type and timing of permitted use associated with SRPs or SUPs.

Management under Alternatives B and C would benefit soil and water across more acreage than Alternatives A and D. The longer seasonal restrictions under Alternative C would offer the greatest protection for soil and water during snowmelt when soils are wettest and most vulnerable to compaction and surface runoff. Thus, recreation management under Alternative C would provide the greatest protection to soil and water.

Impacts from Lands and Realty Management on Soil and Water Resources

Impacts on Water Quality and Soil Health

Rights-of-Way

ROW actions could degrade water quality and soil resources through surface disturbance and potential leaks or spills from maintenance and construction. See discussion under general impacts from surface disturbance on soil and water about the impacts of surface disturbance on water quality and soil health. The proximity of ROW activities to water resources would ultimately determine the severity of impact from leaks or spills associated with ROWs.

Alternatives B, C, and D provide greater levels of indirect protections to soil and water than Alternative A. All three alternatives would indirectly benefit soil resources by reducing the future issuance of ROWs in GRSG habitat. However, because this disturbance could be shifted outside of GRSG habitat, the total net effect on these resources may be negligible, or it could vary, depending on the MZ in which the action is proposed. In the different MZs, the percentage of soils affected by these alternatives would vary greatly, as would the options for relocating proposed ROWs. Disturbances that are shifted outside of GRSG habitat could occur in soils more difficult to stabilize or reclaim than those within the protected habitat.

Alternative B identifies PPH as exclusion areas. This would protect 2,294,200 more acres of PPH than Alternative A. As mentioned above, this could shift ROW development outside of GRSG habitat, where soils may or may not be more difficult to stabilize or reclaim.

Alternative C identifies ADH as exclusion areas. This would protect 4,024,000 more acres of ADH than Alternative A. Similar to Alternative B, this could shift ROW development outside of GRSG habitat where soils may or may not be more difficult to stabilize or reclaim.

Alternative D identifies sagebrush-occupied PPH as avoidance areas. This would reduce but not preclude new ROW construction through PPH. Similar to Alternatives B and C, but to a lesser extent, this could shift ROW development outside of GRSG habitat, where soils may or may not be more difficult to stabilize or reclaim

Proposed Land Withdrawals

Mineral development could impact soil health and water quality through surface disturbance and potential leaks or spills from maintenance and construction. See discussion under general impacts from surface disturbance on soil and water about the impacts of surface disturbance on water quality and soil health. The proximity of mineral development to water resources would ultimately determine the severity of any impact from leaks or spills. Measures to propose land withdrawals would reduce the threat of adverse impacts on soil and water quality from mineral development.

Under Alternatives A and D, the BLM/USFS would not propose new mineral closures for GRSG conservation and protection.

Under Alternative B, the BLM/USFS would propose lands within PPH for mineral withdrawal. In doing so, the BLM/USFS would protect soil resources and water quality by reducing the potential for surface disturbance and leaks and spills from mineral development. Assuming minerals could be developed across all PPH, under Alternative B, the BLM/USFS would protect more acres from future additional disturbance than Alternatives A and D.

Under Alternative C, the BLM/USFS would propose all lands within GRSG habitat for mineral withdrawal. This would protect soil resources and water quality by reducing the potential for surface disturbance and leaks and spills from mineral development. Assuming minerals could be developed across all PPH, under Alternative C, the BLM/USFS would protect 4,024,000 more acres from future disturbance than Alternatives A and D and 1,729,800 more acres than Alternative B.

Impacts from Range Management on Soil and Water Resources

Impacts on Water Quality and Soil Health

General Impacts from Range Management and Retirement of Grazing Privileges

If managed improperly, livestock grazing can remove effective ground cover (vegetation and litter accumulation). This can elevate potential soil erosion and result in indirect impacts on water quality. Grazing can alter reproductive capabilities in desirable vegetation communities. This effect can increase the potential for the establishment of undesirable species, which may lack soil stabilizing characteristics, over desirable vegetation species.

Grazing animals also can impair water quality by the following:

- Directly depositing manure and urine into surface water
- Depositing manure and urine near surface water where runoff and leaching can transport these materials into the water
- Accelerating erosion and sedimentation
- Altering aquatic habitat and stream flow
- Reducing the capacity of riparian vegetation to provide shade, filter contaminants, and stabilize stream banks and shorelines.

The impacts of livestock grazing on water quality can be managed by controlling the timing, intensity, duration, and spatial distribution of grazing.

Under Alternatives A, B, and D, livestock grazing would continue to be managed in the context of achieving BLM Colorado Public Land Health Standards. Grazing practices would be used that minimize impacts on soils and water quality.

Elimination of livestock grazing under Alternative C would maintain or improve overall watershed health and water quality on up to 4,148,500 acres (ADH). Elimination of livestock grazing would decrease hoof compaction of soil surfaces. When combined with the annual freeze-thaw cycle, this may decrease soil bulk density and improve soil moisture conditions, which facilitates vegetation germination and root development. Removing livestock would also increase plant litter and live vegetative ground cover, which would provide more protection from wind and water erosion. Eliminating livestock grazing under Alternative C would also eliminate water quality impacts associated with the deposition of manure and urine into surface water. However, there still could be degradation resulting from wildlife use. Over time, riparian conditions would also improve under Alternative C. This alternative would provide more beneficial impacts on soil and water than Alternatives A, B, and D.

Riparian Areas and Wet Meadows

Riparian vegetation is essential for maintaining or improving water quality because it provides shade, filters contaminants, and stabilizes stream banks and shorelines. Management actions that maintain or enhance properly functioning riparian conditions would directly benefit soil and water.

Under Alternative A, riparian areas would continue to be managed to achieve BLM Colorado Public Land Health Standards and proper functioning condition or Forest Plan standards and guidelines.

Under the three action alternatives, the BLM and USFS would introduce additional guidelines for improving riparian health. This new guidelines would provide greater protection to riparian areas than Alternative A.

Structural Range Improvements and Livestock Management Tools

Developing water sources for livestock grazing can lead to changes in livestock distribution. This in turn can degrade soil health, increase erosion potential, and reduce water quality in area streams. Restricting or limiting water developments and diversions or decommissioning existing infrastructure may benefit water quality by maintaining or restoring natural biotic and hydrologic functions. On the other hand, better grazing plans that improve grazing on public lands often

require range improvements or new stock water sources to better distribute livestock across a larger landscape.

Under Alternative B, the BLM and USFS would limit new water developments to only those that benefit PPH. This would likely result in fewer water developments than under Alternative A and would result in a beneficial impact on soil health and water quality. However, restricting these developments would also reduce the tools available to the BLM and USFS to improve livestock distribution and use across an allotment. Under this alternative, there would be fewer tools available to improve vegetation and therefore soils within GRSG habitat.

Because all livestock would be eliminated under Alternative C, no new water developments are allowed within ADH. This alternative would have the greatest beneficial impact on soil and water.

Alternative D would limit new water developments to only those that do not result in GRSG habitat loss. This would likely result in fewer water developments than under Alternative A, but more than under Alternative B, and would result in a beneficial impact on soil health and water quality. However, restricting these developments would also reduce the tools available to the BLM and USFS to improve livestock distribution and use across an allotment. Under this alternative, there would be fewer tools available to improve vegetation and therefore soils within GRSG habitat.

Impacts from Wild Horse Management on Soil and Water Resources

Impacts on Water Quality and Soil Health

Wild horses can have an adverse impact on water quality and soil health if populations reach levels above established management objectives. Impacts from improper management of wild horse are similar to those described under impacts from range management on soil and water.

Under Alternative A, the BLM would prioritize wild horse gathers to protect a range of resource values, including soil and water.

Under Alternatives B and C, the BLM would prioritize gathers in PPH. This includes 94,300 acres within two HMAs. If PPH are a priority for horse gathers, wild horse populations in adjacent non-PPH could reach levels above management objective. As a result, soil and water on 313,200 acres of non-PPH (which includes all land ownership within two HMAs and two herd areas) would be vulnerable to impacts from improper management of wild horses.

Under Alternative D, the BLM would prioritize gathers and herd management in ADH (184,200 acres), leaving 223,300 acres of undesignated habitat within HMAs and herd areas vulnerable to impacts from improper management of wild horses.

Impacts from Fluid Minerals Management on Soil and Water Resources

Unleased Fluid Minerals

Impacts on Water Quality and Soil Health

Fluid mineral development leads to impacts on soil and water through both surface disturbance and subsurface disturbance. See discussion under General Impacts from Surface Disturbance on Soil and Water Resources regarding the impacts of surface disturbance on water quality and

soil health. Management actions that result in longer reaches for directional well drilling due to limits on surface infrastructure could make impacts on groundwater quality more likely due to the longer distance required from the surface to the production zone.

Such subsurface disturbances as well construction and water developments can alter natural aquifer properties (e.g., enhance hydraulic conductivity of existing fractures, breach confining units, and change hydraulic pressure gradients). This can increase the potential for contamination of surface and groundwater resources along fractures or faults (BLM 2001). In near-stream alluvial aquifers (typical of groundwater in the planning area), groundwater contamination can be a major and potentially long-term contributor to contamination of surface water (US Geological Survey 2002). Furthermore, altering natural aquifer properties can result in dewatering of locally important freshwater sources, such as groundwater, springs, seeps, fens, and streams.

Impacts on groundwater can occur during drilling and completion activities due to surface spills, loss of drilling fluids, and loss of completion and hydraulic fracturing fluids into groundwater. Drilling fluids may be lost at any time in the drilling process due to changes in porosity or other properties of the rock being drilled through for both the surface casing and the production hole. When this occurs, drilling fluids may be introduced into the surrounding formations; this could, depending on local geology, include freshwater aquifers.

Chemical additives used in drilling, completion, and hydraulic fracturing may include acids, alcohols, hydrocarbons, thickening agents, lubricants, and other additives. These chemicals are used, and in some cases stored, on well pads. Fluids are forced into the production zone during completion and hydraulic fracturing. A portion of these fluids is sometimes retrieved and can be reused in other wells, but a portion of these fluids is likely to remain in the producing formations. Proper well design typically involves setting surface casing and cementing behind the casing in the well ring to protect freshwater aquifers. With proper drilling and completion practices, it is highly unlikely that groundwater from different horizons would mix (commingling of aquifers) or that groundwater resources would be contaminated from drilling, completion, and hydraulic fracturing.

Alternative B closes PPH to future fluid mineral leasing and development, which would protect all PPH from additional future fluid mineral development. This would reduce soil erosion potential and sedimentation to area water bodies and would ultimately reduce impacts on water quality on 2,294,200 more acres than Alternative A. However, some of these impacts may be shifted to adjacent areas from PPH. In some cases, this shifting of surface disturbance would be beneficial to water quality when disturbance is shifted farther from drainages and water resources. On the other hand, when this action shifts development closer to water sources and drainages it would create greater potential for water quality contamination. Limitations on surface disturbance associated with fluid mineral development under Alternative B would likely result in longer reaches for directional well drilling. In turn, this could increase the likelihood of drilling and completion impacts on water quality, as described above.

Alternative C would apply restrictions similar to Alternative B except that these restrictions would apply to ADH. This would result in the same positive impacts as Alternative B on 4,024,000 more acres than Alternative A. A similar shift of impacts would occur under Alternative C as described for Alternative B. Limitations on surface disturbance associated with fluid mineral development under Alternative C would likely result in impacts similar to Alternative B. Because these surface restrictions cover ADH, instead of PPH, these impacts would be greater under Alternative C than under Alternative B.

Alternative D would continue to allow development of fluid minerals in PPH, but the BLM or USFS would apply NSO stipulations to protect sites that support sagebrush communities. As a result, 1,604,700 acres within PPH would receive some protection from surface disturbance. Alternative D would be more protective of soil and water than Alternative A but less protective than Alternatives B and C. A similar shift of impacts would occur under Alternative D as described for Alternative B. Limitations on surface disturbance associated with fluid mineral development under Alternative D would likely result in impacts similar to those described for Alternative B. However, because the cap on surface disturbance under Alternative D allows for more surface disturbance than under Alternative B, this impact also would be less under Alternative D.

Impacts on Water Quantity

Fluid mineral development requires substantial amounts of freshwater. If actions to limit oil and gas development were to reduce overall well numbers, there would be less need for freshwater for drilling. The likelihood of reduced well numbers is largely tied to the extent of restrictions on oil and gas development.

Under Alternatives A and D, the BLM/USFS management of oil and gas would be less restrictive, and it is unlikely that water depletions could be avoided. Under Alternatives B, C, and D, oil and gas development would likely be reduced, resulting in less demand for freshwater and a beneficial impact on water quantity in the region.

Leased Fluid Minerals

Impacts on Water Quality and Soil Health

Impacts on soil health and water quality from actions proposed for leased fluid minerals are similar to those described above for unleased fluid minerals. Management actions that reduce surface disturbance would reduce some of these adverse impacts. However, management actions that result in longer reaches for directional well drilling due to limits on surface infrastructure could make impacts on groundwater quality more likely due to the longer distance required from the surface to the production zone.

Water resource values are not evenly distributed across the landscape. Limitations on surface disturbance may shift development away from GRSG habitat but could put water resources outside of habitat at higher risk of contamination. Depending on accessibility, quality, and quantity of the mineral resources present, shifting development outside of habitat may or may not put water resources at greater risk than if that same development occurred within habitat.

Because there is no development cap in habitat in current LUPs, Alternative A would afford the least protection (no acres protected from development) for soil and water from surface disturbance.

Because all action alternatives would require a full reclamation bond ensuring full and proper reclamation following approved disturbances, Alternatives B, C, and D would all be more protective than Alternative A. Under Alternative B, the BLM and USFS would protect 2,294,200 acres across PPH. Seasonal restrictions in Alternatives B would protect more PPH than Alternative A. These seasonal restrictions would offer additional protection to soils by reducing the potential for soil compaction during the spring.

Under Alternative C, the BLM and USFS would protect 4,024,000 acres across ADH and would not grant any waivers to new stipulations or disturbance caps. Alternative C identifies the same seasonal protection measures as Alternative B but extends them to ADH. Alternative C also

would prohibit evaporation ponds and infiltration reservoirs for coal bed methane wastewater in ADH. This would preclude impacts from surface disturbance and leaking ponds and reservoirs and overspray (vegetation and soil degradation caused by concentration of salts at the surface that leads to water quality degradation). However, Alternative C may increase the likelihood that water resources outside of GRSG habitats could be adversely impacted. This is because the greatest number of acres would be protected from development within habitats. Alternative C is more protective of soil and water than the other alternatives.

Alternative D would protect 1,604,700 acres of PPH that is capable of supporting sagebrush communities only (a subset of PPH). Seasonal restrictions in Alternative D would provide greater protection to PPH than Alternative A by reducing potential soil compaction during the spring. However, Alternative D would provide fewer protections to soil and water than Alternatives B and C.

Impacts from Solid, Locatable, and Salable Minerals Management on Soil and Water Resources

Impacts on Water Quality and Soil Health

Impacts on soil health and water quality from actions proposed for solid, locatable, and salable minerals are largely caused by surface disturbance. See discussion under general impacts from surface disturbance on soil and water regarding the impacts of surface disturbance on water quality and soil health. Management actions that reduce surface disturbance would also reduce adverse impacts on soil and water. Actions to restrict solid mineral extraction in GRSG habitat could shift development to other locations (assuming solid minerals are available in other locations) or could result in fewer new coal leases. Spills or leaks from mining equipment could contaminate surface water and groundwater.

Overall, the stipulations proposed under Alternatives B, C, and D would be more protective of soil and water from surface disturbance from surface mining than Alternative A. These stipulations would not preclude development of coal resources, most of which occurs underground. Still present under all alternatives are impacts on water quality from underground mining, such as mine dewatering, stormwater runoff from waste piles, subsidence, and reduced stream and spring flows (capture); however, the extent of impacts would vary, depending on the ability to secure new coal leases. Alternatives B, C, and D would promote reclamation of mineral pits no longer in use in PPH, thus improving soil health and water quality in those areas.

Under Alternative B, the BLM and USFS would find PPH unsuitable for surface mining, thus protecting 2,294,200 acres more than Alternative A. Also, the BLM/USFS would not allow new mineral material sales on this same number of acres. These measures could shift development outside of PPH, with resulting impacts on soil and water in those areas.

Under Alternative C, ADH would be unsuitable for surface mining, protecting 4,024,003 more habitat than Alternative A. Also, the BLM and USFS would not allow new mineral material sales on these same acres. These measures could lead to a shift in development outside of GRSG habitat, with resulting impacts on soil and water in those areas.

Under Alternative D, the BLM/USFS would institute a 5 percent surface disturbance cap where practical, protecting soil health and water quality on 1,604,700 more acres than under Alternative A. The development shift described above for Alternatives B and C would be less pronounced

under Alternative D. Alternative D also emphasizes reclamation and restoration of unused pits. It also would promote reclamation of sites no longer in use and within ADH, while allowing existing facilities to expand under the 5 percent disturbance cap.

Impacts on Water Quantity

Mineral extraction requires freshwater use and leads to some surface water depletions. If actions to limit surface disturbance in GRSG habitat have the effect to reduce overall mineral development, there would be less need for freshwater for mineral extraction; this could result in less surface water depletion.

The development caps proposed under Alternatives B and C could limit mineral extraction in GRSG habitat. This would reduce demand for freshwater in those areas. The same would be true, but to a lesser extent, under Alternative D.

Impacts from Mineral Split-Estate Management on Soil and Water Resources

Impacts on Water Quality and Soil Health

Impacts from mineral split estate management on soil and water are the same as those described above for solid, locatable, and salable minerals management.

Alternatives B and C would apply the same conservation measures for mineral development on private surface ownership that are applied to public surface ownership in PPH. This would protect soil and water in these areas. Surface disturbance footprints would likely be smaller to avoid disturbance cap thresholds, which would reduce the potential for erosion and sedimentation and would benefit water quality and soil health. Development could be shifted outside of GRSG habitat, with subsequent impacts in those areas. . Alternative D would be more protective than Alternative A but less protective than Alternatives B and C.

Impacts from Wildfire Suppression on Soil and Water Resources

Impacts on Water Quality and Soil Health

Impacts on soil and water from planned and unplanned wildland fires are complex and involve changes in nutrient cycling, water infiltration and runoff, and erosion potential (Moody et al. 2008; Martin and Moody 2001). Fire-induced increases in runoff and sediment yield from wildlands are generally greatest 1 to 2 years following fire (Helvey 1980; Inbar et al. 1998; Robichaud 2005) and are typically reduced to background conditions within 10 years (Robichaud 2000). Research has demonstrated that increases in post-fire runoff and sediment yield decline over time. Recovery of post-burn runoff and erosion rates to pre-fire conditions usually occurs within 5 years on rangeland sites (Wright and Bailey 1982); it depends on burn severity, vegetation recovery, litter deposition, debris recruitment, and soil water repellency (Pierson et al. 2008). Use of heavy equipment during surface-disturbing tactics to suppress fires can compact and displace soil. Also, adverse impacts on soil food webs and aquatic organisms are likely if ammonia-based fire retardant is misapplied. Effective fire prescriptions and post-fire rehabilitation can minimize these impacts.

In the short term, suppressing unplanned fires in areas of excessive fuel buildup can minimize high-severity fires and the associated impacts of vegetation loss and erosion. However, continued

suppression of fires can result in increased fuel loading and can increase the risk of high-severity unplanned fires and related soil impacts in the long term.

Under Alternatives B, C, and D, the BLM/USFS would prioritize suppression in PPH. This would reduce the impacts described above but could shift these impacts to areas outside of PPH. Under Alternatives B and D, suppression would also be prioritized within PGH, whereas this would not be the case under Alternative C.

4.16.4. Summary of Impacts on Soil and Water Resources

Under Alternative A, soil and water would be the most adversely impacted of all four alternatives. This is because no additional stipulations and caps on surface disturbance would be introduced under this alternative.

Under Alternative B, the BLM/USFS would institute a 3 percent cap on surface disturbance. This would limit surface-disturbing activities, which have an adverse impact on soil and water. Also, compared to Alternative A, Alternative B would reduce impacts on soil and water by restrictions on existing surface-disturbing activities, a closure to new oil and gas leasing in PPH, and proposed mineral withdrawals. In some cases, these actions may shift development to areas outside of PPH, with subsequent impacts on soil and water in those areas.

BLM/USFS management under Alternative C would be the most protective of soil and water. Under this alternative, the BLM/USFS would eliminate livestock grazing in the planning area, which would yield beneficial impacts over time on soil and water. The BLM/USFS would institute a 3 percent disturbance cap under Alternative C, which would cover a larger area than Alternative B. Thus, this alternative would protect soil and water over a larger area as well. In some cases, these actions may shift development to areas outside of PPH, with subsequent impacts on soil and water in those areas.

BLM/USFS management under Alternative D would be less protective than Alternatives B and C but more protective than Alternative A. The BLM/USFS would institute a 5 percent disturbance cap in PPH under Alternative D, which would allow for more development than Alternatives B and C. The resulting shift in development discussed above for Alternatives B and C would be less pronounced under Alternative D.

4.17. Air Quality

4.17.1. General Description

This section is an analysis of potential impacts on air resources from implementing management actions and allowable uses to meet BLM/USFS-administered resource and resource use objectives for the various programs. Actions that initiate or increase emissions of air pollutants can result in negative impacts on air resources, including increased concentrations of air pollutants, decreased visibility, increased atmospheric deposition on soils and vegetation, and acidification of sensitive water bodies. Actions that reduce or control emissions of air pollutants can be very effective at improving air quality and preventing degradation. This section addresses the potential impacts of emissions of air pollutants from specific activities authorized, allowed, or performed by the BLM/USFS under each alternative. This analysis is derived from data available within the current and ongoing, final and draft LUPs for the planning area field offices. For more detailed

information regarding air resource impacts, refer to the Chapter 4 discussions within available final and draft plans (**Table 4.8**, Documents Incorporated by Reference for Environmental Consequences-Air Resources).

Table 4.8. Documents Incorporated by Reference for Environmental Consequences-Air Resources

Title (NEPA Document)	Publication Year	Internet Web site
Colorado River Valley RMP (Draft EIS)	2011	http://www.blm.gov/pgdata/etc/medialib/blm/co/field_offices/crvfo/kent.Par.38253.File.dat/Chapter%204%20-%20Environmental%20Consequences.pdf
Grand Junction RMP (Draft EIS)		http://www.blm.gov/pgdata/etc/medialib/blm/co/field_offices/grand_junction_field/Draft_RMP/draft_rmp_EIS_v2.Par.34890.File.dat/Ch4_DRMP_508.pdf
Kremmling RMP (Draft EIS)	2011	http://www.blm.gov/pgdata/etc/medialib/blm/co/programs/land_use_planning/rmp/kfo-gsfo/KFODRMPDocuments.Par.78756.File.dat/KFO_Vol%202_Chapter4.pdf
Little Snake RMP (Final EIS)	2010	http://www.blm.gov/pgdata/etc/medialib/blm/co/field_offices/little_snake_field/rmp_revision/final_docs.Par.77419.File.dat/07_LS-FEIS_Vol-II_Chapter-4.pdf
White River RMP (Final EIS)	1996	http://www.blm.gov/pgdata/etc/medialib/blm/co/programs/land_use_planning/rmp/archives/white_river/final_rmp_eis.Par.43205.File.dat/Wrfrmp.pdf
White River RMP Amendment (Draft EIS)	2012	http://www.blm.gov/pgdata/etc/medialib/blm/co/programs/land_use_planning/rmp/white_river/documents/rmpa-2.Par.6607.File.dat/05_WRFO_RMPA-EIS_Chapter%204_Aug2012.pdf

4.17.2. Methodology and Assumptions

In general, the air resource impact analysis contained in each RMP referenced above consisted of an emissions approach to evaluate existing emissions levels and air quality conditions. These levels and conditions were compared with estimated future emissions for each alternative, based on predicted rates of growth and decline and the potential for impacts on future air quality conditions.

The purposes of conducting the emissions based analysis were to evaluate the magnitude of emissions of each pollutant from BLM/USFS-authorized activities and to identify the potential for those emissions to cause adverse impacts on air quality in the context of existing air quality conditions. By identifying those activities with significant estimated emissions, the BLM/USFS can focus its air resource protection efforts more effectively. The emissions-based analysis was also used to evaluate increases in emissions from each activity over a base year for each alternative. This information is useful for evaluating the effect of various management actions on air emissions and for evaluating the effect of emission control strategies. This approach included the following steps:

1. Evaluate existing air quality conditions based on available air monitoring data and identify air quality issues

2. Identify management actions and activities in the planning area, authorized, permitted, or allowed by the BLM or USFS, that generate air pollutant emissions

3. Compile base year operational and production data for each identified emission generating activity
4. Compile projected future development, operational, and production data for each identified emission-generating activity for the selected future years over the life of the plan
5. Calculate estimated current and projected future emissions of specific air pollutants for identified management actions and activities for each alternative and compile the calculations in an emissions inventory
6. Analyze the magnitude of predicted emissions for each activity and changes in estimated emissions over the base year and between alternatives to determine the potential for future impacts on air quality
7. Evaluate increases in estimated emissions from future BLM or USFS actions in the context of potential cumulative emissions within the planning area over the life of the plan to determine the potential for future impacts on air quality and the BLM or USFS incremental contribution
8. Model the emissions inventories and assumptions to predict potential direct, indirect, and cumulative impacts (where applicable)

The following list of emission-generating activities were identified as those management actions and activities authorized, permitted, allowed, or performed under the above RMPs that could emit regulated air pollutants and cause impacts on planning area air quality and in Class I areas within 100 kilometers (62 miles) of the planning area:

- Fluid leasable minerals-Conventional oil and gas
- Fluid leasable minerals-Coal bed natural gas
- Fluid leasable minerals-Shale gas
- Solid leasable minerals-Coal
- Locatable minerals-Uranium and vanadium
- Salable minerals-Sand and gravel
- Lands and realty-ROWs
- Livestock grazing
- Comprehensive travel and transportation management
- Vegetation-Prescribed fire and mechanical treatment

Listed below are the identified air pollutants that could be emitted by management actions and activities authorized, permitted, allowed, or performed under this LUP. Emissions of each of these pollutants were estimated for each identified activity and addressed for each alternative in the referenced analyses.

- CO

- Nitrogen oxides
- PM10
- PM2.5
- Sulfur dioxide
- Volatile organic compounds
- Hazardous air pollutants

The analyses focused on estimating emissions from peak construction, production, and operations associated with the identified emissions-generating management actions and pollutants listed above. Future year estimated emissions were calculated, and in general, management actions associated with oil and gas development represent the largest single sector of emissions for most of the air pollutants; therefore, peak development years for this sector were considered most conservative for calculating the maximum future year emissions. Potential emissions were estimated for several BLM/USFS management actions and activities likely to occur under each alternative analyzed for the various LUPs for each field office. Activities or management actions that could generate quantifiable emissions of regulated air pollutants are included.

Emissions from the following management actions were not estimated because the level of activity is not expected to change significantly between alternatives, and the magnitude of emissions from the activity is considered to be very small in comparison to other management activities: wild (unplanned) fires, fire suppression aircraft, invasive species and pest management, grassland and shrub land management, wild horse management, and activities related to heritage and visual resources, socioeconomic resources, and fish and wildlife resources.

For these management actions, sufficient operational or production data was not available to reliably quantify emissions.

For additional information on the emissions inventory, or a more detailed description of the methodologies and assumptions used in these analyses, refer to the individual RMP Technical Support Document for Air Resources, available on request from the BLM.

Methods of Analysis

Given the uncertainties concerning the number, nature, and specific location of future emission sources and activities, an oil and gas projected development comparison approach was used to provide an appropriate basis for analyzing potential impacts under the various alternatives. Any changes in emissions profiles for any planning area field office are based on the following major assumptions:

- Because oil and gas operations represent the largest portion of the emissions mass for the analyzed pollutants, only changes to these resources are analyzed to derive potential impacts relative to those described under existing and ongoing planning area field office LUPs.
- Emissions estimates are based on predictions of future mineral resource development potential scenarios, rather than on actual development projects.

- Any changes in potential air pollutant emissions presented in this analysis are useful for comparing the relative impacts of each alternative (as compared to planning area LUPs) and may not represent actual future emissions.

- Emissions from the following management actions were not estimated because the potential for development was considered low or speculative: oil shale research and development; geothermal, potash, gold, copper, and silver exploration and development; and miscellaneous gems and other salable materials development.

- Activities associated with underground coal mining and surface mining of uranium and vanadium can be major contributors to particulate matter emissions. Activities associated with travel management, and road maintenance, are predicted to contribute to some pollutant emissions as well. Each of the aforementioned authorized activities not related to oil and gas vary significantly within the planning area. Development impacts from GRSG management actions are too speculative to support a robust, planning level, air quality impacts analysis at this time. Further, emissions of pollutants from these activities unrelated to oil and gas did not contribute significantly to the degradation of air quality, as analyzed under the respective LUPs, and in most cases the emissions were considered de minimis; therefore, no further analysis is warranted, given that GRSG management actions will likely be more restrictive on these activities; that is, they will result in emissions reductions.

- Surface area disturbances for oil and gas development are conservatively estimated at 5- and 10-acre increments to accommodate the well pad, access roads, and infrastructure development for single well and multi-well pads. This assumes that restrictions placed on travel management would provide priority to already disturbed project area reuse.

The potential for management actions to contribute to future significant adverse impacts on air quality was analyzed in the context of existing air quality conditions within the planning area and predicted future growth or decline in emission-generating activities from GRSG management actions. The estimated emissions (five criteria pollutants, volatile organic compounds, and hazardous air pollutants) from each LUP were compiled in an emissions inventory that represents the maximum future year emissions. Future year emissions were based on the current management situation or baseline, depending on the current state of development of each field office's LUP. Where the LUP for a field office is final, Alternative A is the preferred or selected alternative, as described in the LUP's ROD. Where the LUP has not yet been finalized, Alternative A emissions from that analysis are shown below to illustrate the continuance of the current LUPs for those field offices. (Analyzing the preferred alternative from draft LUPs in this analysis would be pre-decisional.)

Baseline emissions represent Alternative A for this EIS (see **Table 4.9**, Baseline Pollutant Emissions, below). Estimated changes in emissions from BLM/USFS GRSG management actions over baseline levels vary by alternative. This comparative analysis relies on the impacted acres of federal mineral lands resulting from the GRSG management actions within the MZs as the primary indicator for quantifying emissions levels and relative air quality impacts.

Colorado Management Zone Analysis

The MZ analysis has been included to provide additional context and to act as the baseline indicator by which management alternatives can be analyzed. In some cases the MZs break across several different field office boundaries; while this may not cause significant analysis issues for

other resources as a whole within the planning area, air resource analysis is complicated by this fact, given that the analysis is field office specific and not landscape or regional in nature. Every effort has been made to provide consistency between the management MZ data and field office data; however, the weighted averaging methods used to split MZ areas into representative Field office areas is not absolute in terms of GIS accuracy and may conflict with numbers presented in other EIS sections. The step was necessary however to ensure the highest quality analysis, given the available data.

Table 4.9. Baseline Pollutant Emissions

Field Office	PM_{10}	$PM_{2.5}$	Nitrogen Oxide	Sulfur Dioxide	CO	Volatile Organic Compounds	Hazardous Air Pollutants	Notes
CRVFO	1,950	200	423	1	805	3,382	418	Alt. A-No Action, Max Planning Emissions Year 2028
GJFO	3,705	695	1,608	49	1,811	934	98	Alt A. No Action, Planning Year 20
KFO	795	182	449	5	699	5,914	118	Alt B. (surrogate for Alt. A-No Action) Emissions Year 2028
LSFO	1,977	1,511	8,643	80	15,930	16,476	1,648	Alt. C, Emissions Year 2026
WRFO	4,174	512	2,181	8	4,016	17,052	1,164	Alt A.-No Action, Emissions Year 2028
Source: CRVFO Draft RMP Table 4.2.1-3, GJFO Draft RMP Table 4-2, KFO Draft RMP Table 4-3, LSFO Approved RMP Table 4-2, WRFO Draft RMP Table 4-16								

The MZ data in **Appendix F**, Disturbance Cap Management, provides the baseline data from which the air analysis begins. To determine the potential impacts on federal minerals development (the major emissions activity assumed to have the most influence on planning area air quality for this EIS), the anthropogenic and total GRSG habitat disturbance caps for each alternative had to be quantified (based on analyzed GIS data). The data also provides limited federal mineral potential for unleased lands within the MZs as well as the type of habitat.

MZs 18 through 21 do not contain PPH or PGH. These numbers represent linkage/connectivity areas covered under ADH.

4.17.3. Direct and Indirect Impacts on Air Quality

Impacts Common to All Alternatives

Air quality impacts can include changes in air pollutant concentrations, visibility, and lake chemistry and atmospheric deposition on soils and vegetation. Several key factors play a role in determining the severity of these impacts, such as the magnitude and chemistry of the air emissions, meteorological conditions, and topography.

Potential emissions changes were quantified for each of the alternatives as an indication of the potential magnitude of impacts on air quality, relative to those impacts described for each planning area field office's LUP analysis. No increases in potential emissions from the baseline are expected from any of the GRSG habitat management alternatives. All of the alternatives result in changes to emissions of air pollutants relative to the baseline that are either less than or equal to those annual mass emissions described under the planning area LUPs; therefore, the potential impacts that are described in the above-mentioned LUP analyses are considered conservative, based on the MZ restrictions analyzed for each alternative below.

All of the planning area field offices have conducted or are conducting planning level air quality modeling to support their final and draft LUPs from a cumulative analysis standpoint. Given that none of the alternatives in this analysis increase mass emissions previously analyzed under the planning area LUPs, those analyses and model results (if currently applicable) are incorporated by reference. This is to establish the representative or upper bounds of planning level emissions impacts on air resources for this EIS. (Refer to those field office documents for a complete description of the impacts disclosed for the baseline alternative shown for this EIS.)

Although air quality modeling can be used to determine ambient concentrations of air pollutants and to assess potential impacts on air quality, the models depend on specific input data to predict these impacts. The input data includes actual meteorological data, actual emissions data, emission source spatial and temporal data, and actual topographic data. At this stage of the planning process, project-specific data sets are not known; therefore, it is unforeseeable and unreasonable to model near field or far field impacts from development at this time.

Proponents of future mineral development projects would be requested to provide this data to the BLM/USFS to analyze project impacts on ambient air resources at the time that a project is proposed. This would be accomplished through an appropriate and required NEPA analysis. The analysis may include air quality modeling (where emissions are significant) to determine whether the project could exceed or violate any ambient standards or cause significant adverse impacts on air quality, including air quality related values.

Implementing the resource area closures and maintaining the disturbance caps as outlined above could drive oil and gas resource development into more concentrated areas. In most cases more compact development is highly desirable from both an environmental and economic standpoint. The most obvious benefits include less overall surface disturbance and traffic within the planning area and collocated or centralized collection, processing, and distribution facilities savings). Potential benefits may include the ability to remotely monitor using telemetry operations on economies of scale that make such options feasible.

Another potential side effect of implementation is more careful planning and coordination among proponents for resource development. Independently owned adjacent parcels could be unified to facilitate more efficient planning and conservation for activities that would count against the disturbance caps. Concentrating development can result in greater local air quality impacts. The BLM/USFS will continue to review actual projects on a case-by-case basis to determine appropriate mitigation from such developments as they occur. Additionally, more concentrated facilities may also subject operators to more stringent permitting requirements because their sites as a whole may exceed permitting thresholds on a more regular basis. This would have the result of providing additional emissions oversight for the project beyond what is required for NEPA.

The remainder of this document will focus on determining potential reductions in development from the alternatives to compare potential impact reductions from the referenced LUP air quality analyses. Total disturbance cap potential will not be quantified because no means exists to reasonably predict non-BLM/USFS surface-disturbance activities within the MZs. Further, in most cases the small anthropogenic disturbance caps (3 percent and 5 percent) are the limiting factors for the alternatives analysis. The analysis presented is simplified and does not consider other MZ habitat TLs, GRSG lek buffers, or other site-specific criteria for analyzing oil and gas development that may further restrict or shift the resource development.

Alternative A

Under Alternative A, resource management objectives described under the planning area's existing LUPs would continue. All the current surface protections and mitigation measures would be stipulated and required on a case-by-case basis, without specific and further consideration of GRSG (by means of habitat protection), unless already explicitly included in any planning area LUP.

The baseline emissions inventory presented in **Table 4.9**, Baseline Pollutant Emissions, is the same for this alternative (i.e., no change). Therefore, the mass emissions and subsequent direct, indirect, and cumulative impacts analysis analyzed under the planning area LUPs is representative of Alternative A. (Refer to those documents for the detailed analysis of air impacts and potential mitigation options presented for each planning area field office.)

Alternative B

Under Alternative B, the unleased PPH identified for each MZ in the planning area would be closed to future leasing. Any currently leased PPH would be subject to anthropogenic and total habitat disturbance caps, defined as 3 percent and 30 percent of the respective GRSG habitat. Refer to **Table 4.10**, Analysis of Alternative B.

Little Snake Field Office and Routt National Forest

An analysis of unleased mineral potential within the MZs contained either wholly or partially within the LSFO suggests that approximately 56 percent of these mineral lands have been rated as either high or medium in relation the their economic mineral potential (development potential given current technology and market conditions). No data is available for the currently leased portions of the MZs, but that data is assumed to be similar for this analysis. Application of this assumption would suggest that approximately 202,600 acres of federal mineral within the currently leased portions of MZ could be ripe for mineral extraction.

Table 4.10. Analysis of Alternative B

Field Office	RMP Acres Available for Lease	RMP Well Projections	MZ Federal Minerals Acres	PPH Acres	Currently Leased PPH Acres	Unleased Acres NSO or Closed by Alternative	Estimated Disturbance Cap Acres (3 percent)
CRVFO	679,200	2,662	99,600	94,800	5,700	89,100	2,800
GJFO	961,600	740	23,300	47,300	3,000	20,300	1,400
KFO	642,900	192	355,900	591,800	118,100	237,700	17,800
LSFO	1,900,300	2,425	1,407,300	1,336,800	361,400	975,300	40,100
WRFO	1,240,500	4,603	586,900	294,500	129,200	165,300	8,800

The current estimates of anthropogenic habitat disturbance within the applicable MZs is approximately 13,800 acres, which represents about 34 percent of the available cap area for this type of disturbance. Using the disturbance area per well assumptions of 5 and 10 acres per well for access, pad, and infrastructure, it can be estimated that the projected development could result in surface disturbance areas of between 12,100 and 24,300 acres within the LSFO. There is no way to know how, where, and when RMP-projected development would occur within the LSFO, and actual development would depend highly on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Given that 74 percent of all the LSFO oil and gas is within the MZs, and if all the estimated disturbance would occur within the LSFO MZs, the 3 percent PPH cap could still be maintained and could accommodate all of the projected RMP development.

Beyond the projected RMP time frame, closure of the resource lands and habitat cap maintenance has the potential of impacting future development. This would decrease emissions from these activities within the LSFO. It is too speculative to suggest when or if that may occur, so the conclusion is that the analysis of impacts from emissions inventories developed for the LSFO RMP are representative of Alternative B in the near future and during the lifetime of the LSFO RMP. (Refer to the Little Snake RMP and supporting EIS documents for the detailed analysis of air impacts and potential mitigation options.)

Colorado River Valley Field Office

An analysis of unleased mineral potential within the MZs contained either wholly or partially within the CRVFO suggests that approximately 40 percent of these mineral lands have been rated as either high or medium in relation the their economic mineral potential (development potential given current technology and market conditions). No data is available for the currently leased portions of the MZs, but they are assumed to be similar for this analysis. Application of this assumption would suggest that approximately 16,200 acres of federal mineral within the currently leased portions of MZ could be ripe for mineral extraction.

The current estimates of anthropogenic habitat disturbance within the applicable MZs is approximately 1,800 acres and represents about 62 percent of the available cap area for this type of disturbance. Using the disturbance area per well assumptions provided for near the beginning of this section-5 and 10 acres per well for access, pad, infrastructure-the projected development could result in surface disturbance areas of between 13,300 and 26,600 acres within the CRVFO. There is no way to know how, where, and when RMP-projected development would occur, and actual development would be highly dependent on such site-specific factors as accessibility, actual mineral potential, and other resource concerns for existing MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Given that 15 percent of all the CRVFO oil and gas is within the field office MZs, most of the estimated disturbance would occur outside the MZs. At estimated disturbance levels, the 3 percent PPH cap could be reached with the additional development of approximately 107 to 214 wells (or approximately 5 percent and 10 percent of RMP projection levels). Maintaining the 3 percent cap of the total habitat has a moderate likelihood of shifting or concentrating development onto non-PPH lands that could have been accommodated within the MZ; however, the extent and relative impacts are unforeseeable absent specific development plans.

Beyond the projected RMP time frame, closure of the resource lands and habitat cap maintenance could impact future development and could decrease emissions from these activities within the CRVFO. It is too speculative to suggest when or if that may occur; therefore the analysis of impacts from emissions inventories developed for the CRVFO RMP are representative of

Alternative B for this EIS in the near future and during the lifetime of the CRVFO RMP. (Refer to the Colorado River Valley RMP and supporting EIS documents for the detailed analysis of air impacts and potential mitigation options.)

Kremmling Field Office

An analysis of unleased mineral potential within the MZs contained either wholly or partially within the KFO suggests that approximately 30 percent of these mineral lands have been rated as either high or medium in relation the their economic mineral potential (development potential given current technology and market conditions). No data is available for the currently leased portions of the MZs, but the assumption is that the data is similar for this analysis. Application of this assumption would suggest that approximately 35,200 acres of federal mineral within the leased portions of MZ could be ripe for mineral extraction.

The current estimates of anthropogenic habitat disturbance within the applicable MZs is approximately 10,600 acres, which represents about 59 percent of the available cap area for this type of disturbance. Using the disturbance area per well assumptions provided for near the beginning of this section-5 and 10 acres per well for access, pad, and infrastructure), the projected development could result in surface disturbance areas of between 1,000 and 1,900 acres within the KFO. There is no way to know how, where, and when RMP-projected development would occur within the KFO, and actual development would be highly dependent on the site-specific factors-accessibility, actual mineral potential, and other resource concerns-for existing MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Even though 55 percent of all the KFO oil and gas is within the MZs, if all of the estimated disturbance occurred within the FO MZs (very unlikely), the 3 percent PPH cap could still be maintained and accommodate all of the projected RMP development. The compensating factor here is that the projected development within the field office is very low, relative to other planning area field offices, even though the KFO MZs and habitat represent most of its minerals.

Beyond the projected RMP time frame, closure of the resource lands and habitat cap maintenance could impact future development and could decrease emissions from these activities within the KFO. It is too speculative to suggest when or if that may occur, so the analysis of impacts from emissions inventories developed for the KFO RMP are representative of Alternative B for this EIS in the near future and during the lifetime of the RMP. (Refer to the Kremmling RMP and supporting EIS documents for the detailed analysis of air impacts and potential mitigation options.)

White River Field Office

An analysis of unleased mineral potential within the MZs contained either wholly or partially within the WRFO suggests that approximately 50 percent of these mineral lands have been rated as either high or medium in relation to their economic mineral potential (that is, development potential given current technology and market conditions). No data is available for the currently leased portions of the MZs, but the data is assumed to be similar for this analysis. Application of this assumption suggests that approximately 65,300 acres of federal mineral within the currently leased portions of MZ could be ripe for mineral extraction.

The current estimates of anthropogenic habitat disturbance within the applicable MZs is approximately 4,400 acres, or about 50 percent of the available cap area for this type of disturbance. Using the disturbance area per well assumptions provided at the beginning of this section (5 and 10 acres per well for access, pad, and infrastructure), the projected development

could result in surface disturbance areas of between 23,000 and 46,000 acres within the WRFO. There is no way to know how, where, and when RMP-projected development would occur within the FO, and actual development would be highly dependent on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Given that 47 percent of all the WRFO oil and gas is within the WRFO MZs and that half of all of the estimated disturbance is assumed to have occurred within the WRFO MZs, the 3 percent disturbance cap could be reached with the additional development of approximately 446 to 892 wells (or approximately 10 percent and 19 percent of RMP projection levels). Maintaining the 3 percent cap of the total habitat has a high likelihood of shifting or concentrating development onto non-PPH lands that could have been accommodated within the MZ; however, the extent and relative impacts are unforeseeable absent specific development plans.

Beyond the projected RMP time frame, closure of the resource lands and habitat cap maintenance could impact future development and could decrease emissions from these activities within the WRFO. It is too speculative to suggest when or if that may occur, so the conclusion is that the analysis of impacts from emissions inventories developed for the WRFO RMP are representative of Alternative B in the near future and during the lifetime of the WRFO RMP. (Refer to the White River RMP and supporting EIS documents for the detailed analysis of air impacts and potential mitigation options.)

Grand Junction Field Office

An analysis of unleased mineral potential within the MZs contained either wholly or partially within the GJFO suggests that approximately 47 percent of these mineral lands have been rated as either high or medium in relation the their economic mineral potential (development potential given current technology and market conditions). No data is available for the leased portions of the MZs, but the data is assumed to be similar for this analysis. This would suggest that approximately 1,400 acres of federal mineral within the currently leased portions of MZ could be ripe for mineral extraction.

The current estimates of anthropogenic habitat disturbance within the applicable MZs is approximately 10,600 acres, which represents about 52 percent of the available cap area for this type of disturbance. Using the disturbance area per well assumptions at the beginning of this section-5 and 10 acres per well for access, pad, and infrastructure-the projected development could result in surface disturbance areas of between 3,700 and 7,400 acres within the GJFO. There is no way to know how, where, and when RMP-projected development would occur within the field office, and actual development would be highly dependent on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Only 2.5 percent of all the GJFO oil and gas is within the MZs, so it is highly unlikely that significant development would occur or be impacted by this management action. The compensating factors are that the projected development and habitat within the GJFO is fairly low, relative to other planning area field offices.

The conclusion is that the analysis of impacts from emissions inventories developed for the GJFO RMP are representative of Alternative B in the near future and during the lifetime of the GJFO RMP. (Refer to the Grand Junction RMP and supporting EIS documents for the detailed analysis of air impacts and potential mitigation options.)

Alternative C

Under Alternative C, ADH, which includes PPH, PGH, and any associated linkage/connectivity areas identified for each MZ in the planning area, would be closed to future leasing. Any currently leased ADH would be subject to anthropogenic and total habitat disturbance caps, defined as 3 percent and 30 percent of the respective GRSG habitat. Refer to **Table 4.11**, Analysis of Alternative C.

Table 4.11. Analysis of Alternative C

Field Office	RMP Acres Available for Lease	RMP Well Projections	MZ Federal Minerals Acres	All GRSG Habitat Acres	Currently Leased ADH Acres	Unleased Acres NSO or Closed by Alternative	Estimated Disturbance Cap Acres (3 percent)
CRVFO	679,200	2,662	99,600	146,000	24,100	75,500	4,400
GJFO	961,600	740	23,300	78,600	38,300	0	2,400
KFO	642,900	192	355,900	711,600	129,200	226,700	21,300
LSFO	1,900,300	2,425	1,407,300	2,349,600	565,800	841,500	70,500
WRFO	1,240,500	4,603	586,900	862,600	336,700	250,200	25,900

Little Snake Field Office and Routt National Forest

An analysis of unleased mineral potential within the MZs contained either wholly or partially within the LSFO suggests that approximately 51 percent of these mineral lands have been rated as either high or medium in relation the their economic mineral potential (development potential given current technology and market conditions). No data is available for the currently leased portions of the MZs, but the data is assumed to be similar for this analysis. Application of this assumption suggests that approximately 289,000 acres of federal mineral within the currently leased portions of MZ could be ripe for mineral extraction.

The current estimates of anthropogenic habitat disturbance within the applicable MZs is approximately 54,000 acres, which represents about 77 percent of the available cap area for this type of disturbance. Using the disturbance area per well assumptions at the beginning of this section (5 and 10 acres per well for access, pad, and infrastructure), the projected development could result in surface disturbance areas of between 12,000 and 24,300 acres within the LSFO. There is no way to know how, where, and when RMP-projected development would occur, and actual development would be highly dependent on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Given that 74 percent of all the LSFO oil and gas is in the MZs, and if all the estimated disturbance were to occur within the MZs, the three percent ADH cap could still be maintained and could accommodate nearly all of the projected RMP development. It is reasonable to assume the unaccommodated portion of development would occur on non-MZ lands.

Beyond the projected RMP time frame, closure of the resource lands and habitat cap maintenance could impact future development, which would decrease emissions from these activities within the LSFO. It is too speculative to suggest when or if that may occur, so the conclusion is that the analysis of impacts from emissions inventories developed for the LSFO RMP are representative of Alternative C in the near future and during the lifetime of the RMP. (Refer to the Little Snake RMP and supporting EIS documents for the detailed analysis of air impacts and potential mitigation options.)

Colorado River Valley Field Office

An analysis of unleased mineral potential within the MZs contained either wholly or partially within the CRVFO suggests that approximately 55 percent of these mineral lands have been rated as either high or medium in relation the their economic mineral potential (development potential given current technology and market conditions). No data is available for the currently leased portions of the MZs, but the data is assumed to be similar for this analysis. Application of this assumption suggests that approximately 13,100 acres of federal mineral within the currently leased portions of MZ could be ripe for mineral extraction.

The current estimates of anthropogenic habitat disturbance within the applicable MZs is approximately 2,600 acres, or about 60 percent of the available cap area for this type of disturbance. Using the disturbance area per well assumptions at the beginning of this section (5 and 10 acres per well for access, pad, and infrastructure), the projected development could result in surface disturbance areas of between 13,300 and 26,600 acres. There is no way to know how, where, and when RMP-projected development would occur within the CRVFO, and actual development would be highly dependent on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing MZ leases and non-MZ mineral lands (federal, state, private, etc.). Given that 15 percent of all the CRVFO oil and gas

resource is located within the MZs, the estimate is that most of all disturbance would occur outside the MZs. At estimated disturbance levels the 3 percent ADH cap could potentially be reached with the additional development of approximately 174 to 348 wells (or approximately 4 percent and 7 percent of RMP projection levels). Maintaining the 3 percent cap of the total habitat has a moderate likelihood of shifting or concentrating development onto non-ADH lands that could have been accommodated within the MZ; however, the extent and relative impacts are unforeseeable absent specific development plans.

Beyond the projected RMP time frame, closure of the resource lands and habitat cap maintenance could impact future development and could decrease emissions from these activities within the FO. It is too speculative to suggest when or if that may occur; therefore, the conclusion is that the analysis of impacts from emissions inventories developed for the CRVFO RMP are representative of Alternative C for this EIS in the near future and during the lifetime of the RMP. (Refer to the Colorado River Valley RMP and supporting EIS documents for the detailed analysis of air impacts and potential mitigation options.)

Kremmling Field Office

An analysis of unleased mineral potential within the MZs contained either wholly or partially within the KFO suggests that approximately 27 percent of these mineral lands have been rated as either high or medium in relation the their economic mineral potential (development potential given current technology and market conditions). No data is available for the leased portions of the MZs, but the data is assumed to be similar for this analysis. Application of this assumption suggests that approximately 35,100 acres of federal mineral within the leased portions of MZ could be ripe for mineral extraction.

The current estimates of anthropogenic habitat disturbance within the applicable MZs is approximately 13,500 acres, which represents about 63 percent of the available cap area for this type of disturbance. Using the disturbance area per well assumptions at the beginning of this section (5 and 10 acres per well for access, pad, and infrastructure), the projected development could result in surface disturbance areas of between 1,000 and 1,900 acres. There is no way to know how, where, and when RMP-projected development would occur within the KFO, and actual development would be highly dependent on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Even though 55 percent of all the KFO oil and gas is within the MZs, and if all of the estimated disturbance were to occur within the MZs (very unlikely), the 3 percent ADH cap could still be maintained and could accommodate all of the projected RMP development. The compensating factor is that the projected development within the KFO is very low, relative to other planning area field offices, even though the KFO MZs and habitat represent most of the KFO minerals.

Beyond the projected RMP time frame, closure of the resource lands and habitat cap maintenance could impact future development and could decrease emissions from these activities within the KFO. It is too speculative to suggest when or if that may occur; therefore, the conclusion is that the analysis of impacts from emissions inventories developed for the KFO RMP are representative of Alternative C in the near future and during the lifetime of the KFO RMP. (Refer to the Kremmling RMP and supporting EIS documents for the detailed analysis of air impacts and potential mitigation options.)

White River Field Office

An analysis of unleased mineral potential within the MZs contained either wholly or partially within the WRFO suggests that approximately 56 percent of these mineral lands have been rated as either high or medium in relation the their economic mineral potential (development potential given current technology and market conditions). No data is available for the leased portions of the MZs, but the data is assumed to be similar for this analysis. Application of this assumption suggests that approximately 188,100 acres of federal mineral within the leased portions of MZ could be ripe for mineral extraction.

The current estimates of anthropogenic habitat disturbance within the applicable MZs is approximately 15,000 acres, which represents about 58 percent of the available cap area for this type of disturbance. Using the disturbance area per well assumptions at the beginning of this section (5 and 10 acres per well for access, pad, and infrastructure), the projected development could result in surface disturbance areas of between 23,000 and 46,000 acres within the WRFO. There is no way to know how, where, and when RMP-projected development would occur within the WRFO, and actual development would be highly dependent on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Given that 47 percent of all the WRFO oil and gas is in the MZs, and if half of all of the estimated disturbance were to occur within the MZs, the 3 percent ADH disturbance cap could be reached with the additional development of approximately 1,090 to 2,180 wells (or approximately 24 percent and 47 percent of RMP projection levels). Maintaining the 3 percent cap of the total habitat has a moderate likelihood of shifting or concentrating development onto non-ADH lands that could have been accommodated within the MZ; however, the extent and relative impacts are unforeseeable absent specific development plans.

Beyond the projected RMP time frame, closure of the resource lands and habitat cap maintenance could impact future development and could decrease emissions from these activities within the WRFO. It is too speculative to suggest when or if that may occur; therefore, the conclusion is that the analysis of impacts from emissions inventories developed for the WRFO RMP are representative of Alternative C in the near future and during the lifetime of the WRFO RMP. (Refer to the White River RMP and supporting EIS documents for the detailed analysis of air impacts and potential mitigation options.)

Grand Junction Field Office

An analysis of unleased mineral potential within the MZs contained either wholly or partially within the GJFO suggests that approximately 61 percent of these mineral lands have been rated as either high or medium in relation the their economic mineral potential (development potential given current technology and market conditions). No data is available for the currently leased portions of the MZs, but the data is assumed to be similar for this analysis. Application of this assumption suggests that approximately 23,300 acres of federal mineral within the leased portions of MZ could be ripe for mineral extraction.

The current estimates of anthropogenic habitat disturbance within the applicable MZs is approximately 1,300 acres, which represents about 54 percent of the available cap area for this type of disturbance. Using the disturbance area per well assumptions at the beginning of this section (5 and 10 acres per well for access, pad, and infrastructure), it can be estimated that the projected development could result in surface disturbance areas of between 3,700 and 7,400 acres within the GJFO. There is no way to know how, where, and when RMP-projected development would occur, and actual development would be highly dependent on the site-specific factors of

accessibility, actual mineral potential, and other resource concerns for existing MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Only 2.5 percent of all the GJFO oil and gas is in the MZs, so it is highly unlikely that significant development would occur or be impacted by this management action. The compensating factors are that the projected development and habitat within the GJFO is fairly low, relative to other planning area field offices. The conclusion is that the analysis of impacts from emissions inventories developed for the GJFO RMP are representative of Alternative C in the near future and during the lifetime of the FO RMP. (Refer to the Grand Junction RMP and supporting EIS documents for the detailed analysis of air impacts and potential mitigation options presented.)

Alternative D

Under Alternative D, all ecological sites supporting sagebrush in PPH identified for each MZ within the planning area would be subject to anthropogenic and total habitat disturbance caps, defined as 5 percent and 30 percent of the respective GRSG habitat. Refer to **Table 4.12**, Analysis of Alternative D.

Table 4.12. Analysis of Alternative D

Field Office	RMP Acres Available for Lease	RMP Well Projections	MZ Federal Minerals Acres	GRSG Habitat Acres	Estimated Disturbance Cap Acres (5 percent)
CRVFO	679,200	2,662	99,600	59,600	3,000
GJFO	961,600	740	23,300	14,000	700
KFO	642,900	192	355,900	459,000	23,000
LSFO	1,900,300	2,425	1,407,300	1,012,600	50,600
WRFO	1,240,500	4,603	586,900	160,400	8,000

Little Snake Field Office and Routt National Forest

The current estimates of anthropogenic habitat disturbance within the applicable MZs is approximately 10,100 acres, which represents about 20 percent of the available cap area for this type of disturbance. Using the disturbance area per well assumptions at the beginning of this section (5 and 10 acres per well for access, pad, and infrastructure), it can be estimated that the projected development could result in surface disturbance areas of between 12,125 and 24,300 acres within the LSFO. There is no way to know how, where, and when RMP-projected development would occur; actual development would be highly dependent on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Given that 74 percent of all the LSFO oil and gas is in the MZs, and if all the estimated disturbance were to occur within the MZs, the 5 percent cap could still be maintained and could accommodate all of the projected RMP development.

Beyond the projected RMP time frame, closure of the resource lands and habitat cap maintenance could impact future development, which would decrease emissions from these activities within the LSFO. It is too speculative to suggest when or if that may occur; therefore, the conclusion is that the analysis of impacts from emissions inventories developed for the LSFO RMP are representative of Alternative D in the near future and during the lifetime of the RMP. (Refer to the Little Snake RMP and supporting EIS documents for the detailed analysis of air impacts and potential mitigation options.)

Colorado River Valley Field Office

The current estimates of anthropogenic habitat disturbance within the applicable MZs is approximately 1,300 acres, which represents about 42 percent of the available cap area for this type of disturbance. Using the disturbance area per well assumptions at the beginning of this section (5 and 10 acres per well for access, pad, and infrastructure), it can be estimated that the projected development could result in surface disturbance areas of between 13,310 and 26,600 acres within the CRVFO. There is no way to know how, where, and when RMP-projected development would occur within the CRVFO, and actual development would be highly dependent on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Given that 15 percent of all the CRVFO oil and gas is in the MZs, most of all the estimated disturbance would occur outside the MZs. At estimated disturbance levels, the 3 percent ADH cap could be reached with the additional development of approximately 173 to 345 wells (or approximately 4 percent and 7 percent of RMP projection levels). Maintaining the 5 percent cap of the total habitat has a moderate likelihood of shifting or concentrating development onto non-GRSG habitat that could have been accommodated within the MZ; however, the extent and relative impacts are unforeseeable absent specific development plans.

Beyond the projected RMP time frame, closure of the resource lands and habitat cap maintenance could impact future development and could decrease emissions from these activities within the CRVFO. It is too speculative to suggest when or if that may occur; therefore, the conclusion is that the analysis of impacts from emissions inventories developed for the CRVFO RMP are representative of Alternative D in the near future and during the lifetime of the RMP. (Refer to the Colorado River Valley RMP and supporting EIS documents for the detailed analysis of air impacts and potential mitigation options.)

Kremmling Field Office

The current estimates of anthropogenic habitat disturbance within the applicable MZs is approximately 8,800 acres, which represents about 38 percent of the available cap area for this type of disturbance. Using the disturbance area per well assumptions at the beginning of this section (5 and 10 acres per well for access, pad, and infrastructure), it can be estimated that the projected development could result in surface disturbance areas of between 1,000 and 1,900 acres within the KFO. There is no way to know how, where, and when RMP-projected development would occur, and actual development would be highly dependent on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Even though 55 percent of all the KFO oil and gas is in the MZs, and if all of the estimated disturbance were to occur within the MZs (very unlikely), the 5-percent habitat cap could still be maintained and could accommodate all of the projected RMP development. The compensating factor is that the projected development within the KFO is very low, relative to other planning area field offices, even though the KFO MZs and habitat represent most of the KFO minerals.

Beyond the projected RMP time frame, closure of the resource lands and habitat cap maintenance could impact future development and could decrease emissions from these activities within the KFO. It is too speculative to suggest when or if that may occur; therefore, the conclusion is that the analysis of impacts from emissions inventories developed for the KFO RMP are representative of Alternative D in the near future and during the lifetime of the RMP. (Refer to the Kremmling RMP and supporting EIS documents for the detailed analysis of air impacts and potential mitigation options.)

White River Field Office

An analysis of unleased mineral potential within the MZs contained either wholly or partially within the WRFO suggests that approximately 56 percent of these mineral lands have been rated as either high or medium in relation the their economic mineral potential (development potential given current technology and market conditions). No data is available for the currently leased portions of the MZs, but the data is assumed to be similar for this analysis. Application of this assumption would suggest that approximately 188,100 acres of federal mineral within the leased portions of MZ could be ripe for mineral extraction.

The current estimates of anthropogenic habitat disturbance within the applicable MZs is approximately 2,400 acres, which represents about 30 percent of the available cap area for this type of disturbance. Using the disturbance area per well assumptions at the beginning of this section (5 and 10 acres per well for access, pad, and infrastructure), it can be estimated that the projected development could result in surface disturbance areas of between 23,000 and 46,000 acres within the WRFO. There is no way to know how, where, and when RMP-projected development would occur, and actual development would be highly dependent on the site-specific factors of accessibility, actual mineral potential, and other resource concerns) for existing MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Given that 47 percent of all the WRFO oil and gas is in the MZs, and if half of all of the estimated disturbance were to occur within the MZs, the 3 percent ADH disturbance cap could be reached with the additional development of approximately 563 to 1,126 wells (or approximately 12 percent and 24 percent of RMP projection levels). Maintaining the 5-percent cap of the total habitat has a moderate likelihood of shifting or concentrating development onto non-GRSG habitat that could have been accommodated within the MZ; however, the extent and relative impacts are unforeseeable absent specific development plans.

Beyond the projected RMP time frame, closure of the resource lands and habitat cap maintenance could impact future development and could decrease emissions from these activities within the WRFO. It is too speculative to suggest when or if that may occur; therefore, the conclusion is that the analysis of impacts from emissions inventories developed for the WRFO RMP are representative of Alternative D in the near future and during the lifetime of the WRFO RMP. (Refer to the White River RMP and supporting EIS documents for the detailed analysis of air impacts and potential mitigation options.)

Grand Junction Field Office

The current estimates of anthropogenic habitat disturbance within the applicable MZs is approximately 300 acres, which represents about 44 percent of the available cap area for this type of disturbance. Using the disturbance area per well assumptions at the beginning of this section (5 and 10 acres per well for access, pad, and infrastructure), it can be estimated that the projected development could result in surface disturbance areas of between 3,700 and 7,400 acres within the GJFO. There is no way to know how, where, and when RMP-projected development would occur, and actual development would be highly dependent on the site-specific factors of accessibility, actual mineral potential, and other resource concerns) for existing MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Only 2.5 percent of all the GJFO oil and gas is in the MZs, so it is highly unlikely that significant development would occur or be impacted by this management action. The compensating factors are that the projected development and habitat within the GJFO is fairly low, relative to other planning area field offices. The conclusion is that the analysis of impacts from emissions inventories developed for the GJFO RMP are

representative of Alternative D in the near future and during the lifetime of the RMP. (Refer to the Grand Junction RMP and supporting EIS documents for the detailed analysis of air impacts and potential mitigation options.)

Summary of Impacts on Air Quality

None of the alternatives analyzed this EIS is statistically better or worse with respect to impacts on air quality.

As previously stated, the various alternatives have different capacities to concentrate development in the future, however the extent of such concentration will be highly dependent on the temporal or incremental changes to the disturbance caps in relation to the mineral potential of any unleased lands. The management actions that would be implemented to effectively manage the caps are not known at this time, and thus there is no way of predicting how oil and gas could be corralled beyond the RMP lifetimes to analyze specific impacts on air quality from such concentrations. Regardless, all future projects will be analyzed, based on the actual development proposals, to ensure that air quality is adequately protected and fully considers all contemporaneous development at appropriate scales.

4.18. Climate Change

Impacts on GRSG (and all other resources) from climate change will be same under each of the alternatives. Climate change is a global phenomenon that affects resources at the local level. Assessing climate change impacts is difficult due to the uncertainty of what the climate may actually do in the future. If greenhouse gas emissions remain at current levels, temperatures could potentially increase by as much as 10° Fahrenheit by the end of the century (National Fish, Wildlife and Plants Climate Adaptation Partnership 2012). If these changes were to occur, it could have profound impacts on GRSG within the planning area.

Vulnerability of resources from climate change is based on three factors; 1) exposure; 2) sensitivity; and 3) the adaptive capacity of the resource (Glick et. al. 2011). Exposure is the nature and degree to which a resource is exposed to climate variations. Sensitivity is the degree to which a resource is affected, either adversely or beneficially, by climate change. Adaptive capacity is the ability of a resource is able to adjust to climate change, including climate variability and extremes to moderate potential damages, to take advantage of opportunities, or to cope with the consequences. With each of these factors there is always some uncertainty.

The main impacts of climate change on GRSG would be the possibility of loss of sagebrush vegetation communities. It is likely that local extirpations of GRSG could occur as vegetation communities change from shrublands to either grasslands or woodlands. The Colorado Plateau Rapid Ecological Assessment Report (Bryce et al. 2012) indicated that under the climate change scenarios that Inter-mountain Basins big sagebrush plant communities were at a relatively high risk of being impacted due to climate change. A loss of sagebrush communities due to climate change would directly impact GRSG. Compounding this issue is that the planning area is at the southern edge of the range for GRSG, since species at the edge of their range are typically at a higher risk. If plant communities shift north in latitude it is possible that local populations of GRSH could be extirpated by the end of the century due to habitat loss attributed to climate change.

Projected hotter, dryer summers could have profound impacts on sagebrush habitats. These hotter, dryer summers may potentially increase the amount of wildfires in the planning area. Since the primary sagebrush species in the planning area that GRSG depend upon are killed by fires and in some cases may take up to 70 years to re-colonize (http://www.fs.fed.us/database/feis/) would cause a decrease in these habitats. An increase in wildfire extent, frequency, and intensity could then lead to an increased chance of cheatgrass invasion which would further increase fire intensity.

In addition to the loss of sagebrush, riparian areas will most likely be impacted as well. Changes in precipitation patterns may affect snowpack and warming temperatures may cause earlier snowmelt thus impacting seasonal stream flows, which in turn may impact riparian and moister habitats. This drying out of riparian areas, especially those that are utilized by GRSG for brood rearing may cause a loss reproductive capacity. A vulnerability assessment was completed for Gunnison sage-grouse (*Centrocercus minimus*) in the Gunnison Basin (Neely et al. 2011) determined that mesic meadows, springs and seeps, and low vegetation riparian areas were at a high risk of exposure to climate change. These habitats are critical to GRSG for brood rearing of young chicks. The loss of these habitats due to climate change impacts, exacerbated by non-climate stressors such as habitat fragmentation due to development and road building, past over grazing practices, and invasive species have the possibility of reducing the survival of GRSG broods. The Colorado Plateau Rapid Ecological Assessment Report (Bryce et. al. 2012) came to the similar conclusions for riparian habitats based on their future climate scenarios.

In summary, climate change has the potential to have profound impacts for those critical habitats that support GRSG populations within the planning area. As the temperatures warm and precipitation patterns change this may change vegetation communities which may cause impacts on GRSG. These climate changes, along with current non-climate related stressors may have profound impacts on GRSG in the long term.

4.19. Visual Resources

4.19.1. General Description

This section describes potential impacts of the alternatives on visual resources, specifically the potential for management decisions to create visual changes or contrasts in the existing landscape. Visual resources are impacted by surface-disturbing activities that introduce new visual elements (in form, line, color, and texture) into the landscape, changing the features that characterize the landscape, including landform, water, vegetation, and structures.

The BLM's VRM system consists of two stages: inventory (visual resource inventory) and development of VRM objectives. The visual resource inventory process provides BLM managers with a means for determining visual values. The inventory consists of a scenic quality evaluation, sensitivity level analysis, and a delineation of distance zones. Based on these three factors, BLM-administered lands are placed into one of four visual resource inventory classes, representing the relative value of visual resources. Classes I and II are the most valued, Class III represents a moderate value, and Class IV is of least value. The visual resource inventory classes are informational and provide the basis for considering visual values in the RMP process. Visual resource inventory classes do not establish management direction and should not be used as a basis for constraining or limiting surface-disturbing activities. VRM classes are established through the RMP process for all BLM-administered lands. VRM management classes may differ from visual resource inventory classes, based on management priorities for land uses. During the

RMP process, the class boundaries are adjusted as necessary to reflect the resource allocation decisions made in RMPs. VRM objectives are established for each class.

The visual resource contrast rating system, described in the 1986 BLM Manual Handbook H-8431-1 Visual Resource Contrast Rating, is a systematic process used by the BLM to analyze potential visual impacts of proposed projects and activities and for identifying measures to mitigate these impacts. The RMP-generated VRM objectives, when available, are used in analyzing impacts on visual resources. The VRM objectives provide a baseline for determining how much a proposed management action would affect the visual values (scenic quality, sensitivity, and distance zones) of visual resources, as well as determining the level of disturbance an area can support while meeting VRM objectives. Where there are no RMP-approved objectives, interim VRM classes would be developed, except the inventory would be limited to the area affected by the project, and VRM classes would reflect the management decision made in existing RMPs. An RMP amendment is not required unless the project that is driving the evaluation requires an amendment. All surface-disturbing activities, regardless of the alternative or management action, would be subject to the VRM objectives of the area within which the activity takes place.

The analysis assumes that areas managed according to VRM Class III and IV objectives would permit more surface-disturbing impacts and could allow for greater adverse impacts on visual resources and scenic quality than those areas managed according to VRM Class I and II objectives.

4.19.2. Methodology and Assumptions

General Impacts on Visual Resources

There are no specific management goals, objectives, or actions being proposed for visual resources related to the protection of GRSG in this EIS. Impacts on visual resources would result from some of the actions proposed under other resources and uses.

Indicators of impacts on visual resources and the measurements used to describe the impacts (where available or appropriate) are described below:

- Alteration of landscape character, public visual sensitivity, and visibility from surface occupancy and surface-disturbing activities.

Changes to form, line, color, and texture of a landscape.

Impacts on visual resources would occur if a proposed project changed the landscape or introduced new features that contrast with the natural physical character of the landscape, diminish the overall scenic quality, and exceed the allowable levels associated with the VRM Class objective.

Impacts on visual resources would occur if a proposed project design integrates repetition of form, line, color, and texture from the local setting and expresses the natural visual characteristics and improves or enhances the scenic quality of a landscape.

Project Examples:

- Earthwork construction-Roads, trails, ROW development, oil and gas development, mineral development, and renewable energy development

    - Construction of structures-Oil and gas facilities, renewable energy facilities, recreation sites, communication sites, and water storage
    - Vegetation treatments-Range improvements, habitat improvements, and fuel treatments
- Preservation or restoration and enhancement of landscape character.

Changes to form, line, color, and texture of a landscape.

Impacts on visual resources would occur if surface land use restrictions forced project relocation and concentration of development to areas with higher scenic quality.

Impacts on visual resources would occur if a proposed project design integrates repetition of form, line, color, and texture from the local setting and expresses the natural visual characteristics and improves or enhances the scenic quality of a landscape.

Project examples:

    - Special designations (e.g., ACECs and WSAs) or stipulations (e.g., NSOs and CSUs) that prohibit or limit surface occupancy or surface-disturbing activities
    - Enhancement or restoration of disturbed or degraded lands due to vegetation treatments or reclamation

Assumptions

- As the population continues to grow and more people move into the wildland-urban interface, scenic resources within the planning area would become more important to adjacent communities. The importance of scenic values, natural appearing landscapes, and unaltered open space is expected to increase in value to residents and visitors.
- As development increases in the wildland-urban interface, the visual intrusion of nighttime "light pollution" from aboveground facilities is also expected to increase.
- Visitors to BLM-administered and National Forest System lands or residents living near BLM-administered and National Forest System lands are sensitive receptors to changes in scenic quality.
- The greater the size and severity of surface disturbance and degree of air quality degradation, the greater the impact there would be on scenic quality.
- Specific viewer variables have an effect on the magnitude of a visual impact and which element of form, line, color, or texture is most dominant and will aid in defining which mitigation techniques will be the most effective. Viewer variables include the viewer's distance, the viewing angle, motion, speed, and length of time in view, and the scale of the proposed project.
- Management actions that provide additional protection. such as cultural resources, special designations, and stipulations, could indirectly limit the level of change to characteristic landscapes and scenic quality, which would preserve the existing character of the landscape.

- VRM class objectives apply to all resource uses. Class objectives would be adhered to through application of fundamental design techniques, BMPs, PDFs, and RDFs, which could include special project design, avoidance, or mitigation.

- All management and resource uses would be subject to NEPA analysis, which would include completing a VRM visual resource contrast rating analysis to determine conformance to VRM objectives in the RMP and to identify measures to minimize or mitigate potential impacts on visual resources. The visual contrast rating system would be used as a guide to analyze site-specific visual impacts from proposed projects, including project design and placement. This analysis would also consider the interrelationship of the underlying visual values (scenic quality, sensitivity, and distance zone) and if the proposed action and alternatives would alter the visual resource inventory classes. Environmental factors should also be considered when assessing visual impacts of a proposed project, including season of use, light conditions, vegetation recovery time, spatial relationships, atmospheric conditions, and motion.

- Additional surface disturbance or structures would contribute to the cumulative impacts of resource development on the landscape. This would increase industrialization of the landscape, would diminish visual quality, and would increase visual contrast. Although surface disturbance can be quantified in most cases, the indirect impacts from surface disturbance, such as fugitive dust and smoke, are not easily quantified and would require a more qualitative approach.

- Changes in air quality from smoke, dust, haze, or other pollutants could reduce or degrade scenic quality by obscuring views both in the short term and long term.

- Valid existing leases would be managed under the stipulations in effect when the leases were issued, and new stipulations proposed under the RMP would apply if leases were renewed.

- VRM class objectives apply only to federal surface lands. On split-estate lands, VRM objectives can be adopted for private surface land with a landowner's consent.

- Proposed activities that could not be effectively mitigated would not be authorized.

4.19.3. Direct and Indirect Impacts on Visual Resources

Impacts from Travel Management on Visual Resources

Alteration of Landscape Character from Surface Occupancy and Surface-disturbing Activities and Preservation or Restoration and Enhancement of Landscape Character

Management actions for resources and resource uses could adversely affect visual resources when they result in surface occupancy and surface disturbance activities or relocation or concentration of development to areas with higher scenic quality because of restrictions on surface land use. Management actions for resources and resource uses could beneficially affect visual resources when they increase surface area protected from surface occupancy and surface disturbance activities due to special designations or stipulations, or when they enhance or restore disturbed or degraded lands due to vegetation treatments or reclamation. The potential indirect impacts of limiting motorized travel and upgrades to existing routes in PPH and ADH on visual resources are summarized below by alternative.

Alternative A-Compared to all the alternatives, Alternative A has the most surface acres open to cross-country travel in PPH. The designation of OHV open areas could have adverse impacts on visual resources. The level of use, type of soil, and vegetation community all could influence the amount of change to the landscape. Although the landscape in many areas would not be impacted by cross-country travel use because of topographic and vegetation constraints, continuing to manage large areas as open would allow the greatest potential for changes to the landscape and impacts on visual resources because of the loss of vegetation and surface disturbance created by cross-country travel and hill climbs. Tire tracks, erosion, and loss of vegetation would be evident and would contrast with the surrounding natural landscape. Upgrading existing designated routes could also have indirect impacts on visual resources because it could make routes more accessible to a greater capacity of users, and fugitive dust may become more of an issue unless the upgrade includes paving. Alternative A has the fewest surface acres, with a limited travel designation. The amount of surface acres with a closed travel designation would be the same across all alternatives. Alternative A has fewer restrictions and would allow unplanned expansion of routes. Over time, this would cause the most direct and indirect impacts on visual resources.

Within the planning area, mineral (fluid and solid) and ROW development often leads to the improvement of existing routes or the construction of new routes. Realigning existing routes would be considered if routes were damaging resources. New route construction or realignment of existing routes would be mitigated by design features to reduce the impact of surface-disturbing activities on visual resources. Project specific design would be required to meet the objectives of the established VRM class for the project area. Transportation actions would be limited in VRM Class I and II areas, and new routes would be restricted in areas identified for such development (SRMAs, for example). Impacts on visual resources would be analyzed in subsequent NEPA documents.

Existing routes that are causing damage to resources and routes that are no longer used would be restored using desirable vegetation when the native plant community cannot recover and occupy the site sufficiently. These measures would indirectly restore and enhance visual resources because the restored areas would more closely resemble the surrounding natural landscape.

Alternative B-Alternative B would limit motorized travel and would prohibit upgrades to existing designated routes within PPH. Under Alternative B, the surface area with an open travel designation (in Alternative A) would be changed to a limited travel designation in PPH. This would indirectly, but beneficially, contribute to the protection of visual resources because no new surface disturbance would occur from inappropriate or unplanned expansion of routes, and upgrades to routes would be prohibited. However, depending on the type of surface, use, and amount of use there could still be indirect visual impacts from fugitive dust. Alternative B would have more surface acres with a limited travel designation. This provides more restrictions than Alternative A and would indirectly protect visual resources by reducing the potential for additional routes and changes to the landscape. The amount of surface acres with a closed travel designation would remain the same as Alternative A.

Alternative B would limit route construction to realigning existing designated routes in PPH, except if valid existing rights cannot be accessed using existing designated routes, then new route construction, using the absolute minimum standard necessary, would be permitted. The impacts of limiting new route construction to the realignment of existing designated routes or construction of new routes to access existing rights would vary, depending on the location, amount of surface disturbance, and current VRM objective. For example, areas managed as VRM Class III or IV would permit more surface-disturbing impacts than areas managed as VRM Class I or II.

However, the landscape itself may dictate what is feasible, and many areas would not be impacted because of topographic and vegetation constraints.

Requiring only minimum standards for new road construction could adversely affect visual resources because the new routes may not be suitable for the intended use, may not comply with road and safety standards, and may not be designed and constructed to allow for successful reclamation. For example, excessive cut and fill slopes would not be conducive to vegetation establishment. This could result in unstable soils, erosion, noxious weed growth, and thus a decline in scenic quality. Alternative B would also require a 3 percent disturbance cap, which may push development and associated infrastructure (e.g., new routes) to other areas that have not reached the disturbance cap. This could indirectly impact areas with higher scenic quality. However, there could also be direct benefits to visual resources if an area has exceeded the 3 percent disturbance cap because no further surface disturbance associated with new route construction would be permitted until enough habitat is restored to maintain the area under this cap.

Alternative B would require that all routes not designated in a travel management plan, WSA, or lands with wilderness characteristics (that have been selected for protection in previous RMPs) in PPH be restored using appropriate seed mixes and to consider transplanted sagebrush. Restoring unnecessary routes, in general, would indirectly benefit visual resources. These areas would be recontoured to mimic the surrounding natural topography and revegetated, which would make the area blend with the surrounding natural landscape, thus enhancing scenic quality.

However, the use of "appropriate seed mixes" under Alternative B is not clearly defined. This could have an adverse effect on visual resources by introducing species that are not native to a site, creating a monoculture of one species of grasses, for example, or introducing noxious weeds that could over time dominate the site. As a result, the restored site would contrast with the surrounding natural vegetation. For example, restoring a route in an area predominantly composed of conifers or deciduous trees with a monoculture of grasses would not blend in well with the surrounding landscape; it would contrast in form, line, color, and texture. Using transplanted sagebrush would be appropriate only if there is sagebrush in the adjacent undisturbed landscape. In this scenario, using sagebrush would provide texture and color to the restored site that would mimic the texture and color in the surrounding landscape.

Alternative B would be less beneficial to visual resources because the type of seed mixes specified would not necessarily be native or species that would blend well with the surrounding native vegetation.

Alternative C-Impacts on visual resources are similar to Alternative B, except upgrading existing designated routes would be prohibited in ADH, versus PPH under Alternative B. Also, route construction would be limited to the alignment of existing designated routes in ADH. This would cover more acreage than PPH under Alternative B.

Alternative C would also require a 4-mile buffer from leks in PPH to determine the realignment of a route and would prohibit new route construction within 4 miles of active GRSG leks in ADH. Although the overall acreage would increase from PPH under Alternative B to ADH under Alternative C, it is difficult to determine if Alternative C would be more beneficial or adversarial to visual resources without project-specific information, including location, amount of surface disturbance, and current VRM objective. Impacts on visual resources would need to be analyzed in subsequent NEPA documents.

Impacts on visual resources are similar to Alternative B, except Alternative C would require the use of appropriate native seed mixes in ADH. By specifying native seed mixes, the restored route would more closely resemble the surrounding natural environment, thus enhancing scenic quality. Again, like Alternative B, the use of "appropriate" is unclear. The native seed mixes selected should be site specific. What works in one location may not work in another location and may ultimately contrast with existing native vegetation.

Alternative C would indirectly benefit visual resources more than any other alternative because the use of native plants would be specified.

Alternative D-Impacts on visual resources are similar to Alternative B, except that upgrades to existing designated routes in PPH would be permitted, provided they do not adversely affect GRSG populations or habitat. Also, Alternative D would apply a 5 percent disturbance cap, which would be less restrictive than Alternative B. Alternative D would require proponents to use Gold Book standards for new road construction. This would indirectly, but beneficially, contribute to the protection of visual resources. The Gold Book provides guidelines and standards for roads and access ways, including guidelines for planning, location, design, construction, maintenance, and operations. The intent is that all roads be designed, constructed, and maintained to ensure public safety and the protection of resources.

Impacts from Lands and Realty Management on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A-This alternative has the fewest acres of exclusion and avoidance areas. Under Alternative A, there are some protective stipulations for other resources, such as threatened and endangered species habitat, soils, and water resources, and special designations, such as WSAs and ACECs, that would prohibit surface occupancy and surface-disturbing activities. These actions would indirectly benefit visual resources because these areas would be protected from new surface disturbance. However, Alternative A has the fewest restrictions to locating ROW corridors and ROWs. It has the fewest restrictions for construction (including burying power lines) and requirements for collocating ROWs and reclaiming unused ROWs.

Alternative B-Under Alternative B, PPH would be managed as ROW exclusion areas, and PGH would be managed as ROW avoidance areas. Exceptions to exclusion areas would be considered where, in the case of a valid existing right not yet developed, a new ROW could be completed entirely within the disturbance footprint of an existing ROW (e.g., locating a pipeline beneath a power line or along an existing road), or, in the case of a valid developed right, the new ROWs could be collocated with an existing ROW. If a new access road or other ROW could not be collocated with an existing ROW, it may be constructed only if impacts are minimized and disturbance remains within a 3 percent cap. If the cap could not be avoided, mitigation would be required.

ROW or SUA authorizations for roads, utilities, communication facilities, and energy development could indirectly impact visual resources by necessitating surface occupancy and surface-disturbing activities. By excluding areas in PPH from ROW or SUA authorizations under Alternative B, this would indirectly protect visual resources because no new surface disturbance would occur in these areas. Although, this could also have an adverse effect on visual resources because there may be fewer areas where ROW or SUA development could be relocated, and these

areas may be more visually sensitive. However, the landscape itself may dictate what is feasible, and many areas would not be impacted because of topographic and vegetation constraints.

Creating avoidance areas in PGH would benefit visual resources because these areas would be avoided for any new ROWs or SUAs, if at all possible; thus, no new surface disturbance would occur in these areas. However, an important point is "if at all possible" because there may be times when some areas cannot be avoided and surface disturbance would still occur. This might include a large transmission corridor or pipeline corridor that may need to cross a PGH area because of other constraints, such as topography land use agreements. The 3 percent disturbance cap may push development and associated infrastructure (e.g., new routes) to other areas and zones that have not reached the 3 percent disturbance cap. This could indirectly impact areas with higher scenic quality. However, there could also be direct benefits to visual resources if an area or zone has exceeded the 3 percent disturbance cap because no further surface disturbance associated with new ROWs would be permitted until enough habitat is restored to maintain the area under this 3 percent cap.

Collocating new ROWs or SUAs within existing ROW or SUA corridors would benefit visual resources because the new surface disturbance would not be associated with prior surface disturbance. The entire footprint of a proposed project would have to be within the existing disturbance. Burying power lines would also benefit visual resources in the long-term because there would no longer be a three-dimensional structure in the landscape that could be seen from greater distances, depending on topography. However, in the short term, the linear corridor created by the surface disturbance from burying the power lines would contrast with the existing natural landscape because of the exposed bare soil, texture, and color. Reclaiming any unused development, such as a road or fence line, associated with a ROW or SUA would also benefit visual resources by removing contrasting elements in the landscape, which would make the area blend with the surrounding natural landscape.

Even with these exceptions, there would be indirect protection of visual resources. For example, with a conservation easement, a landowner would retain private ownership but would be limited to the amount of development that could occur on the land in perpetuity. By limiting development, this would limit the amount of surface disturbance that could occur, thus indirectly protecting visual resources.

In general, retaining public ownership of PPH would be beneficial to visual resources because there would be indirect protection from the land being under BLM/USFS administration. As such, visual resources may be protected by other resource management actions. Land exchanges, acquisitions, and disposals would add or remove land from BLM/USFS administration. Land disposals could result in the loss of the indirect protection of visual resources provided by other resource management actions, whereas acquisitions could indirectly, but beneficially, provide protections that would not be afforded under nonfederal ownership.

Withdrawing lands within PPH from mineral development would be beneficial to visual resources because mineral exploration and development would necessitate surface occupancy and surface disturbance activities that would contrast with the existing landscape. By withdrawing these lands, no new surface disturbance from mineral development would occur. However, this could also have an adverse effect on visual resources because there may be fewer available areas where mineral development could be relocated, and these areas may be more visually sensitive.

Alternative C-Impacts on visual resources are similar to Alternative B, except the amount of acreage protected from surface disturbance would be greater. ADH would become exclusion

areas for new ROWs under Alternative C, compared to PPH under Alternative B. Alternative C would have fewer acres available for ROWs through restrictions to protect GRSG. Conservation measures would be indirectly more protective to visual resources under Alternative C. Also, there would be no exceptions for any disposal of federal land to consolidate ownership that would benefit GRSG. Acquisition of private lands within in ADH would be prioritized over conservation easements. The amount of acreage proposed for mineral withdrawal under Alternative C would also be greater because it would include ADH versus PPH.

Alternative D-Alternative D is similar to Alternative B, except PPH would become avoidance areas under Alternative D versus exclusion areas under Alternative B. This would not necessarily guarantee that an area would be protected from surface disturbance. Alternative D would be less protective of visual resources than Alternative C.

Alternative D is similar to Alternative B, except that, in isolated federal parcels, disposal of tracts that are not capable of altering GRSG populations would be allowed, and GRSG habitat values would be considered in acquisitions. There are no specific measures for proposing lands for mineral withdrawal as under Alternatives B and C.

Impacts from Wind Energy and Industrial Solar Development on Visual Resources

Alteration of Landscape Character from Surface Occupancy and Surface-disturbing Activities

Alternative A-Alternative A does not preclude wind energy development or industrial solar specifically within GRSG habitat. In addition, Alternative A would have the most areas available for ROWs that could lead to more impacts on visual resources.

Alternative B-Alternative B has no specific measures for wind energy development or industrial solar, but this does not preclude wind energy development or the associated impacts on visual resources from new surface disturbance and structures. However, there may be existing land use restrictions and constraints in place that prohibit wind energy development, which would indirectly protect visual resources.

Alternative C– Under Alternative C, wind energy development and industrial solar would be prohibited within ADH. This would create a larger surface acreage that would be protected from surface disturbance and impacts on visual resources associated with wind energy development. However, this could also have an adverse effect on visual resources because there may be fewer available areas where wind energy development and industrial solar (and associated infrastructure like roads and structures) could be relocated; these areas may be more visually sensitive, for example, ridgelines. The overall surface area that could be protected could become much larger in some areas if leks are located near the edge of ADH. This could extend the surface area up to 5 miles beyond ADH from known leks.

Alternative D-Alternative D has no specific measures for wind energy development or industrial solar, but this does not preclude wind energy or industrial solar development or the associated impacts on visual resources from new surface disturbance and structures. However, there may be existing land use restrictions and constraints in place that may prohibit wind energy and industrial solar development, which would indirectly protect visual resources.

Impacts from Range Management on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A-Grazing would continue to be managed based on BLM Colorado Public Land Health Standards, Guidelines for Livestock Grazing Management, and proper functioning condition monitoring results.

Alternative B-Depending on the magnitude, degraded lands may contrast with the surrounding natural and healthy landscapes. The proposed range management measures would indirectly, but beneficially, contribute to maintaining scenic quality because lands would be closely monitored to ensure they are meeting range health standards. If the standards are not being met, grazing may be modified, allowing degraded lands to recover and to return to a condition that more closely resembles the surrounding natural landscape.

Alternative B would allow vegetation treatments only to improve forage for livestock and wild ungulates that conserves, enhances, or restores GRSG habitat in PPH. This would also apply to the design of any new structural range improvements and evaluation of existing structural range improvements. Some structural range improvements, such as water development, would require the application of PDFs or RDFs to mitigate potential impacts from West Nile virus. Alternative B would also require monitoring and treatment of invasive species associated with construction, post-construction, and existing range improvements in PPH. The proposed measures would indirectly, but beneficially, contribute to maintaining scenic quality and visual resources in the long term. This is because vegetation treatments that enhance or restore GRSG habitat would blend in with the adjacent natural landscape, repeating the basic elements in form, line, color, and texture. Well-designed and -sited structural range improvements would disperse the impact of the livestock on the landscape, preventing concentrated areas of surface disturbance, spread of weeds, and soil compaction.

Alternative C-Impacts on visual resources are similar to Alternative B, except vegetation treatments that conserve, enhance, or restore GRSG habitat would be permitted in ADH under Alternative C versus PPH under Alternative B. Treatments must also include pretreatment data on wildlife and habitat condition and must monitor the area for 3 years before grazing returns. New structural range improvements would be avoided unless independent peer-reviewed studies show that the range improvement structure benefits GRSG. Grazing management changes would be considered instead of constructing additional range improvements. Restrictions on range improvements would be expected to reduce potential for visual contrast.

Alternative D-Impacts on visual resources are similar to Alternative B, except completion of land health assessments would be prioritized in ADH versus in PPH under Alternative B; riparian and wet meadow areas would be managed for proper functioning condition in ADH under Alternative D, versus PPH under Alternative B. When a permittee or lessee voluntarily relinquishes grazing preference, converting the allotment to a reserve allotment (grass bank) would be considered. Alternative D would require a specific vegetation composition, with a less than 30 percent disturbance cap for loss of sagebrush. Structural range improvement design would be permitted only to enhance livestock distribution and to control the timing and intensity of utilization. Under Alternative D, there would be fewer restrictions on range improvements and therefore impacts on visual resources would be expected to be greater than under Alternatives B and C, but less than Alternative A.

Impacts from Wild Horse Management on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A-Wild Horses would be managed at an appropriate management level and would be monitored to ensure the appropriate management level is compatible with other resources. The long-term appropriate management level would be adjusted based on the results of the monitoring.

Alternative B-Measures for wild horse management are similar to measures for range management, and wild horse grazing is similar to permitted livestock grazing. Land health assessments would be conducted in ADH to determine if standards of rangeland health are being met; if not, populations would be managed to achieve GRSG habitat objectives. Wild horse gathers in ADH could create short-term localized surface disturbance, but over the long term the impacts would be negligible.

The proposed wild horse management measures would indirectly, but beneficially, contribute to maintaining scenic quality because lands would be closely monitored and managed to ensure they are meeting range health standards. If the standards are not being met, the BLM can adjust appropriate management levels of wild horses if resource damage is occurring, allowing degraded lands to recover and to return to a condition that more closely resembles the surrounding natural (and healthy) landscape.

Alternative C-Impacts on visual resources are the same as Alternative B because the measures for wild horse management are the same.

Alternative D-Impacts on visual resources are similar to Alternative B, except GRSG habitat requirements, in conjunction with all resources values, would be considered in wild horse gathers in ADH. Preference would be given to GRSG habitat unless site-specific circumstances warrant an exemption. Alternative D would have more indirect impacts on visual resources than Alternatives B and C because it would allow more flexibility in managing wild horses.

Impacts from Fluid Minerals Management on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A-Impacts on visual resources would vary across the planning area, but overall, Alternative A would provide the fewest protective measures that would indirectly or directly protect visual resources. Protective measures include stipulations that would limit or prohibit surface occupancy and surface-disturbing activities, special designations, and PDFs as COAs for drilling applications. Alternative A is less restrictive on fluid mineral development.

Alternative B-Measures under Alternative B would close PPH to fluid mineral leasing. Closing off these areas to new leasing would indirectly protect visual resources; this is because there would be no new surface disturbance or other visual impacts associated with fluid mineral development. This could also have an adverse effect on visual resources because there may be fewer available areas for leasing to relocate development, and these areas may be more visually sensitive. However, the potential for fluid mineral development would dictate what is feasible, and many areas would not be impacted because of the low potential for fluid mineral development.

Geophysical exploration would be allowed only within PPH using helicopter-portable drilling, wheeled, or tracked vehicles on existing roads. Geophysical exploration, in general, creates negligible temporary impacts on visual resources. These additional measures would ensure that no impacts on visual resources would be created.

The restrictions listed above would limit the amount of surface area available for fluid mineral development, similar to closing lands to leasing. These measures could benefit or adversely affect visual resources. However, it is difficult to determine the overall impacts on visual resources without project-specific information. Fluid mineral development is dictated by the downhole geology of a specific lease, which determines the potential number of wells that could be reached from one pad. The number of wells and type (horizontal or directional), type of drilling rig, whether completions would occur on-site or remotely would all contribute to the amount of surface disturbance needed to accommodate drilling and completion operations and safety requirements.

Topography and other resource constraints would also come into play and would require special design measures and mitigation. Alternative B has more restrictions on fluid mineral leasing and development than Alternative A, which would indirectly protect visual resources. However, this may cause these impacts to be moved out of GRSG habitat to areas that are more visually sensitive.

Alternative C-Impacts on visual resources are similar to Alternative B, except some of the measures under Alternative C would be within ADH, versus PPH under Alternative B. Measures under Alternative C would close leasing and would prohibit new or reissued leases in ADH. This would create a larger surface area that would be protected from surface disturbance, which would benefit visual resources. However, this may further restrict the available areas for leasing or where fluid mineral development could be relocated within a valid existing lease. As described under Alternative B, the impacts on visual resources cannot be adequately assessed without project-specific information. Alternative C applies the most restrictions on fluid mineral leasing and development, but this may cause more adverse visual impacts outside of GRSG habitat.

Alternative D-Impacts on visual resources are similar to Alternatives B and C, except some measures would be applied in different types of habitat or would be a less restrictive version of a measure. Under Alternative D, future leasing or reissuing expired leases would not be prohibited; instead, PPH would be leased with an NSO stipulation. The NSO would allow an exception if GRSG populations were stable or increasing and GRSG populations would not be adversely affected by habitat loss or disruptive activities. If a development were allowed under an exception, mitigation would be required for impacts beyond a 5 percent disturbance cap. Visual impacts would not occur on federal lands because of the NSO; however, visual impacts may get offset to private lands or non-NSO federal lands to allow directional drilling into materials underlying an NSO area. This could affect the scenic quality of the federal lands because of the cultural modifications that would occur on adjacent lands.

For valid existing leases, Alternative D would replace some of the restrictions under Alternatives B and C with greater flexibility to assess individual projects, based on site-specific conditions and project-specific design. Under such a scenario, the BLM/USFS could approve the action with attached COAs identified during project review as being necessary and appropriate for avoiding, minimizing, or offsetting potential impacts on GRSG and their habitats.

Alternative D would provide more flexibility to fluid mineral leasing and development, which could impact visual resources more within and outside of GRSG habitat.

Impacts from Solid Minerals–Coal and Locatable Minerals Management on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A-Impacts on visual resources would vary, but overall, BLM-administered or National Forest System land would be available for mining, with the exception of SRMAs, ACECs, and WSAs. Alternative A would have the least restrictive measures on coal development and reclamation provisions, resulting in a greater potential for impacts on visual resources.

Alternative B-Alternative B would minimize surface-disturbing activities (operations and maintenance) in ADH for coal mining projects and would prohibit surface coal mines in PPH. Other measures under Alternative B would prohibit new subsurface coal mine leases in PPH, unless surface materials would be located outside of PPH. Also, expansion of existing leases would be limited, unless new surface facilities were either located outside of PPH; if that is not possible, they would have to be collocated within existing disturbance or kept to a minimum. Exploration and development of coal creates large areas of surface disturbance, creating scars in the landscape that remain visible for years.

Other visual impacts include facilities, access roads, equipment, dust, and improper placement of overburden, tailings, and topsoil. Inadequate drainage and revegetation can result in erosion, which would further scar the landscape.

Measures under Alternative B would reduce or eliminate visual impacts of coal mining within GRSG habitat but would not preclude visual impacts outside of GRSG habitat associated with coal development.

Alternative C-Impacts on visual resources from coal mine leasing and development are the same as Alternative B because all of the measures that would be applied are the same.

Alternative D-Alternative D provides more opportunities for new or expanded coal mines, subject to restrictions on the amount of surface disturbance in PPH or ADH areas. Alternative D could increase the amount of surface disturbance from coal development and impacts on visual resources, compared to Alternatives B and C.

Impacts from Nonenergy Leasable Minerals Management on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A-Under Alternative A, only a small amount of GRSG habitat would be closed to nonenergy leasable mineral leasing with varying degrees of PDFs or RDFs district-wide. Alternative A would be expected to allow for the greatest potential to impact visual resources.

Alternative B-Measures under Alternative B would close PPH to nonenergy leasable mineral leasing and would prohibit new leases for expanding existing mines. Alternative B would also require the application of PFDs and RDFs to prevent unnecessary resource degradation. Exploration and development of nonenergy leasable minerals creates surface disturbances and visual impacts similar to the impacts from coal exploration and development, which could adversely affect visual resources. Measures under Alternative B would reduce or eliminate visual impacts of nonenergy mineral development within GRSG habitat; however, these measures would not preclude visual impacts outside of GRSG associated with nonenergy leasable mineral development.

Alternative C-Impacts on visual resources from nonenergy mineral development are the same as Alternative B because all of the measures that would be applied are the same.

Alternative D-Alternative D would consider allowing expansion of existing nonenergy mineral leases. However, where practicable, any permitted disturbance would be limited to a 5 percent disturbance cap. In areas where disturbance exceeds this disturbance cap, mitigation would be required to offset habitat loss. Compared to Alternatives B and C, Alternative D could increase the amount of surface disturbance from locatable mineral development and impacts on visual resources.

Impacts from Salable Mineral Management on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A-Alternative A would allow for the continued development of salable minerals. Overall, this alternative would provide the fewest restrictive measures on salable minerals development and subsequent reclamation requirements; therefore, it could result in more adverse changes to the characteristic landscape than Alternatives B, C, and D. As such, this alternative has the most potential to impact visual resources.

Alternative B-Measures under Alternative B would close PPH to mineral material sales and would require reclamation of salable mineral pits that are no longer in use. Exploration and development of salable minerals creates surface disturbances and visual impacts similar to the impacts from coal exploration and development. This could adversely affect visual resources. Measures under Alternative B, including reclaiming salable mineral pits, would reduce or eliminate visual impacts of salable mineral mines within GRSG habitat; however, this would not preclude visual impacts outside of GRSG associated with nonenergy leasable mineral development.

Alternative C-Impacts on visual resources from salable mineral development are the same as Alternative B because all of the measures that would be applied are the same.

Alternative D-Alternative D would allow existing mineral material sites to continue operations and existing mineral material sales sites to expand. However, where practicable, any permitted disturbance would be limited to a 5 percent disturbance cap. In areas where disturbance exceeds this cap, mitigation would be required to offset habitat loss. compared to Alternatives B and C, Alternative D could increase the amount of surface disturbance from locatable mineral development and impacts on visual resources.

Impacts from Fuels Management and Fire Operations on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A-Alternative A would have the fewest restrictions for fuels management actions, with the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize fire operations beyond what has already been determined in fire management plans for the area. Therefore, Alternative A could have the greatest indirect impacts on visual resources.

Alternative B-Impacts on visual resources from prevention and mitigation programs aimed at reducing unwanted fire are similar to those for vegetation treatments. However, actions related to prevention could reduce human-caused ignitions and related visual impacts caused by fire. Impacts would be minor to moderate in the short term, depending on the magnitude, but would become negligible in the long term. Wildland fires and prescribed fires would result in smoke, causing short-term, minor to moderate impacts on visibility and visual resources.

Alternative B would require the following specific fuel management measures in PPH: reduction of sagebrush canopy cover to no more than 15 percent, seasonal restrictions, restrictions on treatments in sagebrush in less than 12-inch precipitation zones, invasive weed monitoring and control, resting treated areas from grazing for 2 years, requiring native planting materials, long-term monitoring to ensure vegetation persistence, and the use of livestock to reduce fine fuels.

Alternatives B, C, and D do not include specific design measures to avoid creating or enhancing linear features in the landscape. In fact, the design measure that is included under Alternative B, C, and D would require fuels management treatments be implemented in a more linear versus block design to reduce wildfire threats in the greatest area. Depending on the scale, this would contrast with the existing natural landscape, which would typically be composed of natural patterns or mosaics of landscape features that would vary depending on the soil, topography, microclimate, and disturbance regime.

Alternative C-Impacts on visual resources are similar to Alternative B, except all of the fuel treatment measures would be applied to ADH under Alternative C, compared to PPH under Alternative B. Under Alternative C, fuel treatments would be focused on interfaces with human habitation or significant existing disturbances. ADH lands would be managed to be in a good or better ecological condition to help minimize adverse impacts from fire.

Alternative D-Impacts on visual resources are similar to Alternative B, except most of the fuel treatment measures would be applied to ADH, compared to PPH under Alternative B. Alternative D would require specific vegetation cover guidelines with a disturbance cap of 30 percent for loss of sagebrush. It would require that fuels treatments be designed to facilitate firefighter safety, which may require arranging new vegetation treatments with past treatments, vegetation with fire-resistant serial stages, natural barriers, and roads in order to constrain fire spread and growth.

Impacts from Emergency Stabilization and Rehabilitation on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A-Impacts on visual resources are similar to habitat restoration.

Alternative B-Impacts on visual resources are similar to those disclosed under habitat restoration. All measures under Alternative B would be within ADH. Alternative B would require the use of native plant materials for ESR and burned area emergency response and would require that ESR and burned area emergency response management be designed to ensure long-term persistence of vegetation, which would minimize impacts on visual resources.

Alternative C-Impacts on visual resources are similar to Alternative B, except post-fire recovery would require the establishment of adequately sized exclosures (free of livestock grazing) that could be used to access during recovery. Where burned GRSG habitat could not be fenced from other unburned GRSG habitat, the allotment/pasture would be closed to grazing until recovered. During fuels reduction projects (roadsides or other areas) the mowing of grass would be employed. Alternative C would provide the most benefits to visual resources over the long-term because it would require the use of native plant materials and would allow a burned area to recover without additional disturbance.

Alternative D-Alternative D is similar to Alternative B only in that native plant materials would be required for vegetation treatments in ADH.

Impacts from Habitat Restoration on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A-There is variability in the extent and type of restoration and the planting materials required. Alternative A would have the fewest restrictions for habitat restoration actions, with the most potential for vegetation disturbance. Alternative A would not prioritize GRSG habitat restoration and would not require any additional guidelines beyond what has already been determined within the current LUPs for the targeted areas. Alternative A would indirectly benefit visual resources within the targeted areas; however, it would not preclude the indirect benefits to visual resources created by project-specific reclamation projects outside of the target areas (e.g., mineral development and ROW development).

Alternative B-Alternative B would prioritize implementation of restoration projects in sage-brush habitat thought to be limiting GRSG distribution or abundance. Alternative B would also require the use of native plant materials and to design post-restoration management to ensure vegetation persistence. Restoring native (or desirable) plants and post-restoration management to ensure the persistence of these plants in degraded landscapes would create landscape patterns that most benefit GRSG. This would indirectly, but beneficially, contribute to maintaining scenic quality and visual resources in the long term because the restored areas would blend in with the adjacent natural landscape, repeating the basic elements in form, line, color, and texture.

Alternative C-Impacts under Alternative C are similar to the impacts under Alternative B, except exotic seedings would be rehabilitated, interseeded, and restored to recover sagebrush in areas to expand occupied habitat. Alternative C would be more beneficial to visual resources than Alternatives A and B because the landscape would more closely resemble its pre-disturbance condition.

Alternative D-Impacts under Alternative D are similar to the impacts under Alternatives B and C. The only difference is that it would require specific restoration guidelines with a disturbance cap of 30 percent for loss of sagebrush and consideration for GRSG habitat requirements in conjunction with all other resource values managed by the BLM/USFS. Alternative D would be more beneficial to visual resources than Alternative A but less than Alternatives B and C.

Impacts from ACEC/Zoological Area Management on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A-All existing ACEC designations would be recognized. ACEC designations and their management prescriptions offer long-term benefits to visual resources that occur within their boundaries by limiting or preventing surface disturbance. The current ACEC designations would indirectly protect visual resources but would provide less protection than Alternative C, which would make all PPH an ACEC.

Alternative B-Alternative B would recognize all of the existing ACEC designations. Impacts under Alternative B are the same as impacts under Alternative A.

Alternative C-Alternative C would designate PPH as a Sage-Grouse Habitat ACEC. This would create more acreage, beyond or including the surface area of existing ACEC designations under Alternative A, that would be protected from surface disturbance and impacts on visual resources. Designating an ACEC itself provides no protection; it is the management prescriptions associated

with an ACEC that provide the protections. ACECs may be managed for historic, cultural, scenic, fish or wildlife, or natural hazard values. Prescriptions for these values would indirectly benefit visual resources. The measures under Alternative C could have an adverse effect on visual resources because it would limit or prohibit surface occupancy and surface disturbance within the ACEC boundary. This may push development outside of the ACEC into areas that may be more visually sensitive.

Alternative D-Alternative D would recognize all of the existing ACEC designations but does not propose to designate any new ACECs. Impacts under Alternative D are the same as impacts under Alternatives A and B.

4.19.4. Summary of Impacts on Visual Resources

The magnitude of the indirect visual impacts associated with all alternatives proposed under this LUPA/EIS cannot be adequately assessed without project-specific information on the location, scale, landownership, VRM objective and mitigation, spatial relationship to existing surface disturbance, existing infrastructure (road and utility corridors), and GRSG leks and other seasonally critical habitats where surface disturbance should be avoided. Impacts on visual resources would need to be analyzed in subsequent NEPA documents.

In general, the following applies:

- Alternative A provides the least amount of protection for visual resources. Alternative A puts very few restrictions on development, which could result in the most modification of the landscape, and consequently, the most impacts on visual resources.
- Alternative B provides a greater level of protection for visual resources than Alternative A but would provide a lower level of protection than Alternative C.
- Alternative C would provide the most protection for visual resources. The most restrictions would be placed on development under Alternative C, which would afford the most protection for visual resources.
- Alternative D would provide more protection for visual resources than Alternative A but would provide less protection than Alternatives B and C. More flexibility for development is built into Alternative D, which could result in higher levels of development and associated surface disturbance than Alternatives B and C.

4.20. Lands with Wilderness Characteristics

4.20.1. General Description

This section discusses impacts on lands with wilderness characteristics from proposed management actions of other resources and resource uses. Existing conditions concerning lands with wilderness characteristics are described in **Section 3.20**, Lands with Wilderness Characteristics.

The BLM has numerous authorities under FLPMA to maintain inventories of all public lands and their resources, including wilderness characteristics, and to consider such information during land use planning. During the RMP planning process for each field office, a review was

completed of lands within the respective boundaries to determine whether they possess wilderness characteristics. This review included only BLM-administered lands outside of existing WSAs. Wilderness characteristics considered in this analysis include sufficient size (typically 5,000 acres or greater), naturalness, outstanding opportunities for either solitude or primitive and unconfined type of recreation, and supplemental values. In total, 242,400 acres of BLM-administered lands were found to contain, or potentially contain, wilderness character within PPH and 125,800 acres within PGH. An updated inventory would be completed prior to any surface disturbance and any potential impacts on lands with wilderness character would be analyzed through the site-specific NEPA process.

Analysis for this section discusses the impacts of planning decisions on managing lands with wilderness characteristics. Impacts identified in this section are limited to potential changes in wilderness characteristics for only the areas identified to contain, or potentially contain, wilderness character. Areas identified as potentially containing wilderness character meet the manageable size criteria but have not yet been inventoried to determine their naturalness and outstanding opportunities for solitude or primitive and unconfined types of recreation. As such, until a complete on-the-ground inventory can be conducted, they are assumed to contain wilderness character.

Wilderness characteristics are primarily influenced by actions that impact the undeveloped nature of the area or activities that increase the sights and sounds of other visitors. Generally, actions that create surface disturbance degrade the natural character of lands with wilderness characteristics, as well as the setting for experiences of solitude and primitive recreation.

No actions would be taken on any BLM-administered lands without a current inventory of lands with wilderness character that has been completed and shared with the public. Management actions that could impact an area's natural appearance include the presence or absence of roads and trails, use of motorized vehicles along those roads and trails, fences and other improvements, nature and extent of landscape modifications, or other actions that result in surface-disturbing activities. All of these activities affect the presence or absence 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 and primitive and unconfined types of recreation-are related to the human experience in an area. Visitors could have outstanding opportunities for solitude and for primitive and unconfined recreation under the following conditions:

- 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
- Where no or minimal developed recreation facilities are encountered

4.20.2. Methodology and Assumptions

General Impacts on Lands with Wilderness Characteristics

Indicators of impacts on lands with wilderness characteristics and the measurements used to describe the impacts (where available or appropriate) are described below:

- Protection of the inventoried characteristics to a level at which the value of the wilderness characteristic would continue to be present within the specific area
- Degradation of the inventoried characteristics to a level at which the value of the wilderness characteristic would no longer be present within the specific area

Measures common to both general impacts listed above are as follows:

- Size of roadless acres-Impacts would result from building roads that would reduce the roadless size
- Naturalness (apparent naturalness, not ecological naturalness)-Impacts would result from developments or vegetation manipulations that make the area appear less natural
- Opportunities for solitude or primitive recreation-Impacts would result from increases in visitation or loss of primitive recreation opportunities, depending on if either or both solitude or private and unconfined recreation were an identified wilderness characteristic
- Supplemental values-Impacts would result from any action that degrades the inventoried values

Impacts could also include actions that maintain, protect, or improve wilderness characteristics.

Assumptions

The following assumptions were used in the analysis:

- Some BLM-administered lands have been identified as potentially containing wilderness character because they meet the minimum size requirements and are free of roads. However, these parcels have yet to be inventoried to verify their apparent naturalness and opportunities for solitude and unconfined and primitive types of recreation. Until a complete on-the-ground inventory is undertaken, these parcels are assumed to contain wilderness characteristics and would be managed as such.
- All parcels identified as containing wilderness characteristics were identified because they meet the inventory criteria in BLM manual 6310, *Conducting Wilderness Characteristics Inventory on BLM Lands* (i.e., size, apparent naturalness, opportunities for solitude and primitive types of recreation, and supplemental values).
- Impacts on lands with wilderness characteristics are analyzed based on the maintenance, enhancement, or degradation (adverse impacts) of naturalness and outstanding opportunities for solitude or primitive recreation.
- All wilderness characteristics inventories will be maintained and will be updated whenever actions are proposed that could impact parcels identified as containing wilderness characteristics.

- Management of lands with wilderness characteristics to protect those characteristics is subject to valid existing rights.
- The RMPs that would be amended by this LUPA are in varying stages of inventory and management prescriptions for lands with wilderness characteristics. Potential impacts on lands with wilderness characteristics will depend on the underlying RMP's determination whether or not to protect those characteristics.

Implementing management actions for the following resources would have negligible or no impact on lands with wilderness characteristics and are therefore not discussed in detail: recreation, wild horse management, fuels management, fire operations, habitat restoration, and ESR.

4.20.3. Direct and Indirect Impacts on Lands with Wilderness Characteristics

Impacts from Travel Management on Lands with Wilderness Characteristics Not in Protected Status

Degradation of the Inventoried Characteristics to a Level at which the Value of the Wilderness Characteristic would no Longer be Present within the Specific Area

By definition, there are no roads in lands with wilderness character, so there would be no impact. Motorized travel on primitive roads and trails, unless specifically prohibited, would still be allowed. Additional public use of these primitive roads and trails may diminish apparent naturalness and opportunities for solitude.

Alternative A would have the most areas open to motorized travel, and therefore would have the greatest impact on lands with wilderness character. However, these impacts would be relatively moderate.

Under Alternative B, there would be limits on route construction and realignment in PPH. Alternative B would have indirect beneficial effects on lands with wilderness characteristics.

Under Alternative C, there would be limits on route construction and realignment in ADH. Therefore, Alternative C would have fewer impacts on lands with wilderness characteristics through disruption and construction associated with roads.

Protection of the Inventoried Characteristics to a Level at which the Value of the Wilderness Characteristic would Continue to be Present within the Specific Area

Beneficial impacts on restoring roads and trails include returning an area to a more natural state and providing additional opportunities for solitude.

Alternative A would put the lowest priority on restoration and therefore would have the lowest beneficial impact on lands with wilderness character.

Alternative B would put a lower priority on restoration than Alternative C but would put a higher priority on restoration than Alternative D.

Alternative C would put the highest priority on restoration and would have the highest beneficial impact.

Alternative D would put a higher priority on restoration of roads and trails than Alternative A but would put a lower priority on restoration than Alternatives B and C.

Impacts from Lands and Realty Management on Lands with Wilderness Characteristics

ROWs

Degradation of the Inventoried Characteristics to a Level at which the Value of the Wilderness Characteristic would no Longer be Present within the Specific Area

Surface-disturbing activities would be authorized only if there was no negative impact on the characteristics for which an area has been identified as a land with wilderness characteristics (i.e., size, apparent naturalness, opportunities for solitude and primitive types of recreation, and supplemental values). Structures that are detrimental to the apparent naturalness of an area, or that would introduce elements that would reduce or eliminate opportunities for solitude, would not be authorized. However, if the surface disturbance were to enhance the feeling of apparent naturalness, it could be allowed. The majority of the impacts would occur adjacent to the lands managed for lands with wilderness characteristics because existing protections would be the same across all alternatives for those areas.

Alternative A would have the most areas available for ROWs and also construction of structures, with no restrictions in place to protect GRSG habitat specifically and therefore would have the greatest impact on lands with wilderness characteristics.

Alternative B would have fewer areas available for ROWs and also construction of structures, through restrictions to protect GRSG habitat. Therefore, impacts on lands with wilderness characteristics would be less than Alternatives A and D but would be greater than Alternative C.

Alternative C would have the fewest areas available for ROWs and also construction of structures, so it would have the fewest impacts on lands with wilderness characteristics.

Alternative D would have fewer impacts than Alternative A, but greater impacts than Alternatives A and C.

Land Tenure Adjustment

Protection of the Inventoried Characteristics to a Level at which the Value of the Wilderness Characteristic would Continue to be Present within the Specific Area

The BLM would evaluate on a case by case basis acquiring lands with the following criteria:

- State and private lands of 5,000 acres or greater that contain wilderness character
- Conservation easements on state or private parcels that total 5,000 acres or greater and contain wilderness character
- Lands that total 5,000 acres or greater that contain wilderness character proposed for mineral withdrawal

Under Alternative A, the acquisition of lands through exchanges or the disposal of lands would be guided by the existing LUP. Unless specifically managed for wilderness characteristics with

management guidance within an LUP, there could be adverse impacts if lands where disposed of that possessed wilderness characteristics. The acquisition of lands within the decision area would benefit lands with wilderness characteristics if acquired lands contained wilderness characteristics.

Alternative B would encourage retaining public ownership of public lands while considering certain exemptions. Exemptions include land exchanges where there is mixed land ownership and an land exchange would allow for additional or more contiguous federal ownership patterns within PPH or considering disposal of federally owned lands within PPH where there is a minority of ownership and where effective mitigation agreements could be pursued or under the consideration of pursing permanent conservation easements. The BLM and USFS would also seek to acquire state or private lands where conservation actions cannot be achieved. This would provide greater protections to existing lands with wilderness characteristics especially if acquired lands possessed wilderness characteristics.

Alternative C would have the same benefits as Alternative B but the BLM and USFS would strive and prioritize acquisition over conservation easements and there would be no exception of disposals. This would have the greatest benefit to if acquired lands possessed wilderness characteristics or for protections of existing lands with wilderness characteristics.

Alternative D would have similar benefits to Alternatives B and C, however isolated federal parcels could be disposed of if they are not capable of altering grouse populations (e.g., no leks within such parcel). When considering the acquisition of lands the GRSG habitat values would be considered and how such acquisition would benefit the GRSG. Under this alternative there would be fewer benefits than under Alternatives B and C but greater benefits than Alternative A.

Impacts from Range Management on Lands with Wilderness Characteristics

Range Improvements

Degradation of the Inventoried Characteristics to a Level at which the Value of the Wilderness Characteristic would no Longer be Present within the Specific Area

The construction of structures associated with range management is generally consistent with wilderness characteristics, as long as it does not create roads, detract from the apparent naturalness of an area, or negatively impact opportunities for solitude and primitive types of recreation. Examples of structures are water troughs, fences, and corrals.

Alternative A would have the most areas available for livestock grazing, and consequently, construction of structures, with no restrictions in place to protect GRSG habitat specifically; therefore, Alternative A would have the greatest impact on lands with wilderness characteristics.

Alternative B would have fewer areas available for construction of structures, through restrictions to protect GRSG habitat. Therefore, impacts on lands with wilderness characteristics would be less than Alternatives A and D but would be greater than Alternative C.

Alternative C would have no areas available for livestock grazing and construction of structures associated with livestock grazing would be restricted. In order to implement Alternative C, thousands of miles of fence may be needed to be constructed on private allotments to prevent trespass of livestock onto BLM-administered or National Forest System lands. This potential increase in infrastructure would have a greater impact on lands with wilderness characteristics.

Alternative D would have the same restrictions as Alternative B, but those restrictions would be applied to ADH. Alternative D would have greater impacts on lands with wilderness characteristics than Alternative C, but fewer impacts than Alternatives A and B.

Vegetation Disturbance

Degradation of the Inventoried Characteristics to a Level at which the Value of the Wilderness Characteristic would no Longer be Present within the Specific Area

In areas that are available for livestock grazing, changes in vegetation would have an impact on lands with wilderness characteristics if they would detract from the apparent naturalness of an area or negatively impact opportunities for solitude and primitive types of recreation.

Alternative A would have the most areas available for livestock grazing, with the most potential for vegetation disturbance; therefore, Alternative A would have the greatest impact on lands with wilderness characteristics.

Alternative B would have the same areas available for livestock grazing as Alternative A but would put more restrictions on livestock grazing in place. The potential for vegetation disturbance is the same under Alternative B as it is under Alternative A;

Alternative C would not allow livestock grazing in ADH; therefore, Alternative C would have the fewest impacts on lands with wilderness characteristics because it would have the least potential for vegetation disturbance.

Alternative D has the same areas available for livestock grazing as Alternatives A and B. Impacts on lands with wilderness characteristics are the same under Alternative D as they are under Alternatives A and B.

Impacts from Fluid Minerals Management on Lands with Wilderness Characteristics

Degradation of the Inventoried Characteristics to a Level at which the Value of the Wilderness Characteristic would no Longer be Present within the Specific Area

Construction of Structures

Areas with high potential and availability for development of fluid minerals are likely to have a greater impact on lands with wilderness characteristics than areas with low potential and low or no availability for fluid mineral development. The construction of energy facilities would generally be considered detrimental to the apparent naturalness of an area or would introduce elements that would reduce or eliminate opportunities for solitude.

Alternative A would place the fewest restrictions on fluid mineral development, so it would have the most potential for installation of structures to extract the fluid minerals. Alternative A has the most impacts on lands with wilderness characteristics.

Alternative B would place some restrictions on fluid mineral development, including no new leasing in PPH and restrictions on locations of well pads and associated facilities. Impacts on lands with wilderness characteristics are less than Alternatives A and D but greater than Alternative C.

Alternative C would place the most restrictions on fluid mineral development, including no new leasing in ADH and restrictions on locations of well pads and associated facilities. Alternative C would have the fewest impacts on lands with wilderness characteristics.

Alternative D would have fewer impacts than Alternative A but greater impacts than Alternatives A and C because it would allow more flexibility in fluid mineral development.

Construction of Roads and Trails

Areas with high potential and availability for development of fluid minerals would have a greater impact on visual resources than areas with low potential and low or no availability for fluid mineral development. Surface-disturbing activities, such as road and trail construction, would be authorized only if there were no negative impact on an area that had been identified to be managed for wilderness characteristics protection in an RMP. This could change if an underlying RMP determines that these areas would or would not be protected for wilderness characteristics.

Alternative A would place the fewest restrictions on fluid mineral development, so it would have the most potential for roads to access the development to extract the fluid minerals. Alternative A has the most impacts on lands with wilderness characteristics.

Alternative B would place some restrictions on fluid mineral development and therefore some restrictions on creation of access roads. Impacts on lands with wilderness characteristics are less than Alternatives A and D but greater than Alternative C.

Alternative C would place the most restrictions on fluid mineral development, as well as creation of roads, and therefore has the fewest impacts on lands with wilderness characteristics.

Alternative D has fewer impacts than Alternative A but greater impacts than Alternatives A and C because it would allow more flexibility in fluid mineral development, as well as the creation of roads to access the development.

Earthwork Construction

Surface-disturbing activities, earthwork construction, and vegetation disturbance would be authorized only if there were no negative impact on the characteristics for which an area has been identified as a land with wilderness characteristics (i.e., size, apparent naturalness, opportunities for solitude and primitive types of recreation, and supplemental values). Earthwork construction would not be authorized if it would be detrimental to the apparent naturalness of an area or introduce elements that would reduce or eliminate opportunities for solitude. However, if the surface disturbance would enhance the feeling of apparent naturalness, it could be allowed.

Alternative A would place the fewest restrictions on fluid mineral development and so would have the most potential for changes in topography, such as clearing and leveling well pads. Alternative A has the most impacts on lands with wilderness characteristics.

Alternative B would place some restrictions on fluid mineral development and therefore some restrictions on changes in topography. Impacts on lands with wilderness characteristics are less than Alternatives A and D but greater than Alternative C.

Alternative C would place the most restrictions on fluid mineral development, as well as the changes in topography associated with well development; therefore, Alternative C has the fewest impacts on lands with wilderness characteristics.

Alternative D has fewer impacts than Alternative A but greater impacts than Alternatives A and C because it would allow more flexibility in fluid mineral development.

Vegetation Disturbance. Areas with high potential and availability for development of fluid minerals would have a greater impact on lands with wilderness characteristics than areas with low potential and low or no availability for fluid mineral development. Energy facilities could impact lands with wilderness characteristics by necessitating construction and vegetation clearing, thereby reducing an area's apparent naturalness and opportunities for solitude.

Alternative A would place the fewest restrictions on fluid mineral development and therefore would have the most potential for vegetation disturbance, such as the disturbance associated with clearing and leveling well pads. Alternative A has the most impacts on lands with wilderness characteristics in this regard.

Alternative B would place some restrictions on fluid mineral development and therefore some restrictions on vegetation disturbance. Impacts on lands with wilderness characteristics are less than Alternatives A and D but greater than Alternative C.

Alternative C would place the most restrictions on fluid mineral development, as well as the vegetation disturbance associated with well development, and therefore has the fewest impacts on lands with wilderness characteristics.

Alternative D has fewer impacts than Alternative A but greater impacts than Alternatives A and C because it would allow more flexibility in fluid mineral development.

Impacts from Solid Minerals, Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on Lands with Wilderness Characteristics

Impacts from the management actions associated with these resources are the same as the impacts described under *Impacts from Fluid Minerals Management on Lands with Wilderness Characteristics* above.

Impacts from Wildfire Suppression and Fire Rehabilitation on Lands with Wilderness Characteristics

Fire Operations

Degradation of the Inventoried Characteristics to a Level at which the Value of the Wilderness Characteristic would no Longer be Present within the Specific Area

Vegetation Disturbance and Road Construction. Areas prioritized as high for suppression would have fewer impacts on lands with wilderness characteristics than areas prioritized lower or not prioritized at all. Wildland fire can cause great contrast to the natural landscape, removing large swaths of vegetation and leaving behind visible scars. However, these impacts are generally short term as over the long term, fires allow for the regrowth of native or appropriately adapted vegetation, which improves ecological health. Fire is a naturally occurring ecosystem process and, generally speaking, is consistent with wilderness character. However, constructing roads to facilitate fire operations is not consistent with wilderness characteristics.

Alternative A would not prioritize suppression of fire in GRSG habitat and therefore would have the most potential for vegetation disturbance outside of that habitat. Alternative A has the most impacts on lands with wilderness characteristics in this regard.

Alternative B would prioritize suppression in PPH only. Impacts on lands with wilderness characteristics are less than Alternatives A and D but greater than Alternative C.

Alternative C would also prioritize suppression in PPH only; therefore, it has the same impacts on lands with wilderness characteristics as Alternative B.

Alternative D has fewer impacts than Alternative A but greater impacts than Alternative C. This is because it would prioritize suppression, but suppression would be prioritized higher than Alternative A and lower than Alternative C.

Impacts from Habitat Restoration on Lands with Wilderness Characteristics

Protection of the Inventoried Characteristics to a Level at which the Value of the Wilderness Characteristic would Continue to be Present within the Specific Area

Restoration of Surface Disturbance

In areas that contain higher densities of surface disturbance, prioritization of restoration would have a greater impact on lands with wilderness characteristics than areas that contain a lower density of roads and trails. Any increase in restoration would reduce the level and number of existing routes and vegetation loss.

Alternative A would put the lowest priority on restoration of sagebrush habitat. This would not improve the apparent naturalness of the planning area nor create additional opportunities for solitude or primitive types of recreation; therefore, Alternative A has the fewest beneficial impacts on lands with wilderness characteristics in the planning area.

Alternative B would put a lower priority on restoration than Alternative C but would put a higher priority on restoration than Alternative D.

Alternative C would put the highest priority on restoration of sagebrush habitat, which would have the highest beneficial impact on lands with wilderness characteristics in the planning area.

Alternative D would put a higher priority on restoration of sagebrush than Alternative A but would put a lower priority on restoration of sagebrush than Alternatives B and C.

Impacts from ACEC/Zoological Area Management on Lands with Wilderness Characteristics

Protection of the Inventoried Characteristics to a Level at which the Value of the Wilderness Characteristic would Continue to be Present within the Specific Area

Areas that are designated as ACECs would have more beneficial impacts on lands with wilderness characteristics than areas that are not designated as ACECs. Management of ACECs to protect relevant and important values could have both direct and indirect impacts on lands with wilderness characteristics. Prohibiting surface-disturbing activities and other authorized activities would benefit lands with wilderness characteristics by creating areas with an apparent feeling of

naturalness and creating additional opportunities for solitude and primitive types of recreation. ACECs often also help protect supplemental values that are associated with lands with wilderness characteristics.

Alternatives A, B, and D would recognize all of the existing ACEC designations. These alternatives would have fewer beneficial impacts on lands with wilderness characteristics than Alternative C. Alternative C would make all PPH an ACEC, in addition to the existing ACECs. However, there are no additional management actions associated with designation of PPH as an ACEC than what is already in Alternative C.

4.20.4. Summary of Impacts on Lands with Wilderness Characteristics

Potential impacts on lands with wilderness characteristics depends on the underlying RMPs determination whether or not to protect these characteristics.

Alternative A provides the least protection for lands with wilderness characteristics in the planning area. Alternative A puts very few restrictions on development, which could result in the most modification of the landscape and, consequently, the most impacts on lands with wilderness characteristics.

Alternative B provides a greater level of protection for lands with wilderness characteristics than Alternative A but would provide a lower level of protection than Alternative C.

Alternative C would provide the most protection for lands with wilderness characteristics. The most restrictions would be placed on development under Alternative C, which would afford the most protection for lands with wilderness characteristics.

Alternative D would provide more protection for lands with wilderness characteristics than Alternative A but would provide less protection than Alternatives B and C. More flexibility for development is built into Alternative D, which could result in higher levels of development than Alternatives B and C.

4.21. Soundscapes

4.21.1. General Description

A soundscape is the component sounds of the environment, including natural, human-produced, and mechanical in origin. Noise is generally described as unwanted sound in an environment. Weighted noise intensity (or loudness) is measured as sound pressure in decibels. Almost all human activities, such as construction and road traffic and pedestrian traffic, create noise or sound and thus alter the soundscape. The expansion of aircraft “flight-seeing,” snowmobile use, and motorcycle touring are a few examples of technological advancements that now commonly impact public land soundscapes. To adequately manage these impacts, agencies must view them as part of an evolution toward a noisier society rather than as isolated situation-specific events. The factors that combine to determine whether the activities would impacts the soundscape character are loudness, frequency or pattern, duration, the time at which it is produced, the proximity to the source of the sound and sensitive receptors.

4.21.2. Methodology and Assumptions

General Impacts on Soundscapes

Indicators of impacts on soundscapes and the measurements used to describe the impacts (where available or appropriate) are described below:

Activities That Produce Sound

- Changes to ambient or background noise level or noise (decibel) levels
- Adverse or beneficial-Changes to baseline noise levels are considered adverse to GRSG

Assumptions

The following list presents basic assumptions related to soundscapes that apply to the impacts assessment for Alternatives A through D.

- Distance attenuation estimation is an inverse square law: Sound dissipates at 6 decibels as distance doubles from a point source and at 3 decibels from a line source, such as constant flowing traffic.
- All human activities produce some level of sound.
- Topography, climate, and vegetation affect how sound is propagated through the landscape.
- Any change from ambient noise levels would be an adverse impact on soundscapes.
- Any impacts on soundscapes would occur at the project implementation level and would be further analyzed at that time.

4.21.3. Impacts Common to all Management Actions on Soundscapes

Activities That Produce Sound

All human activities would result in some level of impact on the soundscape. In areas with high levels of human activity, noise impacts would increase and would have a greater effect in both context and intensity.

Alternative A would allow the most development and other human activities; therefore, it would result in the most impacts on soundscapes.

Alternative B places restrictions on development and other human activities and would impact soundscapes less than Alternative A but more than Alternative C.

Alternative C places the most restrictions on development and other human activities; therefore, it would result in the fewest impacts on soundscapes.

Alternative D places more restrictions on development and other human activities than Alternative A, but it places fewer restrictions than Alternatives B and C; therefore, Alternative D would impact soundscapes less than Alternative A but more than Alternatives B and C.

4.21.4. Summary of Impacts on Soundscapes

Alternative A-Impacts on soundscapes are the greatest under this alternative since it would allow the most opportunity for human activities.

Alternative B-Impacts on soundscapes under Alternative B are fewer than under Alternative A since it would allow fewer opportunities for human activities.

Alternative C-Impacts on soundscapes are the fewest under this alternative since it would allow the fewest opportunities for human activities.

Alternative D-Impacts on soundscapes are greater than under Alternatives B and C but fewer than Alternative A.

4.22. Cultural Resources

4.22.1. General Description

Cultural resources are the material and physical remains of prehistoric and historic human activity, occupation, or endeavor. "Culture [is] a system of behaviors, values, ideologies, and social arrangements. These features, in addition to tools and expressive elements such as graphic arts, help humans interpret their universe as well as deal with features of their environments, natural and social. Culture is learned, transmitted in a social context, and modifiable. Synonyms for culture include 'lifeways,' 'customs,' 'traditions,' 'social practices,' and 'folkways'" (Parker and King 1998). Natural features of importance in human history, such as mountains and rivers, may also be considered cultural resources. Overall, these resources are fragile and nonrenewable and embody characteristics and information specific to the period in which a cultural group lived in the area. Intrinsically, each cultural resource is important and provides valuable information about human occupation of the area.

4.22.2. Methodology and Assumptions

General Impacts on Cultural Resources

Indicators of impacts on cultural resources and the measurements used to describe the impacts (where available or appropriate) are described below:

- Vandalism/Collection

Measures of vandalism and collection of cultural resources include access and visibility.

Adverse impacts on cultural resources that can lead to vandalism and collection include an increase in access, which could expose significant or sensitive sites to collection or destruction. Increasing or changing ground visibility also could increase vandalism and collection because artifacts and features are more visible and susceptible.

Limiting access and decreasing ground visibility can be beneficial to cultural resources and can decrease the potential for vandalism and collection.

- Scientific Knowledge

Measures of scientific knowledge of cultural resources include site recordation, eligibility determination, and acres inventoried.

Adverse impacts on scientific knowledge of cultural resources can occur from loss of data, such as destroyed features or artifacts.

Beneficial impacts on scientific knowledge of cultural resources comes from new cultural resource inventories, which lead to new sites being documented and their significance determined.

- Site Setting

Measures of site setting for cultural resources include landscape fragmentation, visual disturbance, and audible noise.

Adverse impacts on site setting can occur from increased disturbances around or near sites, which changes the sites' natural setting. Visual or audible disturbances, such as buildings, roads, traffic, and machinery, also contribute to the potential impact on cultural resources.

Decreasing landscape fragmentation and mitigating or deterring visual and audible disturbances would be beneficial to preserving site setting of cultural resources.

- Traditional Cultural Properties

Measures of significance to Traditional Cultural Properties and traditional uses include plant communities, minerals, sacred sites, and access.

Adverse impacts on Traditional Cultural Properties and uses can come from disturbances to plant communities used traditionally, disturbances to significant sites, or limiting or closing access to areas used by tribes.

Limiting disturbances to plant communities or significant sites can be beneficial to protecting Traditional Cultural Properties and uses by keeping these resources intact. Limiting access is also beneficial to protecting traditional properties by ensuring sensitive areas are generally avoided.

- Ground Disturbance

Measures of ground disturbance to cultural resources include human-caused erosion and soil removal.

Adverse impacts from ground disturbance on cultural resources occur from many activities, including construction, livestock hoof action, and creation of unauthorized routes. Additionally, activities that lead to changes in vegetation or stability of soils can cause adverse impacts through erosion.

Limiting ground disturbances that lead to changes in soil stability or vegetation would help reduce adverse impacts on cultural resources.

- Natural Processes

Measures of natural processes that affect cultural resources include wind erosion, water erosion, wildfire, and vegetation loss or increase.

Adverse impacts from natural processes on cultural resources are ongoing. These adverse impacts happen naturally but can be sped up as a cumulative result of human actions.

Beneficial impacts from natural processes include burying cultural materials or increasing vegetation, which helps to stabilize cultural resources.

Assumptions

The following list presents basic assumptions related to cultural resources that apply to the impacts assessment for Alternatives A, B, C, and D.

- All four alternatives require that BLM/USFS-administered cultural resources be managed and protected and comply with all relevant laws and regulations.
- Cultural resources are defined as including archaeological, historic, and Native American traditional cultural properties, religious sites, and sensitive areas, unless otherwise specified in the analysis.
- Historic properties are defined as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP. The term includes, for purposes of these regulations, artifacts, records, and remains that are related to and located within such properties. The term 'eligible for inclusion in the NRHP' includes both properties formally determined as such by the Secretary of the Interior and all other properties that meet NRHP listing criteria" (quoted from 36 CFR, Part 800.2[e]; compare National Historic Preservation Act, Section 301, Appendix 5).
- "An adverse effect is found when an action would alter the characteristics of a historic property that qualify it for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, workmanship, feeling, or association. Adverse impacts would include reasonably foreseeable impacts caused by the action that would occur later in time, be farther removed in distance, or be cumulative" (36 CFR, Part 800.5a).
- Direct impacts result from implementing the management goals, objectives, and actions of other resources that conflict with cultural resource management goals, objectives, and actions.
- Indirect impacts are caused by actions that are farther removed in time or distance.
- Beneficial impacts include management actions or policies that result in preserving the characteristics of cultural resources that are important to traditional or religious uses and protecting the integrity of the cultural property's location, design, setting, workmanship, feeling, or association that would qualify them for listing on the NRHP.
- Any ground-disturbing activity should be considered a potential threat to cultural and Native American resources. Adverse impacts are permanent, and beneficial impacts cannot reverse these impacts; therefore, every impact is considered cumulative. Even minor impacts accrue over time, resulting in deteriorating site condition and loss of important scientific data and cultural values.

- All alternatives require consultation with Native American tribes and recognition of tribal interests during the planning phase of proposed federal undertakings.
- Traditional cultural property locations, importance, and extent of use are limited by the communities associated with them. Maintaining access to and reducing impacts on them are responsibilities of the BLM/USFS and is an important objective of cultural resource management.
- Nondiscretionary mining notices are not federal undertakings, but 43 CFR, Part 3809, specifically provides for the protection of cultural properties by prohibiting mining operators on claims of any size from knowingly disturbing or damaging these properties.
- Unauthorized or unplanned activities, wildland fire, dispersed recreation, natural processes and unauthorized collection, excavation, and vandalism would lead to impacts that would be difficult to monitor and mitigate. Impacts on traditional cultural properties, sacred sites, historic trails, and some other cultural resources that are significant for reasons other than data potential would be difficult or impossible to mitigate unless the resources and associated settings were avoided.

4.22.3. Direct and Indirect Impacts on Cultural Resources

Impacts from Travel Management on Cultural Resources

Restrictions on travel management designed to protect GRSG habitat would also protect cultural resources. Limiting activity and use in areas where there is potential for cultural resources is beneficial to preserving and protecting cultural resources. Moving travel-related impacts outside of GRSG habitat would in turn move these impacts on other areas within the planning area. This could concentrate use in areas where there are potentially significant cultural resources.

Vandalism/Collection

Management actions for travel that limit or control access could reduce vandalism and collection of cultural resources. As access and visibility increase, the probability for unauthorized collection or vandalism rises. This is caused by less control over where people go and what sensitive cultural resources are in those areas.

Alternative A-Travel under this alternative would be the least restrictive. On BLM-administered lands, open OHV travel would be allowed in some areas, making it difficult to avoid and protect cultural resources. This alternative would have the greatest impact on cultural resources from vandalism and collection by continuing to provide access to areas, which increases the opportunity for these activities. Lands within GRSG habitat managed by the USFS are limited to designated routes; therefore, this alternative would not increase or decrease impacts on National Forest System lands.

Alternative B-Under this alternative, motorized travel would be limited to existing routes, which would not be upgraded. Routes that are closed are required to be restored and reseeded with native species. These actions are beneficial to cultural resources by reducing travel and access, which in, turn could reduce vandalism and collection.

Alternative C-This alternative would limit travel the most and follows the management decisions in Alternative B, but in addition, limits new road construction within 4 miles of active GRSG

leks. These actions are beneficial to cultural resources by reducing travel and access, which in, turn could reduce vandalism and collection.

Alternative D-This alternative has travel restrictions similar to Alternatives B and C but offers disturbance exception criteria for construction of new routes and allows upgrades to existing routes. This alternative limits travel to existing routes, which would benefit cultural resources and limit vandalism and collection. Offering exception criteria and allowing upgrading of routes could impact cultural resources through vandalism and collection; however, it would be more limiting than Alternative A because it would also have to be shown that the routes would not adversely impact GRSG populations.

Scientific Knowledge

Management actions for travel would have beneficial impacts on cultural resources by helping to protect scientific knowledge. Scientific knowledge is gained through site discovery and recordation, as well as intensive research. Limiting travel to designated routes helps ensure that people are not traveling cross-country through areas that have not had the cultural resources inventoried. By not restricting people to designated routes, adverse impacts can occur on cultural resources and the scientific knowledge gained from them.

Alternative A-Travel under this alternative would be the least restrictive. On BLM-administered lands, it would allow open OHV travel in some areas, making it difficult to avoid and protect cultural resources. This alternative would have the greatest impact on scientific knowledge of cultural resources by continuing to provide access to areas that have not been inventoried and where significant cultural resources may not be avoided. Lands within GRSG habitat managed by the USFS are limited to designated routes; therefore, this alternative would not increase or decrease impacts on National Forest System lands.

Alternative B-This alternative would limit motorized travel to existing routes, which would not be upgraded. Routes that are closed are required to be restored and reseeded with native species. These actions are beneficial to cultural resources by reducing travel and access in areas that have not been inventoried for cultural resources. This reduces adverse impacts on undocumented and unprotected cultural resources that could provide scientific knowledge.

Alternative C-This alternative would limit travel the most and follows the management decisions in Alternative B, but in addition it limits new road construction within 4 miles of active GRSG leks. These actions are beneficial to cultural resources by reducing travel and access in areas that have not been inventoried for cultural resources. This reduces adverse impacts on undocumented and unprotected cultural resources that could provide scientific knowledge.

Alternative D-This alternative has travel restrictions similar to Alternatives B and C, but it offers disturbance exception criteria for construction of new routes and allows upgrades to existing routes. This alternative limits travel to existing routes, which would reduce travel and access in areas that have not been inventoried for cultural resources. Offering exception criteria and allowing upgrading of routes has little potential to impact scientific knowledge of cultural resources because routes would have to go through the Section 106 process, and adverse impacts would be mitigated.

Site Setting

Management actions for travel have beneficial impacts on site setting of cultural resources. Site setting includes not only the actual area the site encompasses but the surrounding landscape. Limiting travel to designated routes would help preserve site setting by decreasing new disturbance and controlling where travel occurs.

Alternative A-Travel under this alternative would be the least restrictive. On BLM-administered lands, it would allow open OHV travel in some areas, making it difficult to avoid and protect cultural resources. This alternative would have the greatest impact on site setting of cultural resources because it could create disturbances within the area surrounding a site that contributes to its significance. Lands within GRSG habitat managed by the USFS are limited to designated routes; therefore, this alternative would not increase or decrease impacts on National Forest System lands.

Alternative B-This alternative would limit motorized travel to existing routes, which would not be upgraded. Routes that are closed are required to be restored and reseeded with native species. These actions are beneficial to cultural resource setting because it would limit travel to designated routes. This would decrease impacts on site setting by preserving areas around sites and keeping disturbance to a minimum.

Alternative C-This alternative would limit travel the most and follows the management decisions in Alternative B, but in addition it limits new road construction within 4 miles of active GRSG leks. These actions are beneficial to cultural resource setting because it would limit travel to designated routes. This would decrease impacts on site setting by preserving areas around sites and keeping disturbance to a minimum.

Alternative D-This alternative has travel restrictions similar to Alternatives B and C, but it offers disturbance exception criteria for construction of new routes and allows upgrades to existing routes. This alternative limits travel to existing routes, which would reduce travel and access in areas that have not been inventoried for cultural resources. Offering exception criteria and allowing upgrading of routes could impact site setting. By creating new routes and upgrading existing routes, site setting may be impacted by new disturbance within the areas surrounding significant sites.

Opportunities for Native American Traditional Uses

Management actions for travel have both beneficial and negative impacts on opportunities for Native American traditional uses. Limiting travel to existing routes is beneficial because it helps reduce impacts on areas possibly used by Native Americans for traditional uses, such as plant collection, or traditional cultural properties. On the other hand, access is important to tribes for getting to areas for traditional uses. Closing routes and limiting open OHV travel may make it difficult for tribal members to access areas of interest.

Alternative A-Travel under this alternative would be the least restrictive. On BLM-administered lands, it would allow open OHV travel in some areas, making it difficult to avoid and protect traditional areas. On the other hand, this would make areas more accessible to tribes for traditional uses. Lands within GRSG habitat managed by the USFS are limited to designated routes; therefore, this alternative would not increase or decrease impacts on National Forest System lands.

Alternative B-This alternative would limit motorized travel to existing routes, which would not be upgraded. Routes that are closed are required to be restored and reseeded with native species. These actions are beneficial to areas used by tribes for traditional practices because it would limit

travel to designated routes. This would decrease impacts on traditional use sites by preserving areas and keeping disturbance to a minimum. At the same time, this might make it more difficult for tribes to access areas they use traditionally. Closing routes might require additional tribal consultation to identify routes used by tribes and might place those routes in administrative access only use instead of closing the route completely.

Alternative C-This alternative would limit travel the most and follows the management decisions in Alternative B, but in addition it limits new road construction within 4 miles of active GRSG leks. These actions are beneficial to areas used by tribes for traditional practices because it would limit travel to designated routes. This would decrease impacts on traditional use sites by preserving areas and keeping disturbance to a minimum. At the same time, this might make it more difficult for tribes to access areas they use traditionally. Closing routes might require additional tribal consultation to identify routes used by tribes and place those routes in administrative access only use instead of closing the route completely.

Alternative D-This alternative has travel restrictions similar to Alternatives B and C, but it offers disturbance exception criteria for construction of new routes and allows upgrades to existing routes. This alternative limits travel to existing routes, which would reduce travel and access in areas that have not been inventoried for cultural resources. Offering exception criteria and allowing upgrading of routes could impact areas used traditionally by Native Americans. At the same time, it provides access to areas that tribal members can use to practice traditional uses. Closing routes might require additional tribal consultation to identify routes used by tribes and to place those routes in administrative access only use, instead of closing the route completely.

Ground Disturbance

Management actions for travel have mainly beneficial impacts, resulting from restrictions on ground disturbances to cultural resources. By limiting access to designated routes, unplanned ground disturbance would be reduced. Ground disturbance to cultural resources is caused by soil removal from human actions, such as off-highway travel, unauthorized excavation, and construction.

Alternative A-Travel under this alternative would be the least restrictive. On BLM-administered lands, it would allow open OHV travel in some areas, making it difficult to avoid and protect cultural resources. Ground disturbance could adversely impact cultural resources the most with this alternative because OHVs are not limited to designated routes. Vehicles traveling off designated roads can cause ground disturbance, which can increase site disturbances. Lands within GRSG habitat managed by the USFS are limited to designated routes; therefore, this alternative would not increase or decrease impacts on National Forest System lands.

Alternative B-This alternative would limit motorized travel to existing routes, which would not be upgraded. Routes that are closed are required to be restored and reseeded with native species. These actions are beneficial to limiting unplanned ground disturbance and could help protect cultural resources.

Alternative C-This alternative would limit travel the most and follows the management decisions in Alternative B, but in addition, it limits new road construction within 4 miles of active GRSG leks. These actions are beneficial to limiting ground disturbance and could protect cultural resources. On the other hand, limiting new roads to areas outside of GRSG lek areas could push disturbances into areas with a higher probability for cultural resources.

Alternative D-This alternative has travel restrictions similar to Alternatives B and C, but it offers disturbance exception criteria for construction of new routes and allows upgrades to existing routes. This alternative limits travel to existing routes, which would reduce travel and access in areas that have not been inventoried for cultural resources. Offering exception criteria and allowing upgrading of routes has minimal potential to impact cultural resources through ground disturbance because new routes would require cultural resource inventory and compliance.

Natural Processes

Management actions for travel have mainly beneficial impacts on natural processes and cultural resources. Natural processes, such as water and wind erosion, can cause adverse impacts on cultural resources by disturbing artifacts or features.

Alternative A-Travel under this alternative would be the least restrictive. On BLM-administered lands, it would allow open OHV travel in some areas, making it difficult to avoid and protect cultural resources. Natural processes acting on cultural resources could cause the most adverse impacts under this alternative because OHVs are not limited to designated routes. Vehicles traveling off designated roads can increase natural processes, such as erosion or surface disturbances. Lands within GRSG habitat managed by the USFS are limited to designated routes; therefore, this alternative would not increase or decrease impacts on National Forest System lands.

Alternative B-Travel under this alternative would limit motorized travel to existing routes, which would not be upgraded. Routes that are closed are required to be restored and reseeded with native species. These actions are beneficial to decreasing adverse impacts from natural processes, such as erosion from off-highway travel, which could help protect cultural resources.

Alternative C-This alternative would limit travel the most and follows the management decisions in Alternative B, but in addition, it limits new road construction within 4 miles of active GRSG leks. This alternative has the least potential to increase or speed up natural processes, such as erosion, and would help limit adverse impacts on cultural resources.

Alternative D-This alternative has travel restrictions similar to Alternatives B and C, but it offers disturbance exception criteria for construction of new routes and allows upgrades to existing routes. This alternative limits travel to existing routes, which would reduce travel and access in areas that have not been inventoried for cultural resources. Offering exception criteria and allowing upgrading of routes has some potential to contribute to natural processes affecting cultural resources by increasing possible erosion and decreasing vegetation in some areas.

Impacts from Recreation Management on Cultural Resources

Restrictions on recreation to protect GRSG habitat would generally protect cultural resources, but these actions generally would be negligible for cultural resources.

Vandalism/Collection

Management actions for recreation allow for SRPs to be issued in PPH if they have beneficial or neutral impacts. Issuing SRPs has little potential to affect vandalism or collecting of cultural resources because areas used intensively, such as camping locations, are inventoried before the permit. Limiting camping and other nonmotorized recreation seasonally outside of lek areas has some potential to adversely affect cultural resources because it pushes these activities to other areas, which may concentrate use in areas with potential for cultural resources.

Alternative A-Recreation under this alternative restricts SRPs to an as-needed basis for the WRFO and LSFO; all other offices have no restrictions on issuing SRPs. This alternative would have little impact on vandalism or collection of cultural resources. SRPs are usually issued for activities that are dispersed, or they are concentrated activities, such as outfitter camps or trail events. Areas that have concentrated use are inventoried for cultural resources.

Alternative B-This alternative allows SRPs to be issued in PPH if the permits would be neutral or beneficial to habitat areas. This alternative would have little effect on cultural resources. Alternative B might be somewhat beneficial to decreasing vandalism or collection of cultural resources because it limits recreation in these areas through limiting SRPs.

Alternative C-This alternative is the same as Alternative B and allows SRPs to be issued in PPH if the permits would be neutral or beneficial to habitat areas. This alternative would have little effect on cultural resources. Alternative C might be somewhat beneficial to decreasing vandalism or collection of cultural resources because it limits activity in these areas.

Alternative D-This alternative is similar to Alternatives B and C in that it would allow SRPs as long as the activities are not disruptive or cause habitat loss but would not limit camping or nonmotorized recreation. This alternative would have little effect on vandalism or collection of cultural resources.

Scientific Knowledge

Management actions for recreation allow for SRPs to be issued in PPH if they have beneficial or neutral impacts. Issuing SRPs has little potential to affect cultural resource scientific knowledge because areas used intensively for recreation, such as camping locations, are inventoried before the permit. Limiting camping and other nonmotorized recreation seasonally outside of lek areas could adversely affect cultural resources because it pushes these activities to other areas, which may concentrate use in areas with potential for cultural resources.

Alternative A-Recreation under this alternative restricts SRPs to an as-needed basis for the WRFO and LSFO; all other offices have no restrictions on issuing SRPs. This alternative would have little impact on scientific knowledge of cultural resources. SRPs are usually issued for activities that are dispersed, or they are concentrated activities, such as outfitter camps or trail events. Areas that have concentrated use are inventoried for cultural resources.

Alternative B-This alternative allows SRPs to be issued in PPH if the permits would be neutral or beneficial to habitats. This alternative would have little effect on cultural resources and on scientific knowledge of cultural resources.

Alternative C-This alternative is the same as Alternative B and allows SRPs to be issued in PPH if the permits would be neutral or beneficial to habitats. This alternative would have little effect on cultural resources and scientific knowledge of cultural resources.

Alternative D-This alternative is similar to Alternatives B and C in that it would allow SRPs as long as the activities were not disruptive or cause habitat loss, but it would not limit camping or nonmotorized recreation. This alternative would have little effect on scientific knowledge of cultural resources.

Site Setting

Management actions for recreation have neutral to beneficial impacts on site setting for cultural resources. Site setting includes not only the actual area the site encompasses but extends to the surrounding landscape. Limiting SRPs in PPH helps preserve site setting by decreasing heavy use of areas, which over time can increase impacts on cultural resources. For the most part, this impact would be minimal on cultural resources.

Alternative A-Recreation under this alternative restricts SRPs to an as-needed basis for the WRFO and LSFO; all other offices have no restrictions on issuing SRPs. This alternative would have little impact on site setting of cultural resources. SRPs are usually issued for activities that are dispersed, or they are concentrated activities, such as outfitter camps or trail events. Areas that have concentrated use are inventoried for cultural resources.

Alternative B-This alternative allows SRPs to be issued in PPH if the permits would be neutral or beneficial to habitats. This would be beneficial to helping preserve site setting of cultural resources because it would limit recreation in these areas.

Alternative C-This alternative would seasonally prohibit camping within a buffered area around GRSG leks. This is potentially beneficial to site setting of cultural resources by limiting activities.

Alternative D-This alternative is similar to Alternatives B and C in that it would allow SRPs as long as the activities were not disruptive or cause habitat loss, but it would not limit camping or nonmotorized recreation. This is potentially beneficial to preserving site setting because it would limit recreation in these areas.

Opportunities for Native American Traditional Uses

Management actions for recreation have beneficial to neutral impacts on opportunities for Native American traditional uses. Limiting SRPs to within GRSG habitat may help reduce activity in areas of traditional use for Native Americans. When issuing SRPs, these actions require a cultural resource inventory, so impacts on cultural resources or areas of Native American concern should be mitigated before the permit is issued. Overall, this action would have little impact on opportunities for Native American traditional uses.

Alternative A-Recreation under this alternative restricts SRPs to an as-needed basis for the WRFO and LSFO; all other offices have no restrictions on issuing SRPs. This alternative would have little impact on Native American traditional uses. SRPs are usually issued for activities that are dispersed, or they are concentrated activities, such as outfitter camps or trail events. Areas that are concentrated use are inventoried for cultural resources.

Alternative B-This alternative allows SRPs to be issued in PPH if the permits would be neutral or beneficial to habitat areas. This is potentially beneficial to opportunities for Native American traditional uses because it limits activity in PPH that may also coincide with areas of interest to tribes.

Alternative C-This alternative would seasonally prohibit camping within a buffered area around GRSG leks. This is potentially beneficial to reducing impacts on opportunities for Native American traditional because it would limit recreation in these areas.

Alternative D-This alternative has restrictions similar to Alternative B but is less limiting to the issuance of SRPs. It is potentially beneficial to reducing impacts on opportunities for Native American traditions because it would limit recreation in these areas.

Ground Disturbance

Management actions for recreation have mainly beneficial or neutral impacts on ground disturbances of cultural resources. Potential long-term impacts may come from pushing activities to other areas where cultural resources are present. By limiting SPRs within PPH, this can decrease possible ground disturbance from recreation. Ground disturbance to cultural resources is caused by soil removal from human actions, such as off-highway travel.

Alternative A-Recreation under this alternative restricts SRPs to an as-needed basis for the WRFO and LSFO; all other offices have no restrictions on issuing SRPs. This alternative would have little impact on ground disturbance of cultural resources. SRPs are usually issued for activities that are dispersed, or they are concentrated activities, such as outfitter camps or trail events. Areas that have concentrated use are inventoried for cultural resources.

Alternative B-This alternative allows SRPs to be issued in PPH if the permits would be neutral or beneficial to habitat areas. This is potentially beneficial to cultural resources by limiting ground-disturbing impacts in PPH from SRP activities. It may also increase these types of recreation in areas outside of GRSG habitat, which can increase ground disturbances.

Alternative C-This alternative would seasonally prohibit camping and other nonmotorized recreation within a buffered area around GRSG leks. This is potentially beneficial to reducing impacts on cultural resources through ground disturbance by limiting recreation in these areas. Similar to Alternative B, it may also increase these types of recreation in areas outside of GRSG habitat, which can increase ground disturbances.

Alternative D-This alternative has restrictions similar to Alternative B but is less limiting to the issuance of SRPs. This is potentially beneficial to cultural resources by limiting ground-disturbing impacts in PPH from SRP activities. It may also increase these types of recreation in other areas outside of GRSG habitat, which can increase ground disturbances.

Natural Processes

Management actions for recreation have mainly beneficial or neutral impacts on natural process for cultural resources. Natural processes, such as water and wind erosion, can cause adverse impacts on cultural resources by disturbing artifacts or features. Limiting SRPs within GRSG habitat could reduce natural processes in this area but may increase these processes in other areas.

Alternative A-Recreation under this alternative restricts SRPs to an as-needed basis for the WRFO and LSFO; all other offices have no restrictions on issuing SRPs. This alternative would have little impact on natural processes that affect cultural resources. SRPs are usually issued for activities that are dispersed, or they are concentrated activities, such as outfitter camps or trail events. Areas that have concentrated use are inventoried for cultural resources.

Alternative B-This alternative allows SRPs to be issued in PPH if the permits would be neutral or beneficial to habitats. It may increase these types of recreation in areas outside of GRSG habitat, which can increase natural processes, such as erosion.

Alternative C-This alternative would seasonally prohibit camping and other nonmotorized recreation within a buffered area around GRSG leks. This is potentially beneficial to reducing impacts on cultural resources through natural processes by limiting recreation in these areas. Similar to Alternative B, it may also increase these types of recreation in areas outside of GRSG habitat, which can increase natural processes such as erosion.

Alternative D-This alternative has restrictions similar to Alternative B but is less limiting to the issuance of SRPs. It may increase these types of recreation in areas outside of GRSG habitat, which can increase natural processes, such as erosion.

Impacts from Lands and Realty Management on Cultural Resources

Management actions for lands and realty would generally limit actions from occurring in GRSG habitat. This is beneficial to protecting and preserving cultural resources by not allowing or restricting land and realty actions within GRSG habitat. Additionally, this restriction may push these activities and uses to areas outside of GRSG habitat, which may adversely impact cultural resources.

Vandalism/Collection

Management actions for lands and realty include actions to exclude or avoid ROWs, use existing roads for development, make new roads with minimal disturbance, reclaim disturbed areas, retain public ownership of lands, and withdraw minerals from habitats. Generally, actions such as ROWs or mineral development have significant impacts on cultural resources; however, they are inventoried for cultural resources before a permit is issued. These impacts can include surface disturbances to unidentified sites, visual impacts, and loss of protection through land exchange and increased access. As access and visibility increase, the probability for unauthorized collection or vandalism rises. These actions may also push these activities and uses to other areas outside of GRSG habitat, which may adversely impact cultural resources.

Alternative A-Lands and realty actions under this alternative would be the least restrictive, although some protections are provided for threatened or endangered species. In general, these actions are beneficial to protecting cultural resources by limiting ground disturbance, considering resources during land exchanges, or collocating utilities. Although accommodating for cultural resources, this alternative still allows such actions as ROWs and land exchanges and has no restrictions on construction of new roads for new actions. Therefore, possible disturbances from activities and access may increase vandalism and unauthorized collection.

Alternative B-Lands and realty under this alternative would limit or close PPH areas to certain actions. Actions under this alternative are as follows:

- PPH is ROW avoidance areas
- Issue SUAs for exclusion areas
- Remove, bury, or modify power lines
- Reclaim disturbed areas
- Retain public ownership of lands
- Allow land exchanges where there is mixed ownership and land exchange would allow for more contiguous federal ownership patterns within PPH
- Apply mineral withdrawals

In general, all management actions under this alternative are beneficial to cultural resources and protect them from vandalism and collection. Such actions as limiting ROW corridors, withdraw

areas from mineral entry, and retaining BLM-administered and National Forest System lands are all beneficial to minimizing activity in areas of cultural resources and keeping cultural resources under federal protection. A potentially adverse impact on vandalism and collection of cultural resources from these actions is allowing land exchanges to create more contiguous habitat.

Alternative C-This alternative is similar to Alternative B, with a few more restrictions for lands and realty actions. Actions for Alternative C are the following:

- ADH ROW exclusion areas
- New ROWs collocated and only within current ROW footprint

In general, all management actions under this alternative are beneficial to cultural resources and protect them from vandalism and collection. Such actions as ROW exclusions, withdrawal from mineral entry, and retention of BLM-administered and National Forest System lands are beneficial to minimizing activity in areas of cultural resources and keeping cultural resources under federal protection. One potentially adverse impact from these actions is allowing land exchanges to create more contiguous habitat.

Alternative D-This alternative is similar to Alternative B, with some modified restrictions for lands and realty actions. Actions for Alternative D are the following:

- New ROWs issued if they would not affect GRSG populations
- If power lines could not be removed, buried, or modified, perch deterrents would be installed

In general, all management actions under this alternative are beneficial to cultural resources and protect them from vandalism and collection. Such actions as ROW exclusions, withdrawal from mineral entry, and retention of BLM-administered and National Forest System lands are beneficial to minimizing activity in areas of cultural resources and keeping cultural resources under federal protection. A potentially adverse impact on vandalism and collection of cultural resources from these actions is allowing land exchanges to create more contiguous habitat. If BLM-administered and National Forest System lands are exchanged to gain land in GRSG habitat, those lands are no longer protected by cultural resource laws, so the potential for vandalism and unauthorized collection increases.

Site Setting

Management actions for lands and realty are actions to exclude or avoid ROWs, use existing roads for development, make new roads with minimal disturbance, reclaim disturbed areas, retain public ownership of lands, and withdraw minerals from habitat areas. Generally, such actions as ROWs and mineral development have significant impacts on cultural resources, including surface disturbances, visual impacts, and loss of protection through land exchange and increased access. These actions may also push these activities and uses to other areas outside of GRSG habitat, which may adversely impact cultural resources. Management actions for lands and realty have potentially beneficial impacts on site setting of cultural resources. Site setting includes not only the actual area that the site encompasses but extends to the surrounding landscape.

Alternative A-Lands and realty actions under this alternative would be the least restrictive, although some protections are provided for threatened or endangered species. In general, these actions are beneficial to protecting cultural resources by limiting ground disturbance, considering resources during land exchanges, and collocating utilities. Although accommodating for cultural

resources, this alternative still allows such actions as ROWs and land exchanges and has no restrictions on construction of new roads for new actions. Possible impacts on site setting of cultural resources are increased visibility, landscape fragmentation, and construction from utilities or mineral development.

Alternative B-Lands and realty under this alternative would limit or close PPH to certain actions. Actions under this alternative are as follows:

- PPH is ROW avoidance areas
- Issue SUAs for exclusion areas
- Remove, bury, or modify power lines
- Reclaim disturbed areas
- Retain public ownership of lands
- Allow land exchanges where there is mixed ownership and land exchange would allow for more contiguous federal ownership patterns within PPH
- Apply mineral withdrawal

In general, all management actions under this alternative are beneficial to protecting site setting of cultural resources. Such actions as limiting ROW corridors, withdrawing areas from mineral entry, and retaining public lands are beneficial to minimizing activity in areas of cultural resources and keeping cultural resources under federal protection. There are negligible impacts on site setting of cultural resources under this alternative. Potential beneficial impacts on site setting from limiting development of utilities and minerals, providing contiguous land protection by acquiring land, and removing existing power lines help to keep the landscape undisturbed.

Alternative C-This alternative is similar to Alternative B, with a few more restrictions for lands and realty actions. Actions for Alternative C are as follows:

- Manage ADH as ROW exclusion areas
- Collocate new ROWs only within current ROW footprints

In general, all management actions under this alternative are beneficial to protecting site setting of cultural resources. Such actions as ROW exclusions, withdrawal from mineral entry, and retention of public lands are all beneficial to minimizing activity in areas of cultural resources and keeping cultural resources under federal protection. One potentially adverse impact from these actions is allowing land exchanges to create more contiguous habitat. If BLM-administered and National Forest System lands are exchanged to gain land in GRSG habitat, those lands are no longer protected by cultural resource laws; therefore, development can occur, which can impact site setting of nearby cultural resources by fragmenting landscapes.

Alternative D-This alternative is similar to Alternative B, with some modified restrictions for lands and realty actions. Actions for Alternative D are as follows:

- New ROWs issued if they would not affect GRSG populations
- If power lines cannot be removed, buried, or modified, install perch deterrents

In general, all management actions under this alternative are beneficial to protecting site setting of cultural resources. Such actions as ROW exclusions, withdrawal from mineral entry, and retention of public lands are all beneficial to minimizing activity in areas of cultural resources and keeping cultural resources under federal protection. One potentially adverse impact from these actions is allowing land exchanges to create more contiguous habitat. If BLM/USFS lands are exchanged to gain land in GRSG habitat, those lands are no longer protected by cultural resource laws; therefore, development can occur, which can impact site setting of nearby cultural resources by fragmenting landscapes.

Opportunities for Native American Traditional Uses

Management actions for lands and realty are those to exclude or avoid ROWs, use existing roads for development, make new roads with minimal disturbance, reclaim disturbed areas, retain public ownership of lands, and withdraw minerals from habitat areas. Generally, actions such as ROWs or mineral development have significant impacts on cultural resources. These impacts include surface disturbances, visual impacts, loss of protection through land exchange, and increased access. These actions may also push these activities and uses to other areas outside of GRSG habitat, which may adversely impact cultural resources.

Alternative A-Lands and realty actions under this alternative would be the least restrictive, although some protections are provided for threatened or endangered species. In general, these actions are beneficial to protecting cultural resources by limiting ground disturbance, considering resources during land exchanges, or collocating utilities. Although accommodating for cultural resources, this alternative still allows actions such as ROWs and land exchanges and has no restrictions on construction of new roads for new actions. Possible impacts on Native American traditional uses may come from land exchanges, issuing ROWs, or mineral development. These impacts could disturb traditional plants or interfere with traditional religious sites by disturbing the landscape through fragmentation or visual impacts.

Alternative B-Lands and realty under this alternative would limit or close PPH to certain actions. Actions under this alternative are as follows:

- PPH is ROW avoidance areas
- Issue SUAs for exclusion areas
- Remove, bury, or modify power lines
- Reclaim disturbed areas
- Retain public ownership of lands
- Allow land exchanges where there is mixed ownership and land exchange would allow for more contiguous federal ownership patterns within PPH
- Apply mineral withdrawal

In general, all management actions under this alternative are beneficial to protecting Native American traditional uses. Such actions as limiting ROW corridors, withdrawing areas from mineral entry, and retaining public lands are all beneficial to minimizing activity in sensitive areas and keeping lands under federal protection. Possible impacts on Native American traditional uses under this alternative include burying or modifying power lines because it could disturb plants or

sensitive sites through ground disturbance. In some cases, allowing land exchanges in GRSG habitat would affect exchanged land that is no longer protected by cultural resource laws and is no longer available to Native Americans for traditional uses.

Alternative C-This alternative is similar to Alternative B, with a few more restrictions for lands and realty actions. Actions for Alternative C are as follows:

- Manage ADH as ROW exclusion areas
- Collocate new ROWs only within current ROW footprints

In general, all management actions under this alternative are beneficial to preserving Native American traditional uses. Such actions as ROW exclusions, withdrawal from mineral entry, and retention of public lands are all beneficial to minimizing activity in sensitive areas and keeping lands under federal protection. Possible impacts on Native American traditional uses under this alternative are burying or modifying power lines because it could disturb plants or sensitive sites through ground disturbance. In some cases, allowing land exchanges to gain land in GRSG habitat affects exchanged land, which is no longer protected by cultural resource laws and is no longer available to Native Americans for traditional uses.

Alternative D-This alternative is similar to Alternative B, with some modified restrictions for lands and realty actions. Actions for Alternative D are as follows:

- New ROWs issued if they would not affect GRSG populations
- If power lines cannot be removed, buried, or modified, install perch deterrents

In general, all management actions under this alternative are beneficial to preserving Native American traditional uses. Such actions as ROW exclusions, withdrawal from mineral entry, and retention of public lands are all beneficial to minimizing activity in areas of cultural resources and keeping cultural resources under federal protection. Possible impacts on Native American traditional uses under this alternative are burying or modifying existing power lines because it could disturb plants or sensitive sites through ground disturbance. In some cases, allowing land exchanges to gain land in GRSG habitat can affect exchanged land, which is no longer protected by cultural resource laws and is no longer available to Native Americans for traditional uses.

Ground Disturbance

Management actions for lands and realty include those to exclude or avoid ROWs, use existing roads for development, make new roads with minimal disturbance, reclaim disturbed areas, retain public ownership of lands, and withdraw minerals from habitat areas. Generally, actions such as ROWs or mineral development have significant impacts on cultural resources. These impacts include surface disturbances, visual impacts, loss of protection through land exchange, and increased access. These actions can cause ground disturbance through utility installation, mineral development, and land exchange. These actions may also push these activities and uses to other areas outside of GRSG habitat, which may adversely impact cultural resources.

Alternative A-Lands and realty actions under this alternative would be the least restrictive, although some protections are provided for threatened or endangered species. In general, these actions are beneficial to protecting cultural resources by limiting ground disturbance, considering resources during land exchanges, and collocating utilities. Although accommodating for cultural resources, this alternative still allows actions such as ROWs and land exchanges and has no

restrictions on construction of new roads for new actions. All of these actions may impact cultural resources through ground disturbance. Ground disturbance can impact cultural resources by disturbing irreplaceable cultural artifacts, features, and information about the past.

Alternative B-Lands and realty under this alternative would limit or close PPH areas to certain actions. Actions under this alternative are as follows:

- PPH is ROW avoidance areas
- Issue SUAs for exclusion areas
- Remove, bury, or modify power lines
- Reclaim disturbed areas
- Retain public ownership of lands
- Allow land exchanges where there is mixed ownership and land exchange would allow for more contiguous federal ownership patterns within PPH
- Apply mineral withdrawal

In general, all management actions under this alternative are beneficial to reducing ground disturbance and impacting cultural resources. Such actions as limiting ROW corridors, withdrawing areas from mineral entry, and retaining public lands are all beneficial to minimizing activity and limiting ground disturbances. Possible impacts on cultural resources through ground disturbances under this alternative are burying or modifying existing power lines. In some cases, allowing land exchanges in GRSG habitat affects the exchanged land, which is no longer protected by cultural resource laws.

Alternative C-This alternative is similar to Alternative B, with a few more restrictions for lands and realty actions. Actions for Alternative C are as follows:

- Manage ADH as ROW exclusion areas
- Collocate new ROWs only within current ROW footprints

In general, all management actions under this alternative are beneficial to reducing ground disturbance and impacting cultural resources. Such actions as limiting ROW corridors, withdrawing areas from mineral entry, and retaining public lands are all beneficial to minimizing activity and limiting ground disturbances. Possible impacts on cultural resources through ground disturbances under this alternative are burying or modifying existing power lines. In some cases, allowing land exchanges in GRSG habitat affects the exchanged land, which is no longer protected by cultural resource laws.

Alternative D-This alternative is similar to Alternative B, with some modified restrictions for lands and realty actions. Actions for Alternative D are as follows:

- New ROWs issued if would not affect GRSG populations
- If power lines cannot be removed, buried, or modified, perch deterrents would be installed

In general, all management actions under this alternative are beneficial to reducing ground disturbance and impacting cultural resources. Such actions as limiting ROW corridors,

withdrawing areas from mineral entry, and retaining public lands are all beneficial to minimizing activity and limiting ground disturbances. Possible impacts on cultural resources through ground disturbances under this alternative are burying or modifying existing power lines. In some cases, allowing land exchanges in GRSG habitat affects the exchanged land, which is no longer protected by cultural resource laws. This alternative is less restrictive to issuing new ROWs, which could impact cultural resources through ground disturbance more that Alternatives B or C.

Natural Processes

Management actions for lands and realty include those to exclude or avoid ROWs, use existing roads for development, make new roads with minimal disturbance, reclaim disturbed areas, retain public ownership of lands, and withdraw minerals from habitat areas. Generally, actions such as ROWs or mineral development have significant impacts on cultural resources. These impacts include surface disturbances, visual impacts, loss of protection through land exchange, and increased access. These actions can increase natural processes such as erosion through modifying ground surfaces or vegetation. It may also push these activities and uses to other areas outside of GRSG habitat, which may adversely impact cultural resources.

Alternative A-Lands and realty actions under this alternative would be the least restrictive, although some protections are provided for threatened or endangered species. In general, these actions are beneficial to protecting cultural resources by limiting ground disturbance, considering resources during land exchanges, or collocating utilities. Although accommodating for cultural resources, this alternative still allows actions such as ROWs and land exchanges and has no restrictions on construction of new roads for new actions. All of these actions may impact cultural resources through increasing natural processes, such as erosion. This and vegetation changes can occur from such actions as utility installation, new construction, mineral development, and land exchange. Natural processes can increase the deterioration of cultural resources by disturbing artifacts or features and manipulating ground surface or vegetation.

Alternative B-Lands and realty under this alternative would limit or close PPH areas to certain actions. Actions under this alternative are as follows:

- Manage PPH as ROW avoidance areas
- Identify SUA exclusion areas
- Remove, bury, or modify existing power lines
- Reclaim disturbed areas
- Retain public ownership of lands
- Allow land exchanges where there is mixed ownership and land exchange would allow for more contiguous federal ownership patterns within PPH
- Apply mineral withdrawal

In general, all management actions under this alternative are beneficial to reducing natural processes that impact cultural resources. Such actions as limiting ROW corridors, withdrawing areas from mineral entry, and retaining public lands are all beneficial to minimizing activity and limiting natural processes. Possible impacts on cultural resources through natural processes under this alternative are new ground disturbances or vegetation changes from modifying power lines

or allowing land exchanges. For the most part, this alternative would be beneficial to reducing natural processes that impact cultural resources because these management actions are more restrictive than Alternative A.

Alternative C-This alternative is similar to Alternative B, with a few more restrictions for lands and realty actions. Actions for Alternative C are as follows:

- ADH ROW exclusion areas
- New ROWs can be collocated and only within current ROW footprint

In general, all management actions under this alternative are beneficial to reducing natural processes that impact cultural resources. Such actions as limiting ROW corridors, withdrawing areas from mineral entry, and retaining public lands are all beneficial to minimizing activity and limiting natural processes. Possible impacts on cultural resources through natural processes under this alternative include new ground disturbances or vegetation changes from modifying power lines or allowing land exchanges. For the most part this alternative is similar to Alternative B and would be beneficial to reducing natural processes that impact cultural resources.

Alternative D-This alternative is similar to Alternative B, with some modified restrictions for lands and realty actions. Actions for Alternative D are as follows:

- New ROWs issued if they would not affect GRSG populations
- If power lines cannot be removed, buried, or modified, perch deterrents would be installed

In general, all management actions under this alternative are beneficial to reducing natural processes that impact cultural resources. Such actions as limiting ROW corridors, withdrawing areas from mineral entry, and retaining public lands are all beneficial to minimizing activity and limiting natural processes. Possible impacts on cultural resources through natural processes under this alternative include new ground disturbances or vegetation changes from modifying power lines or allowing land exchanges. For the most part this alternative is similar to Alternative B and would be beneficial to reducing natural processes that impact cultural resources.

Impacts from Wind and Solar Energy Development on Cultural Resources

Wind and solar developments are authorized through ROWs. Impacts on cultural resources from restrictions on wind and solar power projects would be expected to be the same as those described under *Impacts from Lands and Realty Management on Cultural Resources*.

Impacts from Range Management on Cultural Resources

Restrictions on grazing designed to protect GRSG habitat would also protect cultural resources. Cultural resources can be adversely impacted by grazing through direct trampling of artifacts and features and from such activities as livestock trailing concentrating around water, under shade, or along natural constraining features, such as rock cliffs. Increased erosion and other natural impacts on cultural resources can occur through the loss of vegetation, such as grass, forbs, and shrubs consumed by livestock. Range management that reduces grazing in GRSG areas could protect cultural resources.

Vandalism/Collection

Restrictions on grazing designed to protect GRSG habitat would also protect cultural resources because the reductions in cattle use may result in less access (via cattle trails) to remote public land areas. Less access typically is linked with less vandalism and reduced unauthorized collection of cultural resources.

Alternative A-In locations where no surface disturbance restrictions for GRSG habitat occur, cultural resources could be adversely impacted by grazing practices. In the CRVFO, the RMP allows for adjustments to grazing management to occur based on monitoring. If these adjustments are made to protect GRSG habitat, the results would likely be beneficial to cultural resources in reducing direct damage by trampling and other surface disturbances of livestock impacts.

The GJFO RMP mostly manages for impacts on soils and riparian and water resources, which may or may not protect GRSG and thus cultural resources.

The LSFO RMP directs the office to identify and begin restoring and rehabilitating sagebrush habitat, which may increase the area in which GRSG can live. Active vegetation treatments such as hydro-axing, prescribed fire, or removing encroaching trees into sage flats may adversely impact wooden, architectural cultural resources, such as brush fences and wickiups and other sites (although these impacts would typically be mitigated through the Section 106 process). Depending on the method used in the LSFO, to move toward the sustainability of biological diversity across the landscape, cultural resources could be adversely impacted (for example, through vegetation treatments and prescribed fire) or beneficially impacted (for example, through fencing or reducing AUMs in a grazing allotment).

Livestock exclusions and rangeland projects mentioned in the Roan Plateau RMP and WRFO RMP to achieve resource objectives for GRSG could be adverse or beneficial to cultural resources, depending on the method used. In general, reductions in grazing can reduce vandalism impacts on cultural resources by reducing access to remote areas where cultural resources may be found.

Alternative B-Action items that direct for vegetation management or changes to livestock grazing in GRSG habitat could result in less surface disturbance (for example, the reduction of livestock and access within an area) or more surface disturbance (for example, increased access to facilitate active vegetation removal to increase sage), depending on the methods used.

Alternative C-Under Alternative C, all GRSG habitat would be excluded from grazing. This would increase protection of cultural resources by removing livestock from the landscape, which would decrease artifact and feature trampling and impacts from livestock concentration.

Alternative D-This is the same as Alternative B.

Scientific Knowledge

Restrictions on range management designed to protect GRSG habitat could limit new scientific knowledge, due to fewer cultural surveys and mitigation excavations, both of which can result in subsequent identification of new cultural resource sites. However, existing sites within PPH would have greater protections, preserving known cultural resource sites for potential future scientific study.

Alternative A-If surface disturbance restrictions for GRSG habitat were to occur based on monitoring, then portions excluded would decrease the number of new sites discovered. However, this may lead to the protection of known cultural resource sites and could preserve them for future scientific study.

Alternative B-Restrictions on surface disturbance for GRSG habitat could decrease the number of new sites discovered but may lead to the protection of known cultural resource sites. Adding additional structural range improvements or water development locations in areas that would improve GRSG habitat would result in additional cultural resource inventory, which would reveal more about cultural resources on the landscape.

Alternative C-Grazing restrictions required under this alternative would allow for the greatest preservation of known cultural resources for potential future scientific study. Not allowing new structural range improvements or water developments for diversion from springs or seeps in GRSG habitat could result in no additional cultural resource information and could encourage wildlife concentration in these sensitive areas, which could impact cultural resources. Dismantling water developments to return riparian areas to predevelopment conditions or removing historic ranching fences or modifications could require cultural surveys. This would increase our understanding of historic water modifications and area ranching methods, but the removal of some of these features may result in the loss of some structures considered to be cultural resources.

Alternative D-Impacts on cultural resources are similar to those listed under Alternatives B and C.

Site Setting

The setting in which a cultural resource is located is an important part of a site's integrity as it provides the backdrop for the feelings and context of a site. Integrity of setting is one of seven categories evaluated for each site when considering it for inclusion on the NRHP.

Alternative A-Under Alternative A, several field offices mention the management of vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado (Grand Junction RMP and Roan Plateau RMP). In some cases, field offices are tasked with restoring and rehabilitating sagebrush habitat (Little Snake RMP). In general, adjustments can be made to meet resource objectives (White River RMP and Colorado River Valley RMP). Any projects that impact large acreages of vegetation could impact the site setting of certain types of sites from the original setting.

Alternative B-Under Alternative B, the action items that alter vegetation type or percentages could alter site setting if the changes in vegetation were to result in differences from the original setting (unless project designs aim for restoring historic settings). Larger projects could result in site setting changes.

Alternative C-This has the same impacts on cultural resources as those listed under Alternative B.

Alternative D-This has the same impacts on cultural resources as those listed under Alternative B.

Opportunities for Native American Uses

Native Americans have a generalized concept of spiritual significance that is not easily transferred to Western models or definitions. During tribal consultation, tribes have described concerns about fragmentation of landscape, loss of site setting, and decreased access to traditional plants, animals, and minerals that are collected from public land. Tribes have also expressed a concern for the loss of sagebrush resources. Vegetation management to increase sage could benefit Native American uses but may also alter the landscape, depending on the methods used to increase sage.

Alternative A-Under this alternative, several field offices mention the management of vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing

Management in Colorado (Grand Junction RMP and Roan Plateau RMP). In some cases the field offices are tasked with restoring and rehabilitating sagebrush habitat (Little Snake RMP), and in general adjustments can be made to meet resource objectives (White River RMP, Colorado River Valley RMP, and Routt National Forest Plan). Any projects that impact large acreages of vegetation could impact the setting of certain types of sites from the original setting, especially in highly visible locations on the landscape. This could adversely impact the setting of and landscape surrounding cultural resource sites considered significant to Native Americans, including traditional trails, rock art, vision quest sites, and other ceremonial sites still used today. Certain collection items may be impacted by changes to vegetation communities.

Alternative B-The impacts on Native American traditional uses and ceremonial sites are the same as those described under Alternative A.

Alternative C-The impacts on Native American traditional uses and ceremonial sites are the same as those described under Alternative A.

Alternative D-The impacts on Native American traditional uses and ceremonial sites are the same as those described under Alternative A.

Ground Disturbance

Restrictions on range management designed to protect GRSG habitat could reduce or eliminate surface disturbance. Ground disturbance within PPH can result in erosion, increased sedimentation, decreased vegetation, and degraded slope stability, all of which could adversely affect cultural resources. However, cultural resource surveys and construction monitors required for ground-disturbing projects could lead to new cultural resource discoveries. Additionally, many projects that manipulate vegetation to increase sage habitat could impact cultural resources, depending on the amount of ground disturbance caused by the methods used.

Alternative A-In locations where no surface disturbance restrictions for GRSG habitat occur, cultural resources could be adversely impacted by grazing practices. In CRVFO, the RMP allows for adjustments to grazing management to occur based on monitoring. If these adjustments are made to the benefit of protecting GRSG habitat, the results would likely be beneficial to cultural resources in reducing direct damage to cultural resources through trampling and other surface disturbance types of livestock impacts. The GJFO RMP mostly manages for impacts on soils, riparian and water resources which may or may not provide protection for GRSG and thus cultural resources. The LSFO RMP directs the office to identify and initiate restoration and rehabilitation of sagebrush habitat which may increase the area in which GRSG can live. Depending on the method used in the LSFO, to move toward the sustainability of biological diversity across the landscape, cultural resources could be potentially adversely impacted (for example, through vegetation treatments, prescribed fire, etc.) or beneficially impacted (for example, through fencing or the reduction of AUMs in a grazing allotment). Livestock exclusions and rangeland projects as mentioned in the Roan Plateau RMP and WRFO RMP to achieve resource objectives for GRSG could be adverse or beneficial to cultural resources depending on the method used.

Alternative B-Range surface disturbance restrictions for GRSG habitat could limit the number of new sites discovered but may protect cultural resource sites. Adding structural range improvements or water development locations in areas that would improve GRSG habitat would result in additional cultural resource inventory. This would reveal more about cultural resources on the landscape. Action items that modify vegetation management or changes to livestock grazing in GRSG habitat could result in less surface disturbance (for example, the reduction

of livestock within an area) or more surface disturbance (for example, vegetation removal to increase sage), depending on the methods used.

Alternative C-Removing grazing from GRSG habitat would result in the greatest protection to cultural resources by removing the need for facilities and eliminating impacts from livestock.

Alternative D-The impacts on cultural resources are similar to those under Alternative B.

Natural Causes

Natural causes that increase cultural resource site deterioration include erosion, increased sedimentation, decreased vegetation, and degraded slope stability. Restrictions on grazing use designed to protect GRSG habitat could reduce or eliminate increased natural causes (such as increased water erosion after rains). This might be the indirect result of disruptive activities that occur during grazing or facility development. Conversely, vegetation treatments, depending on the type used, may also increase natural causes deterioration. In general, natural caused impacts are similar to those described under the ground disturbance section above.

Impacts from Wild Horse Management on Cultural Resources

Restrictions on wild horse management designed to protect GRSG habitat would also protect cultural resources. Cultural resources can be adversely impacted by wild horses through direct trampling of artifacts and features and from activities like trailing and concentrating in areas around water, under shade, or along natural constraining features, such as rock cliffs. Increased erosion and other degradation impacts on cultural resources can occur through the loss of vegetation, such as grass, forbs and shrubs consumed by horses. In general, the impacts on cultural resources from wild horses are similar to those from grazing livestock.

The following field offices and forest do not have wild horses or burros within the decision area: CRVFO, KFO, Roan Plateau, GJFO, and Routt National Forest. The LSFO and WRFO do have wild horses within the decision area.

Vandalism/Collection

Restrictions on wild horse management designed to protect GRSG habitat would also protect cultural resources from increased vandalism or collection.

Alternative A-Restrictions on wild horses for GRSG habitat would result in protection of cultural resources.

Alternative B-This has the same impacts as Alternative A.

Alternative C-This has the same impacts as Alternative A.

Alternative D-This has the same impacts as Alternative A.

Scientific Knowledge

Restrictions on wild horse management designed to protect GRSG habitat would have some effect on scientific knowledge that might be acquired from project specific survey work.

Alternative A-No additional scientific knowledge of cultural resources would be gained from this alternative because no facilities are potentially proposed; therefore, no additional cultural survey

work or incidental excavations would be completed, both of which could increase identification of new cultural resource sites.

Alternative B-Additional cultural resource surveys may be conducted if wild horse facilities, such as water developments or other rangeland improvements, are proposed. This would lead to increased scientific knowledge of cultural resources in the area.

Alternative C-Impacts are the same as Alternative B.

Alternative D-Impacts are the same as Alternative B.

Opportunities for Native American Traditional Uses

Native Americans have a generalized concept of spiritual significance that is not easily transferred to Western models or definitions. Through tribal consultation, tribes have described concerns about fragmentation of landscape, loss of site setting, and decreased access to traditional plants, animals, and minerals that are collected from public land. The management of wild horses to protect GRSG habitat would generally benefit the production of vegetation that may be collected by Native American users.

Alternative A-Managing for GRSG would generally be beneficial to Native Americans, who may use those areas for traditional plants, animals, and minerals.

Alternative B-Impacts are the same as Alternative A.

Alternative C-Impacts are the same as Alternative A.

Alternative D-Impacts are the same as Alternative A.

Ground Disturbance

Restrictions on wild horses designed to protect GRSG habitat could reduce or eliminate surface disturbance from horses. Ground disturbance within PPH can result in erosion, increased sedimentation, decreased vegetation, and degraded slope stability, all of which could adversely affect cultural resources.

Alternative A-Impacts on cultural resources would not be increased or decreased based on the management of wild horses for GRSG under this alternative.

Alternative B-Promoting gathers, which would result in the reduction of wild horses, would lessen their impacts on cultural resources.

Alternative C-Impacts are the same as Alternative B.

Alternative D-Impacts are the same as Alternative B.

Natural Causes

Disruptive activities associated with wild horse management would affect natural causes in the same manner described above for ground disturbance.

Impacts from Fluid Minerals Management

Oil and gas exploration and development includes the construction of well pads, pipelines, utility lines, roads, and facilities, all of which could impact cultural resources. Restrictions on fluid mineral development for GRSG would protect cultural resources in the habitat; however, these restrictions would move potential impacts on cultural resources outside of habitat, as development is forced to go outside of these areas. Many fragile site types in Northwest Colorado, like wickiups, are in pinyon and juniper woodlands; if more development were to occur in these areas due to having to avoid GRSG habitat, this could cause a negative impact on cultural resources.

Vandalism/Collection

In areas of oil and gas development, associated route construction would result in increased public access to areas where cultural resources are present. This increased public access, as well as the additional numbers of industry workers in an area, increases the risk of vandalism or unauthorized collection of cultural resources. Restrictions for GRSG would not cause these negative impacts on the resources within a habitat, though it could cause them outside of the habitat.

Alternative A-With this alternative, fluid mineral development would continue as it currently is, causing the indirect impacts of collection and vandalism to cultural resources.

Alternative B-Increased restrictions on fluid mineral leasing, including allowing no new leases, would increase protections against vandalism and collection of cultural resources in habitats. However, this may cause these impacts to be pushed outside of GRSG habitat.

Alternative C-As the most restrictive, Alternative C would offer the greatest protection of cultural resources in GRSG habitat; however, this may cause impacts to be pushed outside of PPH.

Alternative D-Moderate restrictions on fluid mineral development would have moderate beneficial impacts on the protection of cultural resources in GRSG habitat.

Scientific Knowledge

The results of the oil and gas industry surveys required under Section 106 of the NHPA cause a beneficial impact on cultural resources. This is because the surveys generate data that promotes further understanding of cultural resources in the planning area. Restrictions on fluid mineral development designed to protect GRSG habitat would lessen this beneficial impact.

Alternative A-With this alternative, fluid mineral development would continue as it currently is, causing a beneficial increase in scientific knowledge.

Alternative B-Increased restrictions on fluid mineral leasing, including allowing no new leases, would lessen potential increases in scientific knowledge. However, the restrictions may cause this to be pushed outside of GRSG habitat.

Alternative C-As the most restrictive, Alternative C would restrict gains in scientific knowledge within GRSG habitat; however, this would most likely shift development and the associated potential increase in scientific knowledge outside of PPH.

Alternative D-Moderate restrictions on fluid mineral development would have moderate impacts on the change in scientific knowledge.

Site Setting

Direct impacts on cultural resources can result from actions that result in the following:

- Alter characteristics of the surrounding environment that contribute to resource significance
- Introduce visual or audible elements out of character with the property
- Alter its setting
- Fragment the landscape of which sites are a part

Restrictions for GRSG would have a beneficial impact on cultural resources in GRSG habitat, but they would move impacts on cultural resources outside of habitat if development were concentrated there.

Alternative A-With this alternative, fluid mineral development would continue as it currently is, causing continual and at times cumulative impacts on site settings.

Alternative B-Increased restrictions on fluid mineral leasing, including allowing no new leases, would increase protections against altering site settings in habitat. However, this may cause these impacts to be pushed outside of GRSG habitat.

Alternative C-As the most restrictive, Alternative C would offer the greatest protection against altering settings to sites in GRSG habitat; however, this would most likely move the impacts to site settings outside of PPH.

Alternative D-Moderate restrictions on fluid mineral development would have moderate beneficial impacts on the protection of site settings in GRSG habitat.

Opportunities for Native American Traditional Uses

In areas of fluid mineral development, increased public access can make more areas available for Native American traditional uses, such as gathering plants and minerals. Restrictions on fluid mineral development designed to protect GRSG habitat would lessen this beneficial impact.

Alternative A-With this alternative, fluid mineral development would continue as it currently is, causing increases in public access and enabling new opportunities for Native American uses.

Alternative B-Increased restrictions on fluid mineral leasing, including allowing no new leases, would lessen potential increases in public access. However, this may cause access to be pushed outside of GRSG habitat, increasing opportunities for Native American uses.

Alternative C-As the most restrictive, Alternative C would restrict an increase in access within GRSG habitat; however, this would most likely shift development and the associated increase in public access outside of PPH.

Alternative D-Moderate restrictions on fluid mineral development would have impacts on the opportunities for Native American traditional uses.

Ground Disturbance

Direct impacts occur to cultural resources resulting from any development actions that disturb the soil or alter, damage, or destroy all or part of a resource. Restrictions for GRSG would protect cultural resources in the habitat but could move impacts on cultural resources outside of habitat.

Alternative A-With this alternative, fluid mineral development would continue as it currently is, causing continual and at times cumulative impacts on cultural resources.

Alternative B-Increased restrictions on fluid mineral leasing, including allowing no new leases, would increase protections against ground disturbance to cultural resources in habitat. However, this may cause these direct impacts to be pushed outside of GRSG habitat.

Alternative C-As the most restrictive, Alternative C would offer the greatest protection to cultural resources in GRSG habitat from the ground disturbance that is caused by fluid mineral development. However, this would most likely cause these impacts to happen to sites outside of PPH when development is pushed there.

Alternative D-Moderate restrictions on fluid mineral development would have moderate beneficial impacts on the protection of cultural resources in GRSG habitat.

Natural Processes

Indirect impacts from fluid mineral development on cultural resources are the vegetation loss and increased erosion that is caused by directly impacting ground disturbances. Restrictions for GRSG would protect cultural resources in the habitat but could move impacts on cultural resources outside of habitat.

Alternative A-With this alternative, fluid mineral development would continue as it currently is, causing continual and at times cumulative impacts on cultural resources.

Alternative B-Increased restrictions on fluid mineral leasing, including allowing no new leases, would increase protections of cultural resources from increased natural processes within habitat. However, this may cause these indirect impacts to be pushed outside of GRSG habitat.

Alternative C-As the most restrictive, Alternative C would offer the greatest protection to cultural resources in GRSG habitat from indirect impacts, such as erosion caused by fluid mineral development. However, this would most likely cause these impacts to happen to sites outside of PPH when development is pushed there.

Alternative D-Moderate restrictions on fluid mineral development would have moderate beneficial impacts on the protection of cultural resources in GRSG habitat.

Impacts from Solid Minerals, Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on Cultural Resources

Impacts from management of solid minerals, locatable minerals, nonenergy leasable minerals, and salable minerals on cultural resources are expected to be the same as the impacts described above from fluid minerals management on cultural resources.

Impacts from Fuels Management, Wildland Fire Management, and Emergency Stabilization and Response on Cultural Resources

Vandalism/Collection

Restrictions on wildland fire and prescribed fire to protect GRSG habitat would protect historic sites and at the same time result in higher site and artifact visibility. The increased visibility of historic properties would result in vandalism through artifact extraction and collection. The result would be the loss of scientifically important information.

Alternative A-This would have the fewest restrictions on wildland fire and prescribed fire on PPH, which would have greater potential to impact cultural resources.

Alternative B-Increased restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Alternative C-This is the most restrictive and would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Alternative D-The moderate restrictions under Alternative D would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Scientific Knowledge

Wildland fire could adversely affect both known and unknown cultural resource sites, with impacts on features and artifacts resulting in the loss of scientific knowledge. Prescribed fire would help to provide additional scientific information through site location and recording. Limited use of wildland fire use and prescribed fire would limit scientific study because of fewer undertakings to identify cultural resources.

Alternative A-Alternative A's fewest restrictions on wildland fire and prescribed fire on PPH would have greater potential to impact cultural resources.

Alternative B-Alternative B's increased restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Alternative C-The most restrictive, Alternative C would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Alternative D-With its moderate restrictions, Alternative D would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Site Setting

Wildland and prescribed fire in themselves would have a temporary effect on site setting, while suppression activities would have a longer-lasting alteration of the site setting for historic properties.

Alternative A-This would have the fewest restrictions on wildland fire and prescribed fire on PPH and would have greater potential to impact cultural resources.

Alternative B-With increased restrictions, Alternative B would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Alternative C-The most restrictive, Alternative C would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Alternative D-Alternative D's moderate restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Opportunities for Native American Traditional Uses

Wildland fire suppression could affect resources that are important to traditional Native Americans. The impacts from fire and associated activities may impact traditional plant resources for both the short term and the long term collection and use. Prescribed fire can be designed to potentially avoid or lessen intensity and severity on natural resources important to traditional use.

Alternative A-This would have the fewest restrictions on wildland fire and prescribed fire on PPH and would have greater potential to impact cultural resources.

Alternative B-Increased restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Alternative C-The most restrictive, Alternative C would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Alternative D-Moderate restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Ground Disturbance

Wildland fire suppression and the use of retardant would impact both known and unknown cultural resources, affecting artifacts and datable material by altering radiocarbon dates and affecting paleobotanical data. The use of mechanized equipment would directly impact unknown historic properties, with the loss of scientific information, the direct loss of artifacts, and indirect impacts from water and wind erosion, which would compromise site integrity.

Alternative A-This would have the fewest restrictions on wildland fire and prescribed fire on PPH and would have greater potential to impact cultural resources.

Alternative B-Increased restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Alternative C-The most restrictive, Alternative C would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Alternative D-Moderate restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Natural Processes

Wildland fire would remove protective vegetation cover, exposing historic properties to artifact collection and destruction of site integrity from soil and wind erosion.

Alternative A-This has the fewest restrictions on wildland fire and prescribed fire on PPH and would have greater potential to impact cultural resources.

Alternative B-Increased restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Alternative C-The most restrictive, Alternative C would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Alternative D-Moderate restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PPH.

Impacts from Habitat Restoration on Cultural Resources

Soil

Limiting soil erosion on steep slopes and managing ground-disturbing activities would result in beneficial impacts and would help protect cultural resources. However, because many cultural resource sites are on, or just below, the ground surface, they are susceptible to damage and destruction from ground disturbance and erosion. The techniques or practices used in order to stabilize soils and control soil erosion may include the risk of direct disturbance of cultural resources as the result of ground-disturbing activities. Damage would likely include modification of site spatial relationships and displacement or damage of artifacts, features, and midden deposits. This would result in the loss of information relevant to the site function, dates of use, plants and animals used, past environments, and other important research data. Reclamation measures could help preserve or restore the setting of cultural resources.

Pinyon Juniper

Management activities would continue to be implemented using a variety of treatment methods, including clear-cuts, shelter wood, partial cuts, thinning, managed fire, planting, and mechanical treatments. The degree of impacts on cultural resources would vary by treatment method. Treatments could impact cultural resources through direct surface disturbance, erosion, alteration of setting, cross-country driving, and the adverse impacts of wildland fire.

Rangelands

Vegetation would continue to be treated to maintain and improve rangeland forage. Direct cultural resource impacts include destruction of surface and buried structures and features. Vegetation treatments would cause indirect impacts on cultural resources from increased erosion and displacement and destruction of surface artifacts. Vegetation treatments could result in adverse impacts from ground-disturbing equipment and the alteration of setting. Improvement projects that would impact historic properties would require further cultural resources review. Measures designed to restrict surface occupancy and livestock grazing, to fence sensitive areas,

and to disperse impacts resulting from use within riparian areas could protect cultural sites from ground disturbance. The restoration of desired native species would include plants used or valued by tribal users and would help retain historic settings. Revegetation from a seed bank would introduce seeds and pollens, which would impact the accuracy of paleobotanical data on archaeological sites. Reseeding using the in situ native seed bank would not impact historic properties, whereas the use of drill seeding could have direct impacts on artifacts or features.

Riparian

Invasive and exotic species could be removed from some riparian areas. This may directly impact archaeological and historical resources. Vegetation treatments would result in short-term indirect impacts on cultural resources due to the increased erosion from the invasive species removal. This could, in turn, displace and destroy surface artifacts and, in some cases, surface and buried structures and features. Generally vegetation treatments would be excluded from riparian areas providing protection to cultural resources through avoidance.

Weeds

Impacts on cultural resources from weeds management would depend on the method used to treat weed infestations. Manual treatments would result in minimal impacts on cultural resources because treatment is done by hand, and specific plants, features, or artifacts can be avoided. Mechanical treatments may require the use of light or heavy equipment. Equipment can directly impact cultural resources as the result of surface disturbance and the direct destruction of artifacts and features. Biological treatments would result in no direct impacts on cultural resources. Herbicide applications could create short- and long-term impacts due to the impacts of chemicals, which may affect the accuracy of paleobotanical data on archaeological sites or increase deterioration. These impacts on cultural resources would also apply to plant resources of importance to Native Americans. Herbicide applications, in particular, could affect Native American health from plant gathering and use. Restoration of the native plant community could increase some native vegetation important to Native Americans and could provide additional locations for Native Americans to collect such vegetation. There could be short-term impacts due to the loss of access during treatment or closures for cultural uses.

Vandalism/Collection

Restrictions on habitat restoration would allow for greater site protection, while reducing potential impacts that could lead to artifact collection and the loss of scientific information. Increased vegetation habitat would help to protect sites from artifact collectors because of reduced visibility of sites.

Alternative A-This would have the fewest restrictions on habitat restoration on PPH and would have greater potential to impact cultural resources.

Alternative B-Increased restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative C-The most restrictive, Alternative C would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative D-Moderate restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Scientific Knowledge

The identification of historic properties through vegetation manipulation would result in the location of historic properties that could lend additional information about prehistoric land use.

Alternative A-This would have the fewest restrictions on habitat restoration on PPH and would have greater potential to impact cultural resources.

Alternative B-Increased restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative C-The most restrictive, Alternative C would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative D-Moderate restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Site Setting

Vegetation treatments would result in adverse impacts from ground-disturbing equipment and the alteration of setting. The restoration of desired native species would include plants used or valued by tribal users, which would help retain historic settings.

Alternative A-This would have the fewest restrictions on habitat restoration on PPH and would have greater potential to impact cultural resources.

Alternative B-Increased restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative C-The most restrictive, Alternative C would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative D-Moderate restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Opportunities for Native American Traditional Uses

Vegetation habitat treatments could enhance and protect plant resources that are important to Native American traditional use through manipulation of plant resources and protection in areas important to GRSG habitat. Herbicide applications, in particular, could affect Native American health from plant gathering and use. Restoration of the native plant community could increase some native vegetation important to Native Americans and provide additional locations for Native Americans to collect such vegetation. There could be short-term impacts due to the loss of access during treatment or closures for cultural uses.

Alternative A-This would have the fewest restrictions on habitat restoration on PPH and would have greater potential to impact cultural resources.

Alternative B-Increased restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative C-The most restrictive, Alternative C would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative D-Moderate restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Ground Disturbance

Vegetation treatments would result in adverse impacts ground-disturbing equipment, such as drill seeding and disking, which would affect cultural artifacts, features, and structures. There could be increased soil and wind erosion in the short term from mechanical treatments that could adversely affect historic properties. Vegetation treatments would also allow for increased ground cover that would reduce visibility and increase site protection.

Alternative A-This would have the fewest restrictions on habitat restoration on PPH and would have greater potential to impact cultural resources.

Alternative B-Increased restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative C-The most restrictive, Alternative C would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative D-Moderate restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Natural Processes

The lack of vegetation would result in increased soil erosion from wind and water that would affect both known and unknown cultural resources, leading to the loss of scientific information.

Alternative A-This would have the fewest restrictions on habitat restoration on PPH and would have greater potential to impact cultural resources.

Alternative B-Increased restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative C-The most restrictive, Alternative C would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative D-Moderate restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Impacts from ACEC/Zoological Area Management on Cultural Resources

ACEC designations generally have a beneficial impact on cultural resources. This designation would limit actions within the ACEC area, which in turn would limit actions that could impact cultural resources. This designation may push activities and uses to other areas outside of GRSG habitat, which may concentrate use in other areas where there are potentially significant cultural resources.

Vandalism/Collection

The management action for ACEC designation is to designate PPH as a Sage-Grouse Habitat ACEC under Alternative C. This action would be generally beneficial to protecting cultural resources by limiting activities within this area.

Alternative A-ACEC designation under this alternative would not occur for GRSG habitat. This would have negligible impacts on vandalism and unauthorized collection of cultural resources. There is always potential for people to vandalize or collect cultural resources, and this alternative would neither increase nor decrease this potential impact.

Alternative B-Impacts are the same as Alternative A.

Alternative C-This alternative would designate an ACEC of all PPH. This designation would be beneficial to protecting cultural resources from vandalism and unauthorized collection by limiting activities and actions within this ACEC. Potential impacts from this designation may push potential impacts from vandalism and unauthorized collection to other areas, which could impact cultural resources.

Alternative D-Impacts are the same as Alternative A.

Site Setting

The management action for ACEC designation is to designate PPH as a Sage-Grouse Habitat ACEC under Alternative C. This action would be generally beneficial to protecting cultural resources by limiting activities within this area.

Alternative A-ACEC designation under this alternative would not occur for GRSG habitat. This would have negligible impacts on vandalism and unauthorized collection of cultural resources. There is always potential for people to impact cultural resource site setting, and this alternative would neither increase nor decrease this potential impact.

Alternative B-Impacts are the same as Alternative A.

Alternative C-This alternative would designate an ACEC of all PPH. This designation would be beneficial to protecting cultural resource site setting by limiting activities and actions within this ACEC. However, there are no additional management actions associated with the ACEC beyond what is already in Alternative C. Potential impacts from this designation may push potential site setting impacts on other areas, which impact cultural resources.

Alternative D-Impacts are the same as Alternative A.

Ground Disturbance

The management action for ACEC designation is to designate PPH as a Sage-Grouse Habitat ACEC under Alternative C. This action would be generally beneficial to protecting cultural resources by limiting activities within this area.

Alternative A-ACEC designation under this alternative would not occur for GRSG habitat. This would have negligible impacts on vandalism and unauthorized collection of cultural resources. There is always potential for people to impact cultural resource site setting, and this alternative would neither increase nor decrease this potential impact.

Alternative B-Impacts are the same as Alternative A.

Alternative C-This alternative would designate an ACEC of PPH. This designation would be beneficial to protecting cultural resource site setting by limiting activities and actions within this ACEC. Potential impacts from this designation may push potential site setting impacts on other areas, which impact cultural resources.

Alternative D-Impacts are the same as Alternative A.

Natural Processes

The management action for ACEC designation is to designate PPH as a Sage-Grouse Habitat ACEC under Alternative C. This action would be generally beneficial to protecting cultural resources by limiting activities within this area.

Alternative A-ACEC designation under this alternative would not occur for GRSG habitat. This would have negligible impacts on vandalism and unauthorized collection of cultural resources. There is always potential for people to impact cultural resource site setting, and this alternative would neither increase nor decrease this potential impact.

Alternative B-Impacts are the same as Alternative A.

Alternative C-This alternative would designate an ACEC of PPH. This designation would be beneficial to protecting cultural resource site setting by limiting activities and actions within this ACEC. Potential impacts from this designation may push potential site setting impacts on other areas, which impact cultural resources.

Alternative D-Impacts are the same as Alternative A.

4.22.4. Summary of Impacts on Cultural Resources

Alternative A

Alternative A (current management) is generally the least protective for cultural resources of the alternatives. Current management of cultural resources follows federal laws, regulations, and guidelines to manage and protect significant resources from adverse impacts. These laws and regulations operate outside of management actions, so cultural resources would still be protected and managed to prevent adverse impacts to avoid, minimize, or mitigate any adverse effects on historic properties the extent possible. This alternative provides some limited restrictions of activities or uses within GRSG habitat, which in turn provides some additional protection for cultural resources. Adverse impacts may continue to the degree they occur today through changes in all six cultural resource indicators: vandalism/collection, scientific knowledge, site setting, Native American traditional uses, ground disturbance, and natural causes. Areas open to OHV travel, land exchanges, ROWs, resource development, livestock grazing, or new construction could adversely impact cultural resources because it allows greater land use activity in areas where there are potentially significant sites. Some benefits to allowing more land use activities are an increase in land inventoried for cultural resources and increased knowledge of cultural resources in the area.

Alternative B

Under Alternative B, decisions to retain public land and restrictions to permitted activities generally benefit cultural resources. Examples are livestock grazing, recreation SRPs, ROWs, SUAs, power lines, mineral withdrawal, fluid mineral leasing, solid mineral development, and other activities that would limit or reduce disturbance in GRSG habitat. Limiting motorized travel to existing roads under this alternative is beneficial to some cultural resources in that limitations could reduce vandalism by reducing access to distant sites. In general, restrictions to various

uses to increase or protect GRSG habitat typically reduces vandalism, ground disturbance, and natural disturbances on sites. This happens by reducing access while preserving site settings and traditional uses by tribes. Restricting uses for GRSG habitat may also reduce new scientific knowledge that results from the inventories required before project development.

Potentially adverse impacts on cultural resources under Alternative B include allowing land exchanges to create more contiguous habitat. This is because lands and resources removed from federal ownership would no longer be protected by cultural resource laws. However, that impact would be mitigated by the fact that lands removed from federal ownership would be inventoried and impacts on significant cultural resources minimized. Additionally, this alternative places no restrictions on solar facility development for GRSG habitat or active leks. If solar and wind facilities were developed under this alternative, vandalism and ground disturbance to cultural resources could occur. However, additional scientific knowledge would also be gained during the inventory of those projects.

Some cultural resources in areas crossed by roads may see additional vandalism through unauthorized collection and increased ground disturbance through road use. The decision to not upgrade roads may increase natural disturbance from road erosion. If some routes are closed to public access, some access routes used by tribes for traditional practices could be impacted if they are not identified in consultation. Limiting activities on public lands for GRSG habitat might move those actions to other areas, which could increase overall use in areas that are not sage parks and may possess higher potential for cultural sites.

Alternative C

Alternative C is the most restrictive. Various aspects include making PPH a Sage-Grouse Habitat ACEC, making all habitat a grazing exclusion area, making occupied habitat exclusion areas for new ROWs, and withdrawing habitat from mineral entry. The overall impact would be to protect cultural resources within GRSG habitat. However, this alternative would cause the most impacts outside of GRSG habitat, as development would be pushed into these areas. Additionally, certain actions, such as forcing new roads to be constructed around a 4-mile buffer from leks and avoiding construction in occupied habitat, may cause roads to be longer in distance; in such a case, more areas would be exposed to ground disturbance, erosion, and public impacts.

Such actions as ROW exclusions, withdrawal from mineral entry, and retention of BLM-administered and National Forest System lands are all actions that are beneficial to minimizing activity in areas of cultural resources and keeping cultural resources under federal protection. Potential negative impacts are from such actions as seasonally prohibiting camping and nonmotorized recreation within 4 miles of active leks. This could, cause these activities which are normally dispersed, to be concentrated in other areas and potentially cause vandalism and illegal collection there.

Alternative C would restrict gains in scientific knowledge within GRSG habitat by decreasing the industry development in the habitat. However, this would most likely shift development and the associated potential increase in scientific knowledge outside of PPH. Alternative C would beneficially protect site settings within GRSG habitat, but impacts would again likely shift outside of habitat as development is pushed there.

Also, restoration of such areas as former mineral material sale areas and routes no longer in use could improve previously impacted site settings by restoring the landscape to its original look

and feeling. Alternative C would limit development and travel the most, which would decrease impacts on Native American traditional use sites by preserving areas and keeping disturbance to a minimum; however, this might make it more difficult for tribes to access areas they use traditionally. Restrictions to various uses to increase or protect GRSG habitat would reduce ground disturbance and subsequent acceleration of natural processes to cultural resources but would likely push these impacts onto other areas.

Alternative D

Alternatives A and B have roughly comparable levels of potential adverse impacts. Implementation of Alternative D would result in comparable adverse impacts on cultural resources and values of importance to Native Americans, when compared to Alternatives B and C.

4.23. Paleontological Resources

4.23.1. General Description

Paleontological resources are any fossilized remains, traces, or imprints of organisms preserved in or on the earth's crust that are of scientific or paleontological interest and that provide information about the history of life on earth. BLM policy is to manage paleontological resources for scientific, educational, and appropriate recreational values and to protect or mitigate these resources from adverse impacts. To accomplish this goal, paleontological resources must be professionally identified and evaluated, and paleontological resources should be considered as early as possible in the decision making process. Requirements under all alternatives to identify paleontological resources in areas of high potential before the ground is disturbed would allow evaluation, avoidance, recovery, or other mitigation to preserve the scientific, educational, and appropriate recreational uses.

4.23.2. Methodology and Assumptions

General Impacts on Paleontological Resources

Indicators of impacts on paleontological resources and the measurements used to describe the impacts (where available or appropriate) are described below:

- Vandalism/Collection

Measures of vandalism and collection of paleontological resources include access and visibility.

Adverse impacts on paleontological resources that can lead to vandalism and collection include an increase in access, which could expose vertebrate fossil or significant or sensitive localities to collection or destruction. Increasing or changing ground visibility also could increase vandalism and collection because fossils and their host deposits are more visible and susceptible.

Beneficial impacts on paleontological resources, which can in some cases avoid vandalism and collection, are rare instances where more fossils are being seen and responsibly reported for further scientific follow-up.

Limiting access and decreasing ground visibility can be mostly beneficial to paleontological resources and can decrease the potential for vandalism and collection.

- Scientific Knowledge

Measures of scientific knowledge of paleontological resources include locality recordation, collection of fossils and their associated data, and acres inventoried.

Adverse impacts on scientific knowledge of paleontological resources can occur from loss of data, such as destroyed outcrops and fossils.

Beneficial impacts on scientific knowledge of paleontological resources come from new paleontological resource inventories, which lead to new localities being documented, new specimens and their associated data being collected and analyzed, and their significance being determined.

- Ground Disturbance

Measures of ground disturbance to paleontological resources include human-caused erosion and vegetation and soil removal and, conversely, human-caused deposition and vegetation and soil obscuring bedrock.

Adverse impacts from ground disturbance on paleontological resources occur from many activities, including construction, livestock trampling and defecation, and creation of unauthorized routes. Additionally, activities that lead to changes in vegetation or stability of soils can cause adverse impacts through erosion, deposition, or other obscuring of outcrop visibility.

Limiting ground disturbances that lead to changes in soil stability or vegetation would help reduce adverse impacts on paleontological resources.

In rare cases, limiting ground disturbance changes may also have beneficial impacts on paleontological resources in that more rock outcrop seen may reveal more fossils for scientific collection/recordation.

- Natural Processes

Measures of natural processes that affect paleontological resources include wind erosion, water erosion, wildfire, and vegetation loss or increase.

Adverse impacts from natural processes on paleontological resources are ongoing. These adverse impacts happen naturally but can be sped up as a cumulative result of human actions.

Beneficial impacts from natural processes include burying paleontological materials or increased vegetation, which helps to stabilize paleontological resources.

Conversely, beneficial impacts from natural processes in rare cases include increasing erosional surfaces or decreased vegetation, which helps to better see, locate, collect, and record new paleontological resources.

Assumptions

The following list presents basic assumptions related to paleontological resources that apply to the impacts assessment for Alternatives A, B, C, and D.

- All four alternatives require that BLM/USFS-held paleontological resources be managed and protected and that the BLM/USFS comply with all relevant laws and regulations.
- Paleontological resources are defined as physical evidence of vertebrate, invertebrate, track, trace, or plant fossils generally older than 10,000 years.
- Scientifically significant fossils would continue to be discovered throughout the planning area. Most discoveries would occur in Potential Fossil Yield Class 4 and 5 geologic units.
- Inventories conducted before surface disturbance in high-probability areas (Potential Fossil Yield Class 4 and 5) and some sampling of unknown potential areas (Potential Fossil Yield Class 3) would result in the identification and evaluation of previously undiscovered resources, which the BLM or USFS would manage accordingly.
- Unmitigated surface-disturbing activities could dislodge or damage paleontological resources that were not visible before surface disturbance.
- Conversely, mitigated surface-disturbing activities could help locate, record, and collect paleontological resources that were not visible before surface disturbance.
- Increased access associated with new development and increased recreation would lead to increased access to paleontological localities.
- Vandalism and unauthorized collecting could destroy a fossil or remove it from its context and thereby reduce its value for scientific study.
- Public education would increase public appreciation and awareness of the need for protection, but publication of any specific locations would lead to increased visitation and would require prior inventory, collecting, and interpretation needs to properly protect the localities.
- Direct impacts result from implementing the management goals, objectives, and actions of other resources that conflict with paleontological resource management goals, objectives, and actions.
- Indirect impacts are caused by actions that are farther removed in time or distance.
- Beneficial impacts include management actions or policies that preserve the characteristics of paleontological resources, either on the ground or through proper collection, recordation, and analysis of fossils and their associated data.
- Any ground-disturbing activity should be considered a potential threat to paleontological resources. Adverse impacts are permanent, and beneficial impacts cannot necessarily reverse these impacts; therefore, every impact is considered cumulative. Even minor impacts accrue over time, resulting in deteriorating locality conditions and potential loss of important scientific data and paleontological values.
- Appropriate recreational collection of common invertebrate and plant fossils in reasonable quantities is important. Maintaining access to and reducing impacts on these are required under the Paleontological Resources Preservation Act of 2009 and are responsibilities of the BLM or USFS and an important objective of paleontological and recreational resource management.

- Nondiscretionary mining notices are not federal undertakings, but 43 CFR, Part 3809, specifically provides for the protection of cultural and paleontological properties by prohibiting mining operators, on claims of any size, from knowingly disturbing or damaging these properties.

- Unauthorized or unplanned activities, wildland fire, dispersed recreation, natural processes and unauthorized collection, excavation, and vandalism could lead to impacts that would be difficult to monitor and mitigate. Unmitigated impacts on paleontological resources that are significant would be avoided.

4.23.3. Direct and Indirect Impacts on Paleontological Resources

Impacts from Travel Management on Paleontological Resources

The different proposals for how travel and transportation would be managed to protect GRSG; management includes limiting travel to existing roads, limiting new route construction, and managing travel in general to benefit paleontological resources. There could be negative impacts on paleontological resources if, in having to avoid habitat, roads are caused to be longer, routing around habitat, and exposing more areas to the public.

Vandalism/Collection

Routes provide access to areas that can lead to vandalism and illegal collection of fossils. Restricting vehicle use to existing or designated routes reduces the risk of disturbing resources located off trails. Closing routes to multiple methods of travel provides the greatest protection, reducing opportunities for vandalism and unauthorized collection of fossils. There could be negative impacts on paleontological resources if in having to avoid GRSG habitat, roads are caused to be longer, routing around habitat and exposing more areas to the public.

Alternative A-The fewest restrictions on PPH could result in the least beneficial protection of paleontological resources.

Alternative B-Increased restrictions on PPH would protect paleontological resources from vandalism and illegal collection.

Alternative C-The most restrictions on PPH should protect paleontological resources from vandalism and illegal collection. If in forcing new roads to be constructed around a 4-mile buffer from leks and avoiding construction in occupied habitat causes roads to be longer, more areas would be exposed to the public, potentially causing negative impacts.

Alternative D-Moderate restrictions on travel would offer a moderate level of protection for paleontological resources.

Scientific Knowledge

Construction of new roads can increase scientific knowledge if surveys or paleontological monitors are required. Restrictions on travel development to protect GRSG habitat could not increase routes and therefore would not increase scientific knowledge, due to fewer paleontological surveys, monitoring activity, and incidental excavations.

Alternative A-With this alternative, management of travel would continue as it currently is, causing a potential beneficial increase in scientific knowledge, but typically only if it is tied to an industry-related development occurring in Potential Fossil Yield Class 4 or 5 formations.

Alternative B-Increased restrictions on PPH would lessen the potential beneficial increase in scientific knowledge that is tied to route development.

Alternative C-As the most restrictive alternative, this should be the least beneficial to a potential increase in scientific knowledge of paleontological resources. However, prohibiting new road construction within 4 miles of active leks and avoiding construction in occupied habitat may push this development into other areas and could increase scientific knowledge there.

Alternative D-Moderate restrictions on travel would cause a moderate level of impacts.

Ground Disturbance

Construction of new routes can directly impact paleontological resources. Restrictions on route development in GRSG habitat would protect paleontological resources in habitat. Restrictions could cause more impacts on paleontological resources if, in having to avoid GRSG habitat, roads are caused to be longer, routing around habitat and causing more disturbance.

Alternative A-The fewest restrictions on PPH could result in the least beneficial protection of paleontological resources from direct impacts, such as ground disturbance.

Alternative B-Increased restrictions on PPH would benefit the protection of paleontological resources from vandalism and illegal collection.

Alternative C-The most restrictions on PPH should give protection of paleontological resources from ground disturbance. If in forcing new roads to be constructed around a 4-mile buffer from leks and avoiding construction in occupied habitat, causes roads to be longer, more areas would be directly impacted by ground disturbance.

Alternative D-Moderate restrictions on travel would offer a moderate level of protection from direct impacts on paleontological resources.

Natural Processes

Deliberate route development causes ground disturbance, which can then hasten natural processes, such as erosion. Restrictions on recreation designed to protect GRSG habitat would beneficially protect paleontological resources in the habitat.

Alternative A-The fewest restrictions on PPH could result in the least beneficial protection of paleontological resources from indirect impacts, such as erosion.

Alternative B-Limiting travel to existing roads and restoring roads not designated in travel management plans would help lessen erosion.

Alternative C-As the most restrictive alternative, this would be the most beneficial to paleontological resources in GRSG habitat. Natural erosion caused by roads would lessen the most under this alternative. However, prohibiting new road construction within 4 miles of active leks and avoiding construction in occupied habitat may push this development into other areas and potentially cause impacts there.

Alternative D-Moderate restrictions on travel would offer a moderate level of protection from indirect impacts on paleontological resources.

Impacts from Recreation Management on Paleontological Resources

Recreation can affect paleontological resources. Restrictions on recreation designed to protect GRSG habitat would also protect paleontological resources within the habitat. Recreation could be shifted outside of GRSG habitat, where impacts on paleontological resources would then occur; however, this would depend on the availability of recreation opportunities. Areas with high potential for recreation would be most affected.

Vandalism/Collection

Recreation can physically expose shallowly buried paleontological resources, facilitating illegal collection and vandalism. Increased public access increases the risk of vandalism or illegal collection of paleontological resources. Restrictions on recreation designed to protect GRSG habitat would beneficially protect paleontological resources in GRSG habitat, albeit on a small scale.

Alternative A-The fewest restrictions on recreation in GRSG habitat would result in the least protection of paleontological resources.

Alternative B-Increased restrictions on recreation in GRSG habitat would provide a small beneficial protection of paleontological resources from vandalism and illegal collection.

Alternative C-As the most restrictive alternative, this should be the most beneficial to paleontological resources in GRSG habitat. However, seasonally prohibiting camping and nonmotorized recreation within 4 miles of active leks may cause these activities, which are normally dispersed to concentrate in other areas and potentially cause vandalism and illegal collection there.

Alternative D-Moderate restrictions on recreation in GRSG habitat would offer a moderate level of protection for paleontological resources.

Ground Disturbance

Recreation can cause decreases in vegetation, potentially adversely affecting paleontological resources, physically altering exposed or previous shallowly buried paleontological resources. Restrictions on recreation designed to protect GRSG habitat would beneficially protect paleontological resources in habitat.

Alternative A-The fewest restrictions on recreation in GRSG habitat would result in the least protection of paleontological resources from direct impacts.

Alternative B-Increased restrictions on recreation in GRSG habitat would provide a small beneficial protection of paleontological resources from direct ground disturbance.

Alternative C-As the most restrictive alternative, this would be the most beneficial to paleontological resources in GRSG habitat.

Alternative D-Moderate restrictions on travel would offer a moderate level of protection for paleontological resources.

Natural Processes

Recreation can decrease vegetation, degrade slope stability, and can expose shallowly buried paleontological resources, leading to damage from erosion. Restrictions on recreation designed to protect GRSG habitat would beneficially protect paleontological resources in GRSG habitat.

Alternative A-The fewest restrictions on recreation in GRSG habitat would result in the least protection of paleontological resources from indirect impacts.

Alternative B-Increased restrictions on recreation in GRSG habitat would provide a small beneficial protection of paleontological resources from increased erosion.

Alternative C-As the most restrictive alternative, this would be the most beneficial to paleontological resources in GRSG habitat.

Alternative D-Moderate restrictions on travel would offer a moderate level of protection for paleontological resources.

Impacts from Lands and Realty Management on Paleontological Resources

The different alternatives for how lands and realty actions would be managed to protect GRSG, such as collocating new ROWs in the footprint of existing ROWS, limiting new ROWs, and reclaiming ROWs no longer in use, would in general benefit paleontological resources. There could be negative impacts on paleontological resources if ROWs have to avoid habitat and are therefore routed around habitat, exposing more areas to the public.

Vandalism/Collection

New roads and pipeline scars provide access for the public to areas, which can lead to vandalism and illegal collection of fossils. Restricting vehicle use to existing or designated routes reduces the risk of disturbing resources located off trails. There could be negative impacts on paleontological resources if ROWs have to avoid habitat and are therefore routed around habitat, exposing more areas to the public.

Alternative A-The fewest restrictions on PPH would result in the least protection of paleontological resources.

Alternative B-Increased restrictions on PPH, such as requiring reclamation of roads and wells no longer in use and having ROWs be collocated to reduce new disturbances, would protect paleontological resources from vandalism and over-collection.

Alternative C-By being the most restrictive, this alternative would allow for the greatest protection of paleontological resources.

Alternative D-Moderate restrictions on lands and realty would offer a moderate level of protection for paleontological resources.

Scientific Knowledge

Restrictions on land and realty actions designed to protect GRSG would cause less new disturbance in habitat and lessen any potential increase in scientific knowledge. If ROWs have

to avoid habitat and route around habitat, there can be more ground disturbance and potential increase in scientific knowledge outside of habitat.

Alternative A-The fewest restrictions on GRSG habitat would be the most beneficial in terms of gains in scientific knowledge.

Alternative B-Increased restrictions on PPH would reduce incidental excavation, as well as paleontological surveys and monitors. Alternatively, both identified and unidentified fossil resources would be preserved for scientific study.

Alternative C-By being the most restrictive, this alternative would allow for the greatest preservation of paleontological resources but would yield the fewest immediate gains in scientific knowledge, at least in GRSG habitat. If new disturbances were pushed outside of habitat, scientific knowledge could be gained.

Alternative D-Moderate restrictions on lands and realty would offer a balance of preservation versus survey and monitoring discoveries and incidental excavation.

Ground Disturbance

Restrictions on lands and realty designed to protect GRSG habitat would beneficially protect paleontological resources in GRSG habitat. There could be negative impacts on paleontological resources if ROWs have to avoid habitat and are therefore routed around habitat, causing more ground disturbance.

Alternative A-The fewest restrictions on PPH would result in the least protection of paleontological resources from direct impacts of ground disturbance.

Alternative B-Increased restrictions on PPH, such as requiring reclamation of roads and wells no longer in use and having ROWs be collocated to reduce new disturbances, would protect paleontological resources from exposure.

Alternative C-By being the most restrictive, this alternative would allow for the greatest protection and preservation of paleontological resources.

Alternative D-Moderate restrictions on lands and realty would offer a moderate level of protection for paleontological resources.

Natural Processes

Restrictions on lands and realty designed to protect GRSG habitat would beneficially protect paleontological resources in GRSG habitat. There could be negative impacts on paleontological resources if ROWs have to avoid habitat and are therefore routed around habitat, causing more disturbance and hastening natural processes, such as erosion.

Alternative A-The fewest restrictions on PPH would result in the least protection of paleontological resources from natural processes, such as erosion.

Alternative B-Increased restrictions on PPH, such as requiring reclamation of roads and wells no longer in use and having ROWs be collocated to reduce new disturbances, would protect paleontological resources from continual exposure.

Alternative C-By being the most restrictive, this alternative would allow for the greatest protection and preservation of paleontological resources.

Alternative D-Moderate restrictions on lands and realty would offer a moderate level of protection for paleontological resources.

Impacts from Wind Energy Development on Paleontological Resources

Restrictions on wind power projects designed to protect GRSG habitat would also protect paleontological resources. Areas with high potential for wind resource development would be affected adversely.

Vandalism/Collection

Restrictions on wind power projects designed to protect GRSG habitat would also protect paleontological resources, because the reductions in surface disturbance that can unearth or expose subsurface paleontological resources would be reduced.

Alternative A-No restrictions for GRSG habitat would result in the least protection for paleontological resources.

Alternative B-No restrictions for GRSG habitat would result in the least protection for paleontological resources.

Alternative C-By being the most restrictive, this alternative would provide the greatest protection of paleontological resources.

Alternative D-No restrictions for GRSG habitat would result in the least protection for paleontological resources.

Scientific Knowledge

Restrictions on wind power projects designed to protect GRSG habitat could decrease scientific knowledge, due to fewer paleontological surveys and incidental excavations, both of which can result in subsequent identification of new paleontological sites. However, existing sites within PPH would have greater protections, preserving known paleontological sites for future scientific study.

Alternative A-No restrictions for GRSG habitat could increase the number of new sites discovered but may lead to degradation of known paleontological sites.

Alternative B-No restrictions for GRSG habitat could increase the number of new sites discovered but may lead to degradation of known paleontological sites.

Alternative C-By being the most restrictive, this alternative would allow for the greatest preservation of known paleontological resources for scientific study but would decrease the number of newly discovered paleontological sites.

Alternative D-No restrictions for GRSG habitat could increase the number of new sites discovered but may lead to degradation of known paleontological sites.

Ground Disturbance

Restrictions on wind power projects designed to protect GRSG habitat could reduce or eliminate surface disturbance. Ground disturbance within PPH can result in erosion, increased sedimentation, decreased vegetation, and degraded slope stability, all of which could adversely affect paleontological resources. However, paleontological surveys and construction monitors required for ground-disturbing projects could lead to new paleontological resource discoveries.

Alternative A-No restrictions for GRSG habitat could increase the number of new sites discovered but could lead to degradation of known paleontological sites.

Alternative B-No restrictions for GRSG habitat could increase the number of new sites discovered but could lead to degradation of known paleontological sites.

Alternative C-By being the most restrictive, this alternative would allow for the greatest protection of known paleontological resources but could lead to fewer new discoveries.

Alternative D-No restrictions for GRSG habitat could increase the number of new sites discovered but could lead to degradation of known paleontological sites.

Natural Processes

Disruptive activities associated with wind power project development would affect natural processes in the same manner described for ground disturbance.

Impacts from Industrial Solar Development on Paleontological Resources

Restrictions on solar power projects designed to protect GRSG habitat would also protect paleontological resources. Areas with high potential for solar resource development would be affected adversely.

Vandalism/Collection

Restrictions on solar power projects designed to protect GRSG habitat would also protect paleontological resources because the reductions in surface disturbance that can unearth or expose subsurface paleontological resources would be reduced.

Alternative A-No restrictions for GRSG habitat would result in the least protection for paleontological resources.

Alternative B-No restrictions for GRSG habitat would result in the least protection for paleontological resources.

Alternative C-By being the most restrictive, this alternative would provide the greatest protection of paleontological resources.

Alternative D-No restrictions for GRSG habitat would result in the least protection for paleontological resources.

Scientific Knowledge

Restrictions on solar power projects designed to protect GRSG habitat could decrease scientific knowledge, due to fewer paleontological surveys and incidental excavations, both of which can result in subsequent identification of new paleontological sites. However, existing sites within PPH would have greater protections, preserving paleontological sites for future scientific study.

Alternative A-No restrictions for GRSG habitat could increase the number of new sites discovered but may lead to degradation of known paleontological sites.

Alternative B-No restrictions for GRSG habitat could increase the number of new sites discovered but may lead to degradation of known paleontological sites.

Alternative C-By being the most restrictive, this alternative would allow for the greatest preservation of known paleontological resources for scientific study, but it would decrease the number of newly discovered paleontological sites.

Alternative D-No restrictions for GRSG habitat could increase the number of new sites discovered, but it may lead to degradation of known paleontological sites.

Ground Disturbance

Restrictions on solar power projects designed to protect GRSG habitat could reduce or eliminate surface disturbance. Ground disturbance within PPH can result in erosion, increased sedimentation, decreased vegetation, and degraded slope stability, all of which could adversely affect paleontological resources. However, paleontological surveys and construction monitors required for ground-disturbing projects could lead to new paleontological resource discoveries.

Alternative A-No restrictions for GRSG habitat could increase the number of new sites discovered, but it could lead to degradation of known paleontological sites.

Alternative B-No restrictions for GRSG habitat could increase the number of new sites discovered, but it could lead to degradation of known paleontological sites.

Alternative C-By being the most restrictive, this alternative would allow for the greatest protection of known paleontological resources, but it could lead to fewer new discoveries.

Alternative D-No restrictions for GRSG habitat could increase the number of new sites discovered, but it could lead to degradation of known paleontological sites.

Natural Processes

Disruptive activities associated with solar power project development would affect natural processes in the same manner described for ground disturbance.

Impacts from Range Management on Paleontological Resources

Restrictions on range management designed to protect GRSG habitat would also protect paleontological resources. Areas used for range management would be affected adversely.

Vandalism/Collection

Restrictions on range management designed to protect GRSG habitat would also protect paleontological resources because the reductions in surface disturbance. which can unearth or expose subsurface paleontological resources, would be reduced.

Alternative A-No surface disturbance restrictions for GRSG habitat would result in the least protection for paleontological resources.

Alternative B-No surface disturbance restrictions for GRSG habitat would result in the least protection for paleontological resources.

Alternative C-Surface disturbance restrictions required in this alternative would provide the greatest protection of paleontological resources.

Alternative D-No surface disturbance restrictions for GRSG habitat would result in the least protection for paleontological resources.

Scientific Knowledge

Restrictions on range management designed to protect GRSG habitat could decrease scientific knowledge due to fewer paleontological surveys and incidental excavations, both of which can result in subsequent identification of new paleontological sites. However, existing sites within PPH would have greater protections, preserving known paleontological sites for future scientific study.

Alternative A-No surface disturbance restrictions for GRSG habitat could increase the number of new sites discovered, but it may lead to degradation of known paleontological sites.

Alternative B-No surface disturbance restrictions for GRSG habitat could increase the number of new sites discovered, but it may lead to degradation of known paleontological sites.

Alternative C-Surface disturbance restrictions required in this alternative would allow for the greatest preservation of known paleontological resources for scientific study, but it would decrease the number of newly discovered paleontological sites.

Alternative D-No surface disturbance restrictions for GRSG habitat could decrease the number of new sites discovered, but it may lead to better preservation of known paleontological sites.

Ground Disturbance

Restrictions on range management designed to protect GRSG habitat could reduce or eliminate surface disturbance. Ground disturbance within PPH can result in erosion, increased sedimentation, decreased vegetation, and degraded slope stability, all of which could adversely affect paleontological resources. However, paleontological surveys and construction monitors required for ground-disturbing projects could lead to new paleontological resource discoveries.

Alternative A-No surface disturbance restrictions for GRSG habitat could decrease the number of new sites discovered, but it could lead to better preservation of known paleontological sites.

Alternative B-No surface disturbance restrictions for GRSG habitat could decrease the number of new sites discovered, but it could lead to better preservation of known paleontological sites.

Alternative C-Surface disturbance restrictions required in this alternative would allow for the greatest protection of known paleontological resources, but it could lead to fewer new discoveries.

Alternative D-No surface disturbance restrictions for GRSG habitat could decrease the number of new sites discovered, but it could lead to better preservation of known paleontological sites.

Natural Processes

Disruptive activities associated with solar power project development would affect natural processes in the same manner described for ground disturbance.

Impacts from Wild Horse Management on Paleontological Resources

Restrictions on wild horse management designed to protect GRSG habitat would also protect paleontological resources. Areas used for wild horse management would be affected adversely.

Vandalism/Collection

Restrictions on wild horse management designed to protect GRSG habitat would also protect paleontological resources.

Alternative A-Restrictions for GRSG habitat would result in protection of paleontological resources.

Alternative B-Restrictions for GRSG habitat would result in protection of paleontological resources.

Alternative C-Restrictions for GRSG habitat would result in protection of paleontological resources.

Alternative D-Restrictions for GRSG habitat would result in protection of paleontological resources.

Ground Disturbance

Disruptive activities associated with wild horse management would affect natural processes in the same manner described for ground disturbance.

Natural Processes

Disruptive activities associated with wild horse management would affect natural processes in the same manner described for ground disturbance.

Impacts from Fluid Minerals Management on Paleontological Resources

Restrictions on fluid minerals designed to protect GRSG habitat would also protect paleontological resources, while reducing some management options designed to benefit paleontological resources. Areas with high potential for fluid mineral development would be most affected, both adversely and beneficially.

Vandalism/Collection

Restrictions on fluid minerals designed to protect GRSG habitat would also protect paleontological resources because the reductions in anthropogenic disturbance, which unearths or exposes resources, would be reduced. Additionally, areas of increased potential fossil yield and identified discovery sites would be less accessible.

Alternative A-The fewest restrictions on PPH would result in the least protection of paleontological resources. Fluid mineral operations are not currently affecting most high potential fossil yield formations underlying identified GRSG habitat. However, the potential exists for

energy development to become a larger factor in the future, especially in areas of dense bedrock exposures.

Alternative B-Increased restrictions on PPH would protect paleontological resources from vandalism and over-collection.

Alternative C-By being the most restrictive, this alternative would allow for the greatest protection of paleontological resources.

Alternative D-Moderate restrictions on fluid mineral development would offer a moderate level of protection for paleontological resources.

Scientific Knowledge

Restrictions on fluid minerals designed to protect GRSG habitat could increase scientific knowledge due to fewer paleontological surveys and incidental excavations, both of which can result is subsequent identification of discovery sites. However, existing sites within PPH would have greater protections, preserving discovery sites for future scientific study.

Alternative A-The fewest restrictions on PPH could increase scientific knowledge, with the caveat that incidental excavations can result in damage of paleontological resources. Surveys, however, can lead to resource discovery and mitigation of resource degradation.

Alternative B-Increased restrictions on PPH would reduce incidental excavation as well as paleontological surveys. Alternatively, both identified and unidentified fossil resources would be preserved for scientific study.

Alternative C-By being the most restrictive, this alternative would allow for the greatest preservation of paleontological resources for scientific study.

Alternative D-Moderate restrictions on fluid mineral development would offer a balance of preservation versus survey discovery and incidental excavation.

Ground Disturbance

Restrictions on fluid minerals designed to protect GRSG habitat could benefit paleontological resources. Ground disturbance within PPH can result in erosion, increased sedimentation, decreased vegetation, and degraded slope stability, all of which could adversely affect paleontological resources.

Alternative A-The fewest restrictions on PPH has the highest potential to adversely impact paleontological resources.

Alternative B-Increased restrictions on PPH would reduce the potential to adversely impact paleontological resources.

Alternative C-By being the most restrictive, this alternative would allow for the greatest protection of paleontological resources.

Alternative D-Moderate restrictions on fluid mineral development would offer a reasonable balance of protection versus adverse impacts on resources.

Natural Processes

Disruptive activities associated with fluid minerals development would affect natural processes in the same manner described for ground disturbance.

Impacts from Solid Minerals–Coal Management on Paleontological Resources

Restrictions on coal designed to protect GRSG habitat would also protect paleontological resources, while reducing some management options designed to benefit paleontological resources. Areas with high potential for coal development would be most affected, both adversely and beneficially.

Vandalism/Collection

Restrictions on coal designed to protect GRSG habitat would also protect paleontological resources because the reductions in anthropogenic disturbance, which unearths or exposes resources, would be reduced. Additionally, areas of increased potential fossil yield and identified discovery sites would be less accessible.

Alternative A-The fewest restrictions on PPH would result in the least protection of paleontological resources. Coal operations have an increased potential to affect paleontological resources due to the stratigraphic nature of coal seams and their propensity to appear in bedrock outcrops. Intact and preserved fossils tend to be located in outcrop as well and could be in proximity to coal seams.

Alternative B-Increased restrictions on PPH would protect paleontological resources from vandalism and over collection.

Alternative C-By being the most restrictive, this alternative would allow for the greatest protection of paleontological resources.

Alternative D-Moderate restrictions on coal development would offer a moderate level of protection for paleontological resources.

Scientific Knowledge

Restrictions on coal designed to protect GRSG habitat could increase paleontological scientific knowledge due to fewer paleontological surveys and incidental excavations, both of which can result is subsequent identification of discovery sites. However, existing sites within PPH would have greater protections, preserving discovery sites for future scientific study.

Alternative A-The fewest restrictions on PPH could increase scientific knowledge, with the caveat that incidental excavations can result in damage of paleontological resources. Surveys, however, can lead to resource discovery and mitigation of resource degradation.

Alternative B-Increased restrictions on PPH would reduce incidental excavation, as well as paleontological surveys. Alternatively, both identified and unidentified fossil resources would be preserved for scientific study.

Alternative C-By being the most restrictive, this alternative would allow for the greatest preservation of paleontological resources for scientific study.

Alternative D-Moderate restrictions on coal development would offer a balance of preservation versus survey discovery and incidental excavation.

Ground Disturbance

Restrictions on coal development designed to protect GRSG habitat could benefit paleontological resources. Ground disturbance within PPH can result in erosion, increased sedimentation, decreased vegetation, and degraded slope stability, all of which could adversely affect paleontological Resources.

Alternative A-The fewest restrictions on PPH has the highest potential to adversely impact paleontological resources.

Alternative B-Increased restrictions on PPH would reduce the potential to adversely impact Paleontological resources.

Alternative C-By being the most restrictive, this alternative would allow for the greatest protection of paleontological resources.

Alternative D-Moderate restrictions on fluid mineral development would offer a reasonable balance of protection versus adverse impacts on resources.

Natural Processes

Disruptive activities associated with coal development would affect natural processes in the same manner described for ground disturbance.

Impacts from Locatable Minerals Management on Paleontological Resources

Restrictions on locatable minerals to protect GRSG habitat would offer little to no protection to paleontological resources. Areas with high potential for locatable minerals would be least affected both adversely and beneficially. Igneous and metamorphic source rocks tend to have low quality or nonexistent fossil specimens due to the extreme environments in which they were created.

Vandalism/Collection

Restrictions on locatable minerals designed to protect GRSG habitat would also have little to no beneficial or adverse impacts on paleontological resources due to the scarcity of fossils at these localities.

Alternative A-The fewest restrictions on PPH would have little to no impacts on protection of paleontological resources.

Alternative B-Increased restrictions on PPH would have little to no impacts on protection of paleontological resources.

Alternative C-By being the most restrictive, this alternative would have little to no impacts on protection of paleontological resources.

Alternative D-Moderate restrictions on locatable mineral development would have little to no impacts on protection of paleontological resources.

Scientific Knowledge

Restrictions on locatable minerals designed to protect GRSG habitat could decrease paleontological scientific knowledge due to fewer opportunities to discover metamorphic changes

to sedimentary strata. However, preservation of geologic processes in mineral localities has the benefit to increase scientific knowledge for future generations.

Alternative A-The fewest restrictions on PPH could increase scientific knowledge from associated discoveries. But fewer restrictions result in less preservation of geologic and paleontological records.

Alternative B-Increased restrictions on PPH would reduce incidental discoveries but offer more preservation for geologic and paleontological scientific records.

Alternative C-By being the most restrictive, this alternative would allow for the greatest preservation of geologic and paleontological scientific records.

Alternative D-Moderate restrictions on coal development would offer a balance of preservation versus incidental discovery.

Ground Disturbance

Restrictions on locatable minerals designed to protect GRSG habitat would have little to no impacts on to paleontological resources. Generally, locatable mineral localities do not outcrop congruently with sedimentary strata, the place where fossils are most likely to be found. However, development of roads and processing facilities could have associated impacts.

Natural Processes

Disruptive activities associated with locatable minerals development would affect natural processes in the same manner described for ground disturbance.

Impacts from Nonenergy Leasable Minerals Management on Paleontological Resources

Restrictions on nonenergy leasable minerals designed to protect GRSG habitat would also protect paleontological resources, while reducing some management options designed to benefit paleontological resources. Areas with high potential for nonenergy leasable minerals development would be most affected, both adversely and beneficially.

Vandalism/Collection

Restrictions on nonenergy leasable minerals designed to protect GRSG habitat would also protect paleontological resources because the reductions in anthropogenic disturbance, which unearths or exposes resources, would be reduced. Additionally, areas of increased potential fossil yield and identified discovery sites would be less accessible.

Alternative A-The fewest restrictions on PPH would result in the least protection of paleontological resources. nonenergy leasable mineral operations have an increased potential to affect paleontological resources. This is because of the stratigraphic and depositional nature of evaporitic minerals and their propensity to appear in bedrock outcrops. Intact and preserved fossils tend to be located in outcrop as well and could be in proximity to nonenergy leasable minerals.

Alternative B-Increased restrictions on PPH would protect Paleontological Resources from vandalism and over-collection.

Alternative C-By being the most restrictive, this alternative would allow for the greatest protection of paleontological resources.

Alternative D-Moderate restrictions on nonenergy leasable mineral development would offer a moderate level of protection for paleontological resources.

Scientific Knowledge

Restrictions on nonenergy leasable mineral development designed to protect GRSG habitat could decrease paleontological scientific knowledge. This is due to fewer paleontological surveys and incidental excavations, both of which can result is subsequent identification of discovery sites. However, existing sites within PPH would have greater protections, preserving discovery sites for future scientific study.

Alternative A-The fewest restrictions on PPH could increase scientific knowledge, with the caveat that incidental excavations can damage paleontological resources. Surveys, however, can lead to resource discovery and mitigation of resource degradation.

Alternative B-Increased restrictions on PPH would reduce incidental excavation, as well as paleontological surveys. Alternatively, both identified and unidentified fossil resources would be preserved for scientific study.

Alternative C-By being the most restrictive, this alternative would allow for the greatest preservation of paleontological resources for scientific study.

Alternative D-Moderate restrictions on nonenergy leasable mineral development would offer a balance of preservation versus survey discovery and incidental excavation.

Ground Disturbance

Restrictions on nonenergy leasable mineral development designed to protect GRSG habitat could benefit paleontological resources. Ground disturbance within PPH can result in erosion, increased sedimentation, decreased vegetation, and degraded slope stability, all of which could adversely affect paleontological resources. Furthermore, water can dissolve evaporitic minerals, which can interact with fossils and increase carbonaceous breakdown.

Alternative A-The fewest restrictions on PPH has the highest potential to adversely impact paleontological resources.

Alternative B-Increased restrictions on PPH would reduce the potential to adversely impact paleontological resources.

Alternative C-By being the most restrictive, this alternative would allow for the greatest protection of paleontological resources.

Alternative D-Moderate restrictions on nonenergy leasable mineral development would offer a reasonable balance of protection versus adverse impacts on resources.

Natural Processes

Disruptive activities associated with nonenergy leasable mineral development would affect natural processes in the same manner described for ground disturbance.

Impacts from Salable Minerals Management on Paleontological Resources

Restrictions on salable minerals to protect GRSG habitat would offer beneficial or noncommittal protection to paleontological resources. Areas with high potential for locatable minerals would be moderately affected, both adversely and beneficially. Boulders, gravels, and sands generally have low quality or nonexistent fossil specimens due to mechanical and chemical weathering processes. However, boulders and cobbles can contain intact specimens, and in some cases fossil specimens themselves are part of colluvial and alluvial matrices.

Vandalism/Collection

Restrictions on salable minerals designed to protect GRSG habitat would have little to no beneficial or adverse impacts on paleontological resources, due to the poor quality or transient nature of fossils at these localities.

Scientific Knowledge

Restrictions on salable minerals designed to protect GRSG habitat have a low potential to affect paleontological scientific knowledge. However, some benefit can be gleaned from the lithic portions of fossils, helping researchers to predict where source rocks are located.

Alternative A-The fewest restrictions on PPH could increase scientific knowledge from associated discoveries. But fewer restrictions result in less preservation of geologic and paleontological records.

Alternative B-Increased restrictions on PPH would reduce incidental discoveries but offer more preservation for geologic and paleontological scientific records.

Alternative C-By being the most restrictive, this alternative would allow for the greatest preservation of geologic and paleontological scientific records.

Alternative D-Moderate restrictions on salable mineral development would offer a balance of preservation versus incidental discovery.

Ground Disturbance

Restrictions on salable minerals designed to protect GRSG habitat has little to no impacts on paleontological resources. Generally, salable mineral localities have undergone mass wasting events, erosion, and weathering. Operations involved with salable mineral development have little to no impact on paleontological resources in theses localities.

Natural Processes

Disruptive activities associated with locatable minerals development would affect natural processes in the same manner described for ground disturbance.

Impacts from Fuels Management, Wildland Fire Management, and Emergency Stabilization and Response on Paleontological Resources

The range of alternatives allows for limited treatment of vegetation, including mechanical, wildland or prescribed fire use, and chemical methods. Wildland fire use and prescribed fire could result in direct and indirect impacts on paleontological resources. Fire could cause the direct

destruction of organic fossil remains. The removal of vegetative cover by fire would accelerate erosion in the short term, thereby creating indirect impacts, although these impacts are negligible compared to similar impacts that occur by natural processes.

Fire suppression that involves the use of heavy equipment and the building of fire lines could damage or destroy surface fossils. In these areas, avoidance of paleontological resources would reduce potential adverse impacts. Potential long-term adverse impacts would result from the construction of fire lines. Wildland fires could increase access to BLM-administered and National Forest System lands that were previously less accessible to the public, thereby increasing the potential for unauthorized fossil collecting and vandalism.

The recovery and preservation of fossils as the result of paleontological mitigation would result in beneficial impacts because these actions would permanently preserve paleontological resources available for scientific research, education, and display that may otherwise never have been discovered. Wildfire could be used for resource benefit, depending on if more fossils are found in such areas of removed vegetation and increased erosion. *Vandalism/Collection*

The restrictions on fuels management, wildland fire management, and ESR would limit the adverse impacts of exposed ground surface and actions taken for fire suppression in GRSG habitat that could expose fossils, limiting the potential for collecting scientifically important paleontological resources. Indirect impacts, such as soil or wind erosion, could expose more fossils.

Alternative A-The fewest restrictions on PPH would have greater impacts on protection of paleontological resources with greater fire suppression actions.

Alternative B-Increased restrictions on PPH would have fewer impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Alternative C-By being the most restrictive, this alternative would have the fewest impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Alternative D-Moderate restrictions from fuels management, wildland fire management, and ESR would have little to no impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Increased Scientific Knowledge

Restrictions on fuels management, wildland fire management, and ESR designed to protect GRSG habitat would decrease paleontological scientific knowledge due to fewer paleontological surveys and incidental excavations. Fire could cause the direct destruction of organic fossil remains. Existing sites within PPH would have greater protections, preserving known discovery sites for future scientific study.

Alternative A-The fewest restrictions on PPH would have greater impacts on protection of paleontological resources.

Alternative B-Increased restrictions on PPH would have fewer impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Alternative C-By being the most restrictive, this alternative would have the fewest impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Alternative D-Moderate restrictions from fuels management, wildland fire management, and ESR would have little to no impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Ground Disturbance

Restrictions on fuels management, wildland fire management, and ESR designed to protect GRSG habitat would have direct and indirect impacts. This would be measured by the amount of exposed ground surface from wildland fire and from suppression actions, such as hand line and dozer line construction, which would could expose and damage scientifically important fossil material, resulting in increased access from fire suppression.

Alternative A-The fewest restrictions on PPH would have greater impacts on protection of paleontological resources.

Alternative B-Increased restrictions on PPH would have fewer impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Alternative C-By being the most restrictive, this alternative would have the fewest impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Alternative D-Moderate restrictions from fuels management, wildland fire management, and ESR would have little to no impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Natural Processes

The restrictions on fuels management, wildland fire management, and ESR would have no effect on the natural erosional processes that would take place naturally; however, they would increase those natural erosional processes, exposing potentially scientifically important paleontological fossil resources. The removal of vegetative cover by fire would accelerate erosion in the short term, thereby creating indirect impacts, although these impacts are negligible compared to similar impacts that occur by natural processes.

Alternative A-The fewest restrictions on PPH would have greater impacts on protection of paleontological resources.

Alternative B-Increased restrictions on PPH would have fewer impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Alternative C-By being the most restrictive, this alternative would have the fewest impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Alternative D-Moderate restrictions from fuels management, wildland fire management, and ESR would have little to no impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Impacts from Habitat Restoration on Paleontological Resources

Surface-disturbing activities could expose, dislodge, or damage paleontological resources and features that were not visible before surface disturbance. Surface-disturbing activities include mitigation measures designed to reduce impacts on paleontological resources, when appropriate.

The number of localities that could be impacted by various actions would directly correlate to the degree, nature, and quantity of surface-disturbing activities. Paleontological resources identified during assessments and inventories would be protected through data and specimen collection and mitigation.

Vandalism/Collection

Surface-disturbing activities that would affect soils directly or indirectly from exposure and erosion would increase visibility and the potential for loss of information from illegal collection.

Alternative A-The fewest restrictions on PPH would have greater impacts on protection of paleontological resources.

Alternative B-Increased restrictions on PPH would have fewer impacts on paleontological resources.

Alternative C-By being the most restrictive, this alternative would have the fewest impacts on paleontological resources.

Alternative D-Moderate restrictions on PPH would have little to no impacts on paleontological resources.

Scientific Knowledge

Fossil resource exposure from direct surface-disturbing activities would help increased scientific knowledge as a beneficial impact on paleontological resources.

Alternative A-Fewest restrictions on PPH would have greater impacts on protection of paleontological resources.

Alternative B-Increased restrictions on PPH would have fewer impacts on paleontological resources.

Alternative C-By being the most restrictive, this alternative would have the fewest impacts on paleontological resources.

Alternative D-Moderate restrictions on PPH would have little to no impacts on paleontological resources.

Ground Disturbance

Revegetation activities would be an adverse impact on paleontological resources by exposing and even damaging fossils from drill seeding or disking. The beneficial effect would come through scientific recordation, collection, and study.

Alternative A-Fewest restrictions on PPH would have greater impacts on protection of paleontological resources.

Alternative B-Increased restrictions on PPH would have fewer impacts on paleontological resources.

Alternative C-By being the most restrictive, this alternative would have the fewest impacts on paleontological resources.

Alternative D-Moderate restrictions on PPH would have little to no impacts on paleontological resources.

Natural Processes

Erosion and vegetation loss are adverse impacts on paleontological resources. Increase in vegetation and soils may develop a protective layer, which could be a beneficial impact on paleontological Resources. However, increase in vegetation and soils may also cause mechanical and chemical destruction to paleontological resources (e.g., fossil-killing tree or sagebrush roots or leaching soils).

Alternative A-The fewest restrictions on PPH would have greater impacts on protection of paleontological resources.

Alternative B-Increased restrictions on PPH would have fewer impacts on paleontological resources.

Alternative C-By being the most restrictive, this alternative would have the fewest impacts on paleontological resources.

Alternative D-Moderate restrictions on PPH would have little to no impacts on paleontological resources.

Impacts from ACEC/Zoological Area Management on Paleontological Resources

The only management action for ACEC designation is to designate all PPH as a Sage-Grouse Habitat ACEC under Alternative C. ACEC impacts on paleontological resources are difficult to analyze without the details of specific ACECs. For example ACECs can range from avoidance to exclusion areas and can have exceptions and waivers, all which dictate the level of activity that can occur in that ACEC. In general, ACECs offer protection for paleontological resources.

Vandalism/Collection

In general, ACECs should help protect paleontological resources from vandalism and illegal collection.

Alternative A-With this alternative, management would continue as it currently is, not making all GRSG habitat an ACEC; impacts on paleontological resources could continue at their current rate.

Alternative B-Impacts are the same as Alternative A.

Alternative C-This Alternative would designate all PPH as an ACEC. The level of impact cannot be analyzed without knowing more details. All potential impacts should have been covered above in individual sections regarding impacts on different resources under this alternative.

Alternative D-Impacts are the same as Alternative A.

Scientific Knowledge

In general, ACECs should limit development, thereby lessening potentially beneficial increases in scientific knowledge.

Alternative A-With this alternative, management would continue as it currently is, not making all GRSG habitat an ACEC, and impacts on paleontological resources could continue at their current rate.

Alternative B-Impacts are the same as Alternative A.

Alternative C-This alternative would make all PPH designated as an ACEC. The level of impact cannot be analyzed without knowing more details. All potential impacts should have been covered above in individual sections regarding impacts on different resources under this alternative.

Alternative D-Impacts are the same as Alternative A.

Ground Disturbance

In general, ACECs should limit development and lessen potential ground disturbance to paleontological resources.

Alternative A-With this alternative, management would continue as it currently is, not making all GRSG habitat an ACEC, and impacts on paleontological resources could continue at their current rate.

Alternative B-Impacts are the same as Alternative A.

Alternative C-This alternative would designate all PPH as an ACEC. The level of impact cannot be analyzed without knowing more details. All potential impacts should have been covered above in individual sections regarding impacts on different resources under this alternative.

Alternative D-Impacts are the same as Alternative A.

Natural Processes

In general, ACECs should limit development and the associated hastening of natural processes, such as erosion to paleontological resources.

Alternative A-With this alternative, management would continue as it currently is, not making all GRSG habitat an ACEC, and impacts on paleontological resources could continue at their current rate.

Alternative B-Impacts are the same as Alternative A.

Alternative C-This alternative would designate all PPH as an ACEC. The level of impact cannot be analyzed without knowing more details. All potential impacts should have been covered above in individual sections regarding impacts on different resources under this alternative.

Alternative D-Impacts are the same as Alternative A.

4.23.4. Summary of Impacts on Paleontological Resources

Alternative A

With this being the no action, or status quo, alternative, all resource management actions would continue as they are. Ultimately, Alternative A has the fewest restrictions imposed on resource

management related to protection of GRSG. In respect to the general impacts described above, this alternative offers the least protection from vandalism/collection, could increase scientific knowledge, and offers the least protection from ground disturbance and natural processes. However, there are some resources that would have little to no impact change on paleontological resources, including salable and locatable minerals.

Alternative B

This alternative would provide more surface protections than Alternatives A and D but less than C. Impacts from natural processes, ground disturbance, vandalism, and theft would be less than the impacts of Alternatives A and D but more than impacts from Alternative C. New scientifically significant discoveries could be less frequent than under Alternatives A and D but more frequent than with Alternative C. This is due to less required paleontological surveys and less surface disturbance associated with various types of surface-disturbing projects.

Alternative C

Alternative C is the most restrictive. Various aspects include making all PPH a Sage-Grouse Habitat ACEC, making all habitat a grazing exclusion area, making occupied habitat exclusion areas for new ROWs and withdrawals of habitat from mineral entry. The overall impact would be protection of paleontological resources within GRSG habitat. However, this alternative would cause the most impacts outside of GRSG habitat, as development would be pushed into these areas. Additionally, certain actions, such as forcing new roads to be constructed around a 4-mile buffer from leks and avoiding construction in occupied habitat, may cause roads to be longer, where more areas would be exposed to ground disturbance, erosion, and public impacts.

Such actions as ROW exclusions, withdrawal from mineral entry, and retention of BLM-administered and National Forest System lands are all beneficial to minimizing activity in areas of paleontological resources and keeping paleontological resources under federal protection. Potential negative impacts come from such actions as seasonally prohibiting camping and nonmotorized recreation within 4 miles of active leks, which may cause these activities, which are normally dispersed, to concentrate in other areas and potentially cause vandalism and illegal collection there.

Alternative C would restrict gains in scientific knowledge within GRSG habitat by decreasing the amount of industry development in habitat. However, this would most likely shift development and the associated potential increase in scientific knowledge outside of PPH. Restrictions to various uses to increase or protect GRSG habitat reduce ground disturbance and the subsequent acceleration of natural processes to paleontological resources, but they may likely push these impacts on other areas.

Alternative D

Alternatives A and B have roughly comparable levels of potential adverse impacts. Implementation of Alternative D would result in comparable adverse impacts on paleontological resources, when compared to Alternatives B and C.

4.24. Social and Economic Impacts (Including Environmental Justice)

4.24.1. 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 **Section 3.24**, Social and Economic Conditions (Including Environmental Justice). This section also addresses environmental justice impacts and the differences between alternatives for the social and economic impacts identified.

4.24.2. Methodology and Assumptions

For the analysis of economic impacts, quantitative estimates are provided where sufficient data or estimates are available. IMPLAN was used to estimate impacts on outcomes, employment, and earnings in the 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 in the planning area.

For the analysis of social impacts, two other types of impacts were considered. The first is that derived from migration induced by management actions. These impacts are induced by economic opportunities that drive population into or out of specific areas and affect population growth as well as the demand for housing and public services. The second is that associated with specific interest groups, community livelihoods, or minority and low income populations (Environmental Justice).

The following are summaries of the types of social and economic impacts and associated indicators of those impacts, from management actions related to the protection of GRSG within the study area:

- Direct economic activity dependent on BLM-administered and National Forest System land and resource management

Qualitative assessment of the volume of economic activity dependent on BLM-administered and National Forest System lands and resources

Indirect impacts could be changes in economic activity.

- Overall employment, earnings, output, and earnings per job associated with economic activities impacted by management alternatives

Dollar value of output, earnings, and earnings per job; number of jobs

Indirect impacts would include changes in number of jobs.

- Tax revenues and payments to states and counties

Dollar value of tax revenues

- Indirect impacts would include changes in tax revenues. Other (nonmarket) values

Dollar value of consumer surplus associated with recreation activities; qualitative assessment of the non-use values attributable to GRSG populations and ranching activity

- Indirect impacts would include changes in nonmarket values. Population

Qualitative assessment of potential increase or decrease in population

- Indirect impacts would include changes in population. Housing and public services

Qualitative assessment of local availability of housing and public services

- Indirect Impacts would include changes in availability of housing and public services.

- Consistency with county LUPs

Qualitative assessment of consistency with county LUPs

- Interest groups and communities of place

Qualitative assessment of alignment with interest group objectives and community livelihoods

- Environmental Justice

Disproportionately high and adverse human health and environmental impacts

Assumptions

The following list presents the basic assumptions related to social and economic impact assessment for Alternatives A through D.

- 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 based on the latest available data. Active AUMs measure the amount of forage from land available for grazing. USFS terms this measure "permitted" AUMs. Billed AUMs measure the amount of forage the BLM and USFS bill for annually. USFS uses the term "authorized" AUMs for the same concept.

- Recreational expenditures incurred by local visitors to federal lands for recreational purposes are expected to still be spent locally if recreational resources on federal lands are no longer available. Expenditures by nonlocal visitors to federal lands are assumed to no longer be spent in the primary study area if federal lands are no longer available for recreation. Economic impacts were assumed to derive from recreation from nonlocal visitors.

- 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.

- As in other sections of this document, renewable energy development is assumed to continue to be a possibility for the primary study area in the future, and applications would be considered on a case-by-case basis.

Implementing management actions for the following resources would have negligible social or economic impacts and are therefore not discussed in detail: ACECs, wild horses, fuels management, fire operations, ESR, and habitat restoration. Effects regarding effectiveness and efficiency of implementing agency actions to achieve these objectives and resource outcomes are presented in respective resource sections within Chapter 4 and are not restated in this section to avoid redundancy.

4.24.3. Economic Impacts

Impacts from Management Actions Affecting Grazing Allotments

Overall Employment, Earnings, and Output per Job Impacted by Management Alternatives

The potential impacts of management alternatives affecting grazing on overall employment, earnings, and output were estimated quantitatively initially only for Alternatives A and C. Alternatives A, B, and D, would maintain GRSG habitat open for grazing, but under Alternatives B and D would allow less flexibility for management to target increasing forage availability for livestock in GRSG habitat. The extent to which this would actually reduce the amount of active or billed AUMs is unclear. For the purposes of quantitative comparison of alternatives, the mid-point between Alternatives A and C is presented as an estimate for Alternative B and the mid-point between Alternatives A and B is presented as an estimate for Alternative D. This estimate is presented to allow addition to the impacts of other resource areas on output, employment, and earnings for comparison of alternatives, but should be understood as representing the range of potential impacts.

Economic impact estimates presented below are based on estimated AUMs on all federal lands under each alternative and not just on federal land with GRSG habitat. Although grazing on federal lands not containing GRSG habitat would not be directly affected by the choice of alternatives, they could be affected indirectly by access restrictions (as discussed further below). Although grazing on private lands could also be impacted by access restrictions, they are not included in the quantitative estimates but rather discussed qualitatively.

Estimates for one 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. For this reason, estimates are presented based on the range between billed and active AUMs in 2011. Further details are provided in **Appendix M**, Socioeconomics Data and Methodology. **Table 4.13**, One Year Impact of Management Actions Affecting Grazing on Output, Employment, and Earnings, Alternatives A and C, presents these estimates. Employment estimates do not include family labor and may, therefore, underestimate labor use differences among alternatives.

Table 4.13. One Year Impact of Management Actions Affecting Grazing on Output, Employment, and Earnings, Alternatives A and C

	Alternative A		Alternative C	
	Billed AUMs	**Active AUMs**	**Billed AUMs**	**Active AUMs**
Primary Study Area				
Output (2011 $)	$36,242,706	$52,862,642	$10,622,304	$15,493,408
Employment	425	621	125	182
Earnings (2011 $)	$12,587,812	$18,355,752	$3,689,337	$5,379,851
Average Earnings Per Job (2011 $)	$29,604	$29,570	$29,604	$29,570
Primary and Secondary Study Area				
Output (2011 $)	$36,334,222	$52,996,215	$10,649,126	$15,532,557
Employment	425	621	125	182
Earnings (2011 $)	$12,606,299	$18,382,729	$3,694,756	$5,387,758
Average Earnings Per Job (2011 $)	$29,648	$29,614	$29,648	$29,614
Source: Calculated using the IMPLAN model as explained in the text and in **Appendix M**, Socioeconomics Data and Methodology.				

Table 4.14, One Year Impact of Management Actions Affecting Grazing on Output, Employment, and Earnings by Alternative, presents one year impacts of management actions affecting grazing on output, employment and earnings for all four alternatives. Estimates for Alternatives A and C are the mid-point of the estimates using billed and active AUMs.

Table 4.14. One Year Impact of Management Actions Affecting Grazing on Output, Employment, and Earnings by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D
Primary Study Area				
Output (2011 $)	$44,552,674	$28,805,265	$13,057,856	$36,678,970
Employment	523	$338	154	$431
Earnings (2011 $)	$15,471,782	$10,003,188	$4,534,594	$12,737,485
Average Earnings Per Job (2011 $)	$29,583	$29,562	$29,541	$29,572
Primary and Secondary Study Area				
Output (2011 $)	$44,665,219	$28,878,030	$13,090,842	$36,771,624
Employment	523	$338	154	$431
Earnings (2011 $)	$15,494,514	$10,017,886	$4,541,257	$12,756,200
Average Earnings Per Job (2011 $)	$29,626	$29,605	$29,585	$29,616
Source: Calculated using the IMPLAN model as explained in the text and in **Appendix M**, Socioeconomics Data and Methodology				

Alternative A-Under Alternative A, grazing on federal lands is estimated to contribute to an annual output between $36.2 and $52.9 million in the primary study area, in 2011 dollars. Grazing is estimated to also contribute between 425 and 621 annual jobs earning an average of over $29,000 per year. Total earnings are estimated to amount to between $12.6 million and $18.4 million in the primary study area. Almost all of the economic impacts are estimated to occur in the primary study area, with few additional impacts in the secondary study area.

Alternative B-Under Alternative B, grazing on federal lands with GRSG habitat is likely to be similar to Alternative A because all GRSG habitat would be kept open for grazing. However, under Alternative B, decisions on livestock movement, range improvements, and vegetation

treatments may be subject to the conservation, enhancement, or restoration of GRSG habitat, potentially reducing forage available because permittees would be required to move livestock off-range if necessary to protect GRSG. Seasonal restrictions could also be imposed, requiring that permittees move their livestock elsewhere, with added costs to their operations. Because it is unclear the extent to which these additional constraints would reduce grazing on federal lands, **Table 4.14**, One Year Impact of Management Actions Affecting Grazing on Output, Employment, and Earnings by Alternative, present the mid-point between Alternatives A and C as a quantitative estimate for the impact of Alternative B on grazing. This estimate is provided to allow addition to the impacts of other resource areas on output, employment, and earnings for comparison of Alternatives, but should be understand as representing the range of potential impacts (between those of A and C).

Alternative C-Under Alternative C, ADH would be closed to livestock grazing. Livestock grazing on federal lands in the primary study area would be restricted to those with no GRSG habitat. The impact of Alternative C is reflected in the estimated loss of approximately 70 percent of the output, employment, and earnings expected to be supported by grazing on federal lands. The impact of Alternative C may also be greater than estimated, if the closure of federal lands makes some grazing operations no longer viable. In addition, permittees may incur fencing costs if desiring to prevent livestock from entering public lands in ADH.

Alternative D-Impacts from management under Alternative D are estimated to be similar to Alternatives A and B in that all GRSG habitat are estimated to be open for grazing. Some restrictions on range improvements to protect GRSG habitat, or seasonal restrictions could affect the availability of forage, but to a lesser extent than Alternative B. The resulting economic activity would be expected to fall between Alternatives A and B. **Table 4.14**, One Year Impact of Management Actions Affecting Grazing on Output, Employment, and Earnings by Alternative, presents the mid-point between Alternatives A and B as a quantitative estimate for the impact of Alternative D on grazing. As in the case of the estimate presented for Alternative B, this estimate is provided to allow addition to the impacts of other resource areas on output, employment, and earnings for comparison of alternatives, and should be understand as representing the range of potential impacts (between those of A and B).

Not shown in the impacts described above for Alternatives B, C, and D, are the potential impacts on grazing on private or state lands. Restrictions on grazing on public lands within GRSG habitat can sometimes have additional impacts on grazing by limiting access to adjacent private and public lands with no GRSG habitat.

Other Values Associated with Livestock Grazing

As described in **Chapter 3**, public land managed for livestock grazing provides both market values and nonmarket values; the latter include open space and western ranch scenery, which provide value to some residents and outside visitors, and ranches may also provide some value to the non-using public (e.g., the cultural icon of the American cowboy). Some residents and visitors also perceive nonmarket opportunity costs associated with livestock grazing; in addition, some of the lifestyle value of ranching is likely to be captured in markets (e.g., property values of ranches adjacent to public lands). The "Other Values" section in **Section 3.24**, Social and Economic Conditions (Including Environmental Justice), and **Appendix M**, Socioeconomics Data and Methodology, provide additional discussion of these values. Overall, the process for incorporating potential nonmarket values associated with the management of public land for

livestock grazing into analyses of net public benefits remains uncertain, and the BLM and USFS did not attempt to quantify these values for the present study.

However, 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, and D as all of these alternatives are likely to result in similar levels of livestock grazing operations in the study area. If the net nonmarket value associated with livestock grazing and ranching is positive, then that value would be lower under Alternative C, in line with the market impacts discussed immediately above.

Alternative A-Under Alternative A, the economic viability of livestock grazing and ranching activities would continue on current trends. 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 greatest in Alternative A, and would be preserved in accordance with current trends.

Alternative B-Under Alternative B, grazing on federal lands with GRSG habitat is likely to be similar to Alternative A because all GRSG habitat would be kept open for grazing. However, management under Alternative B may affect forage availability supporting grazing on federal lands, which may adversely affect ranching activity. This could, in turn, result in impacts on any nonmarket values associated with keeping lands in ranching.

Alternative C-Management under Alternative C would result in the greatest impacts on the economic viability of livestock grazing in the study area. As a result, it would have the greatest impacts on nonmarket values associated with livestock grazing and ranching.

Alternative D-Management under Alternative D would have impacts on nonmarket values associated with livestock grazing that are similar to Alternatives A and B.

Impacts from Management Actions Affecting Recreation

Overall Employment, Earnings, Output, and Earnings per Job Impacted by Management Alternatives

As discussed in **Chapter 3**, service related sectors, including many typically linked to recreational activities such as the accommodation and food services industry, are important sources of employment and earnings throughout the primary study area. Management actions under the various alternatives may impact recreational activities with consequences for employment and earnings. The potential impacts of management alternatives affecting recreation on overall employment, earnings, and output were estimated quantitatively using IMPLAN. Input on the potential impact of management actions on recreation activities was obtained from BLM and USFS recreation specialists. In addition, visits were estimated separately for local and nonlocal visits (see **Appendix M**, Socioeconomics Data and Methodology, for details). Only nonlocal visits are considered in the quantitative impact estimates presented below. As explained in the assumptions previously listed, local recreational expenditures are expected to be spent locally regardless of the availability of Federal lands for recreational purposes. Results are presented in **Table 4.15**, Average Annual Impact of Management Actions Affecting Recreation on Output, Employment, and Earnings by Alternative.

Table 4.15. Average Annual Impact of Management Actions Affecting Recreation on Output, Employment, and Earnings by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D
Primary Study Area				
Output (2011 $)	$499,519,279	$492,458,193	$484,141,230	$498,654,161
Employment	4,351	4,290	4,217	4,344
Earnings (2011 $)	$151,326,539	$149,192,166	$146,670,873	$151,067,195
Average Earnings Per Job (2011 $)	$34,779	$34,779	$34,779	$34,779
Primary and Secondary Study Area				
Output (2011 $)	$501,463,072	$494,369,011	$484,141,230	$500,591,412
Employment	4,354	4,292	4,220	4,346
Earnings (2011 $)	$151,890,958	$149,746,832	$147,216,784	$151,629,612
Average Earnings Per Job (2011 $)	$34,888	$34,888	$34,888	$34,888
Source: Calculated using the IMPLAN model, as explained in the text and in **Appendix M**, Socioeconomics Data and Methodology				

Restrictions on recreation activities imposed under Alternatives B, C, and D could limit permitted activities and motorized recreation activities, they would also favor recreation activities requiring less disturbed and more primitive or natural settings. This was one of the considerations made by the BLM and USFS recreation experts in considering the potential impacts of management alternatives on individual recreation sites (see **Appendix M**, Socioeconomics Data and Methodology, for details). This is likely at least part of the reason why the economic impact of management alternatives through effects on recreation activities is expected to remain very similar regardless of alternative. In addition to the volume of recreation, the type of recreation also affects the local economic impact. In particular, overnight recreation visits tend to support more local spending and consequently support greater local job creation and earnings.

As noted in the recreation section, permits or authorizations that are in or near PPH could be terminated or modified. That section describes SRPs and SUAs within PPH, PGH, and linkage/connectivity areas that could be affected by these changes and the types of modifications that could occur. Although specific permit modifications are not prescribed at the EIS level, potential adverse economic impacts could include loss of commercial revenue to recreation service providers and loss of permit-generated fee revenue for the managing agencies. Beneficial impacts could include reductions in user conflicts between different recreation users (either other permittees or the general public), and enhanced opportunities for sage grouse-compatible recreation activities.

Alternative A-Under current management, Alternative A, fewer restrictions would be placed on permitted recreation activities than under Alternatives B, C, or D. Under Alternative A, recreation on federal lands is estimated to contribute an annual average output of almost $500 million and would support approximately 4,350 annual jobs. Almost all economic impacts of recreational activities in the primary study area are estimated to be felt in the primary study itself, with little additional impact on the secondary study area. Alternative A would have the fewest impacts on business and agency revenue attributable to SRPs and SUAs, as it would result in no changes to current management.

Alternative B-Under Alternatives B and D, recreation would support more output, employment, and earnings than Alternative C, but less than Alternative A. Alternative B, along with Alternative C, would have the greatest impacts on business and agency revenue attributable to SRPs and

SUAs, as it would have the most potential for modifying permit or authorization management. However, beneficial impacts could arise from enhanced opportunities for GRSG-compatible recreation activities.

Alternative C-Because the fewest areas available for surface disturbing activities would be allowed under Alternative C relative to the other alternatives considered, this alternative imposes the most constraints on recreational opportunities and corresponding generation of employment and earnings. Annual average output from recreation on federal lands is estimated to be lower though still similar to the alternatives, and is estimated to remain over $480 million. Annual jobs supported by recreation on federal lands are estimated to be approximately 4,220. Alternative C, along with Alternative B, would have the greatest impacts on business and agency revenue attributable to SRPs and SUAs, as it would have the most potential for modifying permit and authorization management. However, beneficial impacts could arise from enhanced opportunities for GRSG-compatible recreation activities.

Alternative D-Because restrictions to recreation under Alternative D are the least after Alternative A, recreation-related employment and income generation would be expected to be higher but still similar to Alternatives B and C. Alternative D, would have more impacts on business and agency revenue attributable to SRPs and SUAs than Alternative A, but not as much as Alternatives B or C. Some beneficial impacts could arise from enhanced opportunities for GRSG-compatible recreation activities.

Other Values Associated with Recreation

As described in **Chapter 3**, only a portion of the value of recreation on public lands is captured in the marketplace. Here, the concept of consumer surplus is used to measure the "nonmarket" portion of recreation value. As noted in **Chapter 3** and **Appendix M**, Socioeconomics Data and Methodology, these nonmarket values are not directly comparable to output, earnings, or jobs associated with various resource uses on BLM-administered and National Forest System lands, which are described elsewhere in this section (see **Appendix M**, Socioeconomics Data and Methodology, for more information on the distinction).

Whereas the analysis of recreation expenditures focuses on recreation activity of people who do not live within the planning area, the analysis of nonmarket values associated with recreation includes the activity of all people who recreate on the public lands regardless of whether they live within the planning area. This is another distinction between the analysis of expenditures and the analysis of nonmarket values; the nonmarket analysis applies to all recreation activity, whether or not it represents additional income to the regional economy.

The relative magnitude and direction of the results for the analysis of nonmarket recreation values are similar to that for recreation expenditures: current management, Alternative A, would result in the largest positive impact, while management under Alternative C would result in the largest decreases. However, the difference among the alternatives would be relatively small because of the offsetting effects of the restrictions to recreational activities imposed under Alternatives B, C, and D (potential benefits for certain kinds of recreational activities), described above. The changes in consumer surplus are calculated based on forecasted changes in recreation activities (differing by alternative), using the same methodology as described above and in **Appendix M**, Socioeconomics Data and Methodology, for impacts on employment, earnings, output, and earnings per job.

Alternative A-Recreation under Alternative A would be less subject to potential restrictions on permitted recreational activities than under Alternatives B, C, and D. Under Alternative A, recreation on federal lands is estimated to contribute an annual average consumer surplus value of about $219.1 million. As noted in **Chapter 3**, the current estimated nonmarket value of recreation on federal lands is about $193.8 million; the increase is in large part due to increasing population and resulting increases in recreational use.

Alternative B-Under Alternatives B and D, recreation would support more consumer surplus value than Alternative C, but less than Alternative A. Recreation on federal lands in Alternative B is estimated to contribute an annual average consumer surplus value of about $217 million.

Alternative C-As noted above, management under Alternative C would impose the most constraints on surface disturbing activities and therefore would have the greatest potential impacts on certain kinds of recreation activity. Overall net impacts would still be somewhat similar to other alternatives. Recreation on federal lands under Alternative C is estimated to contribute an annual average consumer surplus value of about $214.6 million.

Alternative D-Under Alternative D, recreation would support more consumer surplus value than Alternative C and only slightly less than Alternative A. Recreation on federal lands in Alternative D is estimated to contribute an annual average consumer surplus value of about $218.8 million.

Impacts from Management of Oil and Gas Leases

Overall Employment, Earnings, Output, and Earnings per Job Impacted by Management Alternatives

The potential impacts of management alternatives affecting oil and gas drilling, completion, and production on overall employment, earnings, and output were estimated quantitatively using the IMPLAN model. In doing so, only new wells projected for a future 20-year horizon were considered. Existing wells would not be impacted by GRSG habitat management alternatives. Projections were based on each BLM field office's current RFDS (see **Appendix M**, Socioeconomics Data and Methodology, for more details). Results are presented in **Table 4.16**, Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings by Alternative.

Table 4.16. Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D
Primary Study Area				
Output (2011 $)	$2,974,932,481	$2,683,008,735	$2,108,789,332	$2,828,970,608
Employment	19,073	17,215	13,532	18,144
Earnings (2011 $)	$1,078,265,304	$973,088,057	$764,866,305	$1,025,676,680
Average Earnings Per Job (2011 $)	$56,533	$56,526	$56,522	$56,529
Primary and Secondary Study Area				
Output (2011 $)	$2,987,617,539	$2,694,454,030	$2,117,785,549	$2,841,035,784
Employment	19,154	17,288	13,590	18,221
Earnings (2011 $)	$1,081,759,573	$976,240,875	$767,344,476	$1,029,000,224
Average Earnings Per Job (2011 $)	$56,476	$56,469	$56,465	$56,473

	Alternative A	Alternative B	Alternative C	Alternative D
Source: Calculated using the IMPLAN model as explained in the text and in **Appendix M**, Socioeconomics Data and Methodology N/A: not applicable, as described in the text				

Alternative A-Under Alternative A, restrictions on leasing and development would continue to be imposed to protect sensitive habitats, including that of the GRSG. Compared with Alternatives B, C, and D, however, these restrictions would result in the highest level of oil and gas related output, employment, and earnings. Under Alternative A, annual average output is estimated to average almost $3 billion. Employment supported by oil and gas activities in the area is estimated to average approximately 19,000 annually.

Alternative B-Alternative B would no longer permit drilling and oil and gas production in GRSG PPH. The extent of the impact of Alternative B depends somewhat on the extent to which oil and gas production would increase in private and state-owned surfaces in response to the restrictions on federal surfaces. Oil and gas production on federal lands is estimated to support an output of almost $2.7 billion and approximately 17,000 annual jobs. In addition, restrictions on the construction of access roads in PPH, other ROWs and restriction on surface, could create increased costs to oil and gas activities through realignments or roads and increased costs of construction and operations.

Alternative C-Management under Alternative C would have the most economic impacts through restriction on oil and gas drilling and production. Estimated annual output and employment would be approximately two-thirds that of Alternative A. In addition, restrictions on the construction of access roads in ADH, other ROWs, and restriction on surface, could create increased costs to oil and gas activities through realignments or roads and increased costs of construction and operations.

Alternative D-This alternative would include an NSO stipulation on PPH. The impact of management under this alternative would depend on the extent to which horizontal drilling could be used to reach the same oil reserves. If operators are able to access oil reserves using horizontal drilling, impacts would resemble those from Alternative A. If operators are unable to reach oil reserves using horizontal drilling, the economic impacts of Alternative D would resemble those of Alternative B. To allow comparison between alternatives of output, employment, and earnings affected by management of various resources, **Table 4.16**, Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings by Alternative, presents a quantitative estimate for Alternative D that is the mid-range between Alternatives A and B.

The economic impact of decreases in oil and gas production in the primary study area under Alternatives B, C, and D are likely to be principally felt in the oil and gas producing areas and where workers and service providers reside. Garfield and Rio Blanco counties are the main oil and gas producing counties in the primary study area, with commuters often residing in Moffat, Mesa, and Eagle counties.

Impacts from Management of Other Minerals

Direct Economic Activity Dependent on BLM-administered and National Forest System Land and Resource Management

As described in **Chapter 3**, the primary study area produces coal and several salable and locatable minerals, including sodium, limestone, gypsum, and sand and gravel. GRSG habitat management alternatives would impose restrictions on development of mineral production, particularly under Alternatives B and C, where PPH would be excluded from mineral development. These restrictions would hamper employment generation that is dependent on these economic activities and on the overall level of economic activity derived from mining. Unfortunately, there is not enough information on the potential for mineral production throughout the primary study area to quantify the potential economic impacts of restrictions imposed by management alternatives. Acreages for mineral exclusion or avoidance are reported in the various mining impacts sections (leasable, salable, and locatable). Some useful information on current production includes the following:

- Current gypsum production in Eagle County would not intersect with PPH or ADH.
- Current coal and sodium production in the WRFO planning area would not intersect with PPH or ADH.
- Current limestone production in the LSFO and CRVFO planning areas would not intersect with PPH or ADH.
- Current sand and gravel production would not intersect with PPH or ADH, with the exceptions of areas in the KFO that would intersect with PPH and areas in the LSFO that would intersect mostly with ADH.
- Current coal production in the LSFO planning area would intersect with ADH.

The potential economic impact of management alternatives that affect mineral production is discussed qualitatively below.

Alternative A-Current management imposes the fewest restrictions on mineral production, and economic benefits associated with mining activities would continue current trends.

Alternative B-Alternative B would exclude PPH from mineral production and avoid production on all other GRSG habitat. Economic impacts would depend on the extent to which future mineral production would otherwise occur in areas that intersect with GRSG habitat. Based on current sand and gravel production in the KFO planning area, withdrawal of acreage for mineral development in the planning area could restrict the development of sand and gravel. Travel management restrictions in PPH could generate additional costs to mining activities.

Alternative C-Under Alternative C, PPH would also be excluded from mineral development, resulting in similar economic impacts to Alternative B. Additional impacts could occur due to additional travel restrictions in ADH.

Alternative D-Under Alternative D, mineral development would be more restricted than Alternative A due to disturbance caps and increased costs of mitigation, such as seasonal restrictions and project design features.

Impacts from Management Actions Affecting Land and Realty and Travel Management

Direct Economic Activity Dependent on BLM-administered and National Forest System Land and Resource Management

Management actions that affect development of infrastructure could have important hindering effects on the growth of economic activity in the area. Limitations on new ROWs for power lines, pipelines, and access routes or restrictions to route construction and to travel on existing roads could increase the cost of new economic investments or make them no longer economically viable. Additional information about changes in cost effectiveness and efficiency associated with restrictions on ROW, corridors, and treatments are discussed in the Land and Realty, as well as the Vegetation sections in **Chapter 4**. A qualitative discussion of the potential for economic impacts from restrictions to land use and transportation is provided below for each alternative.

Alternative A-Current management, Alternative A, places the fewest restrictions on ROW development and route construction and has the largest area open to travel.

Alternative B-Under Alternative B, new ROWs would be excluded or avoided in 95 percent of GRSG habitat. Motorized travel would be limited in PPH and routes constructed in excess of a 3 percent disturbance cap would face increased costs with mitigation resulting from the loss of habitat. Alternative B would impose limitations and added costs to future economic investments in the primary study area compared with Alternative A.

Alternative C-Management under Alternative C would have similar impacts to Alternative B, with added restrictions: 100 percent of GRSG habitat would face ROW restrictions and route construction would require a 4-mile buffer from leks in ADH. Alternative C would impose the most limitations and added costs to future economic investments in the primary study area.

Alternative D-ROW development under Alternative D would also face restrictions, but these would be more limited than under Alternatives B and C, affecting approximately 53 percent of GRSG habitat. Route construction would face similar restrictions as Alternative B, but the increased cost of mitigation resulting from habitat loss would only be required for routes constructed in excess of a 5 percent disturbance cap. Restriction and costs to infrastructure development under Alternative D would be greater than under Alternative A but less than under Alternatives B or C.

Impacts from Management Actions Affecting Special Status Species

Other Values Associated with Populations of GRSG

As described in **Chapter 3**, economists and policy makers have long recognized that rare, threatened, and endangered species have economic values beyond those associated with active "use" through viewing or hunting. **Chapter 3** and **Appendix M**, Socioeconomics Data and Methodology, document current methods to estimate these "non-use" values, including a description of the literature review that the BLM and USFS conducted to determine if there were existing non-use value studies for GRSG. Although there are no existing studies on valuation specific to the GRSG, several studies published in peer-reviewed scientific journals for bird species with similar characteristics find average stated willingness-to-pay between $15 and $58 per household per year in order to restore a self-sustaining population or prevent regional extinction (see **Appendix M**, Socioeconomics Data and Methodology, for details). These values represent a mix of use and non-use values, but the non-use components of value are likely to be the majority share since the studies primarily address species that are not hunted.

Since GRSG protection is a public good available to all households throughout the intermountain west, if similar per-household values apply and if even a small portion of the per-household value represents a non-use value, then the aggregate regional non-use value could be substantial. However, the BLM and USFS did not quantify the aggregate value because of several factors, including uncertainty associated with the comparability of the existing studies to the GRSG context and the documented difference between stated and actual willingness-to-pay.

From a qualitative perspective, however, the non-use values associated with populations of GRSG would be expected to correspond to the degree of habitat protection associated with each alternative. The potential impacts associated with each alternative are documented immediately below.

Alternative A-Current management, Alternative A, provides the least amount of protection for GRSG in the planning area and consequently could result in the most impacts on GRSG. As a result, to the degree that there are non-use values associated with populations of GRSG, management under Alternative A would have the greatest adverse impacts on those values.

Alternative B-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 non-use 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.

Alternative C-Management under Alternative C would provide the most protection for GRSG. As a result, to the degree that there are non-use values associated with populations of GRSG, management under Alternative C would have the least adverse impacts (or the most beneficial impacts) on those values.

Alternative D-Management under Alternative D would provide more protection for GRSG than Alternative A but less protection than Alternatives B and C. To the degree that there are non-use 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 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, and investment earnings. The largest impact of management alternatives on county fiscal revenues would be through taxes paid by the oil and gas sector. **Table 4.17**, Average Annual Federal Royalty and State Severance Taxes on Oil and Gas by Alternative, 2011$, estimates federal royalties and state severance taxes paid by the oil and gas sector under each management alternative. Oil and gas production was assumed valued at 87.5 percent of its market price (Colorado Oil and Gas Association 2011). State severance tax rates depend on production value but are 5 percent for production valued over $300,000 (Colorado Oil and Gas Association 2011). **Appendix M**, Socioeconomics Data and Methodology, shows the calculation details.

Table 4.17. Average Annual Federal Royalty and State Severance Taxes on Oil and Gas by Alternative, 2011$

	Alternative A	Alternative B	Alternative C	Alternative D
Federal Royalties	$9,550,377	$8,423,309	$6,609,030	$8,986,843
State Severance Tax	$3,820,151	$3,369,323	$2,643,612	$3,594,737
Total	$13,370,528	$11,792,632	$9,252,642	$12,581,580

Source: Calculated using the IMPLAN model as explained in the text and in **Appendix M**, Socioeconomics Data and Methodology

N/A: not applicable, as described in the text

As discussed in **Chapter 3**, 50 percent of federal leases from mineral revenues are distributed to the States, which in turn distribute 50 percent of what they receive to the counties of origin, with the rest going to the state school fund, the Department of Local Affairs and the Water Conservations Board. Differences in distribution of federal royalties to counties among alternatives are partially reduced by payments in lieu of taxes that, according to the payments in lieu of taxes rule, are reduced by amounts received the previous fiscal year from several Federal payments, including mineral federal royalties (31 USC Chapter 69). Fifty percent of state severance taxes are also distributed to counties, with 30 percent of that amount (15 percent of total) distributed directly to those counties impacted by mineral production (Department of Local Affairs 2012).

Other than fiscal revenues from federal royalties and state severance taxes, other revenue sources such as real property taxes, municipal sales and use taxes, revenues from leases and fees, whether through mining, recreation or grazing activities, would all tend to decrease with the lesser economic activity expected in the study area under Alternatives B, C, and D when compared to Alternative A, with the least revenues expected under Alternative C.

Alternative A-Under Alternative A, average annual federal royalty and state severance tax collections on oil and gas are estimated to be highest and would amount to an estimated $13 million, with just over 70 percent of that being federal royalties. Other fiscal revenues are also estimated to be highest under Alternative A.

Alternative B-Under Alternative B, average annual federal royalty and state severance tax collections on oil and gas are estimated to be approximately 88 percent of their levels under Alternative A. Other fiscal revenues would be lower than under Alternative A.

Alternative C-Under Alternative C, average annual federal royalty and state severance tax collections on oil and gas are estimated to be approximately 69 percent of their levels under Alternative A. Other fiscal revenues would likely also be lowest under Alternative C.

Alternative D-Quantitative estimates for average annual federal royalty and state severance tax collections on oil and gas under Alternative D would fall between those described for Alternatives A and B. To allow comparison between alternatives of output, employment and earnings affected by management of various resources, **Table 4.17**, Average Annual Federal Royalty and State Severance Taxes on Oil and Gas by Alternative, 2011$, presents a quantitative estimate for Alternative D that is the mid-range between Alternatives A and B. Other fiscal revenues under Alternative D would likely be less than under Alternative A, but greater than fiscal revenues under Alternatives B or C.

Summary of Economic Impacts

Table 4.18, Average Annual Impact on Employment and Earnings by Alternative, 2011$, and **Table 4.19**, Average Annual Impact on Employment and Earnings by Alternative, Percent of Baseline, summarize the quantitative analysis of the potential effects of management alternatives on employment, earnings, and earnings per job in the primary study area. Alternative A represents impacts associated with current management. The difference between Alternative A and Alternatives, B, C, and D represent the share of current employment and earnings that are estimated to be impacted by each action alternative. Although the quantitative analysis included only earnings and employment affected by management impacts on grazing, recreation, and oil and gas, these activities are those expected to jointly capture the great majority of the economic impact of the alternatives in the primary study area.

Table 4.18. Average Annual Impact on Employment and Earnings by Alternative, Primary Study Area, 2011$

	Alternative A	Alternative B	Alternative C	Alternative D
Employment	23,947	21,843	17,903	22,919
Earnings	$1,245,063,625	$1,132,283,411	$916,071,772	$1,189,481,360
Average Earnings Per Job	$51,992	$51,837	$51,169	$51,900
Source: Impacts calculated using the IMPLAN model as explained in the text and **Appendix M**, Socioeconomics Data and Methodology				

Table 4.19. Average Annual Impact on Employment and Earnings by Alternative, Primary Study Area, Percent of 2010 Baseline

	Alt A/ 2010 Baseline	Alt B/ 2010 Baseline	Alt C /2010 Baseline	Alt D /2010 Baseline	Alt A - Alt B	Alt A - Alt C	Alt A - Alt D
Employment	11.68%	10.65%	8.73%	11.17%	1.03%	2.95%	0.50%
Earnings	14.31%	13.02%	10.53%	13.68%	1.30%	3.78%	0.64%
Average Earnings Per Job	122.61%	122.24%	120.67%	122.39%	0.37%	1.94%	0.22%
Source: Impacts calculated using the IMPLAN model as explained in the text and **Appendix M**, Socioeconomics Data and Methodology. Baseline values for employment and labor earnings are those presented in **Table 3.83**, Employment by Industry Sector within the Socioeconomic Study Area, and **Table 3.84**, Labor Income by Industry Sector and Non-Labor Income within the Socioeconomic Study Area (2010 dollars), of **Section 3.25**, Social and Economic Conditions (Including Environmental Justice), respectively. Earnings were deflated to 2010 dollars using the US Bureau of Labor Statistics Consumer Price Index Inflation Calculator for comparison with labor earnings values presented in **Chapter 3** for 2010.							

Table 4.18, Average Annual Impact on Employment and Earnings by Alternative, 2001$, shows that the resources potentially affected by the choice of alternative are estimated to support 23,947 annual jobs under Alternative A and 17,903 annual jobs under Alternative C. Alternatives B and D would have an impact in between these two estimates, with Alternative D supporting more jobs than Alternative B.

Table 4.19, Average Annual Impact on Employment and Earnings by Alternative, Percent of 2010 Baseline, shows that the difference between the employment supported under Alternative A and that supported under Alternative C corresponds to approximately 2.95 percent of the total 2010 employment in the primary study area. Approximately 80 percent of the employment affected is related to oil and gas exploration. Almost 18 percent of the employment affected is related to recreational activities and about 2 percent is associated with grazing activities. Earnings potentially affected by the choice of alternative are approximately 3.78 percent of the 2010

earnings in the primary study area. The higher potential impact on earnings than on jobs reflects the higher average earnings per job in the oil and gas industry, when compared to the overall average in the primary study area. This 2.95 percent one year impact of Alternative C with respect to Alternative A compares with an average annual employment growth of 1.39 percent in the nine years between 2001 and 2010 (see **Chapter 3**, growth of 13.2 percent in employment over the nine year period).

The difference in the quantitative impact of alternatives on employment and earnings is largely driven by differences in the expected impact of management actions on oil and gas development on federal lands. To the extent that oil and gas development were to proceed in the primary study area under private or state-owned surface when restrictions on federal surface are imposed, the differences among alternatives of the estimated quantitative economic impacts would be less than those shown in **Table 4.19**, Average Annual Impact on Employment and Earnings by Alternative, Primary Study Area, Percent of 2010 Baseline.

The description of impacts by alternative below summarizes other quantitative and qualitative impacts of the management alternatives.

Alternative A-Current management, Alternative A, imposes the fewest restrictions on future economic investments in the primary study area by avoiding new limitations and added costs to mining development, ROW development, route construction, and travel. Tax revenues are expected to be highest under this alternative. In terms of other (nonmarket) values, consumer surplus associated with recreation is expected to be highest, and, to the extent that there is a positive net nonmarket value associated with livestock grazing and ranching, those values are expected to be greatest in Alternative A. Because this alternative could result in the most impacts on GRSG populations, it is expected to result in the greatest adverse impacts on potential non-use values associated with populations of GRSG.

Alternative B-Alternative B would impose more restrictions on future economic investments in the primary study than under Alternative A by imposing new limitations and added costs to mining development, ROW development, route construction, and travel.

In terms of other (nonmarket) values, consumer surplus associated with recreation under Alternative B would be lower than in Alternative A, while potential non-use values associated with populations of GRSG would be greater. To the extent there is a positive net nonmarket value associated with livestock grazing and ranching, those values would be similar to Alternative A with potentially some adverse impacts.

Alternative C-Alternative C would impose the most restrictions on future economic investments in the primary study area through limitations and added costs to mining development, ROW development, route construction, and travel. This alternative would provide the least tax revenues.

In terms of other (nonmarket) values, consumer surplus associated with recreation under Alternative C would be lowest of all the alternatives, but the difference from Alternative A would be relatively small. Management under Alternative C would result in the greatest potential impacts on nonmarket values associated with livestock grazing and ranching. However, to the degree that there are non-use values associated with populations of GRSG, Alternative C would have the fewest adverse impacts (or the most beneficial impacts) on those values.

Alternative D-Alternative D would impose more restrictions on future economic investments in the primary study than Alternative A but fewer than Alternatives B and C. Impacts on other

(nonmarket) values would also fall in this range, with impacts on recreation-related values being slightly adverse compared to Alternative A, impacts on livestock grazing-related values comparable to Alternative A, and some positive impacts related to potential non-use values associated with populations of GRSG.

Table 4.20. Other Economic Impacts

	Alternative A	Alternative B	Alternative C	Alternative D
Other economic activity (ROW related construction, mining, Travel)	Current trend, lowest impact	Between A and C	Most restrictions	Between A and B
Tax revenues	Highest	Between A and C	Lowest	Between A and B
Nonmarket values	Highest impact	Between A and C	Lowest impact	Between A and B

In addition to the impacts summarized in the tables above, there are impacts on specific communities and local geographic areas that must be taken into account, even if they are not visible at the regional level. This is especially a concern for smaller communities that are adjacent to large areas of federally managed GRSG habitat, such as the town of Walden in Jackson County, and that have economies focused on ranching or oil and gas development.

4.24.4. Social Impacts

Impacts from Management Actions Affecting Migration

Population

As previously discussed, the extent to which estimated job and income impacts would in fact happen depends on the extent to which oil and gas exploration would move from federal to private or state surface lands. Oil and gas drives approximately 94 percent of the employment impacts of management alternatives in the quantitative analysis conducted here. The decrease in employment opportunities in the primary study area that would accompany the action alternatives (B, C, and D) may impact the capacity of the primary study area to attract and retain its labor force, with possible consequences for population growth.

Specific counties and communities most likely affected would be those linked to oil and gas production. As previously discussed, the counties in the primary study area strongly linked to oil and gas production include Garfield and Rio Blanco counties, as well as the adjacent counties of Moffat, Mesa, and Eagle. As shown in **Chapter 3**, Eagle County was the fastest growing county in the primary study area during the decade 2000 to 2010, Garfield County being the second.

Communities not linked to oil and gas production might also be affected by Alternative C if highly dependent on affected economic activities and surrounded by GRSG habitat. Walden, the county seat of Jackson County, is an example. Jackson County is the only county in the primary study area that faced a population decrease in the decade 2000 to 2010.

Alternative A-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, this alternative has the lowest potential for impacts on population growth.

Alternative B-The potential for impacts on population trends from Alternative B is greater than Alternative A but less than Alternatives C and D. Because population impacts would be mostly driven by impacts on employment opportunities and those in the oil and gas sector would be the most impacted by management under Alternative B, the population impacts of Alternative B depend largely on the extent to which oil and gas production would grow on private and state-owned surface in response to the restrictions on federal surface and sub-surface. Increased oil and gas exploration on private and state lands would result in fewer impacts of Alternative B on population trends because fewer impacts on employment opportunities in the primary study area would be expected.

Alternative C-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 oil and gas employment opportunities for income. However, some communities highly dependent on cattle ranching could also be affected if highly dependent on GRSG habitat on public lands for grazing.

Alternative D-The impacts of Alternative D on population trends would fall between those described under Alternatives A and B. Similar to Alternative B, impacts on population are dependent on the extent to which oil and gas production on state and private surface compensate for a decline in federal production. In addition, as noted in the Economics section, if horizontal drilling results in better access to minerals under federal surface, this could also result in fewer impacts from Alternative D.

Housing and Public Services

Alternative A-Current management, Alternative A, may have the most impacts on population growth and, therefore, on the demand for housing and public services. Because this alternative would be a continuation of current management, no change in population growth in the study area would be expected and there would be no change in trends in demand for housing and public services that could not be serviced by local communities.

Alternative B-Management under Alternative B would be less favorable for economic and population growth than Alternative A. To the extent that Alternative B imposes restrictions on economic activities central to the generation of income of specific communities, the decrease in the capacity of these communities to retain their current population could lead to hindering impacts on housing development.

Alternative C-Management under Alternative C would have similar impacts to Alternative B, but restrictions on population growth would be greater, and potential hindering impacts on housing development in some local communities would be more likely.

Alternative D-Impacts under Alternative D would be less than under Alternatives B and C, but more restrictive of population growth and demand for housing and public services than Alternative A.

Impacts from Management Actions Affecting Specific Groups and Communities

Consistency with County Land Use Plans

The decision under consideration may result in amended BLM and USFS management and LUPs throughout northwest Colorado. The BLM and USFS management and LUPs must be consistent with state and local LUPs to the extent possible, and any amendments to be made would aim to maintain this consistency. This would be the case under all alternatives.

Interest Groups and Communities of Place

As described in **Chapter 3**, there is a range of interest groups in the primary study area with overlapping and divergent interests. Groups centered on recreation interests, grazing, mining, land development, infrastructure development, business development, and conservation of natural resources will be impacted differently by the management alternatives. Within these interest groups, there are more specific ones that could be particularly affected. Among the interest groups most likely to be affected by the choice of alternative are those associated with motorized and developed recreation, wildlife conservation, and business groups associated with mining, grazing, and infrastructure development.

Specific communities will also not be impacted in the same way by the management alternatives. Communities with more diversified economies, and those less dependent on grazing or oil and gas, will likely be less impacted than those that do depend heavily on grazing or oil and gas. Although oil-and-gas-related economic impacts are estimated to be the most substantial in terms of employment and earnings effects, small communities dependent on grazing for their livelihoods may be impacted by alternatives to the degree they are located within or adjacent to GRSG habitat. As noted in **Chapter 3**, the number and size of ranches is decreasing in several counties in the primary study area (including Garfield, Grant, and Routt). Counties reliant on ranching as a major source of income include Jackson County, which is also the only county in the primary study area that lost population between 2000 and 2010. Communities in Jackson County – such as Walden, its county seat and the only incorporated municipality – are adjacent to large swaths of GRSG habitat and could experience social impacts if grazing were no longer allowed in federally administered GRSG habitat, as would be the case in Alternative C. In addition, individual ranches may be impacted differently depending on the extent of their reliance on public lands for grazing.

Alternative A-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-Alternative B would impose restrictions on land and infrastructure development interests and would impose additional costs to business in 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.

Alternative C-Management under Alternative C would have adverse impacts on groups associated with motorized and mechanized recreation and would have the most potential adverse impacts on land and infrastructure development interests. 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.

Alternative D-Impacts under Alternative D would be most like those of Alternative B, but the magnitude of these impacts would be somewhat less than in Alternative B. Because management

under Alternative D would require fewer land use restrictions, it would not be expected to have severe impacts on small ranching-dependent communities in the same way as Alternative C.

Summary of Social Impacts

Management under Alternatives B, C, and D could have the effect of limiting the attraction and retention of population in the primary study area. These impacts would be more severe under Alternative C than under Alternatives B or D. These impacts would not be homogeneous throughout the primary study area but would be concentrated in specific communities where GRSG habitat intersects with resources important to social well-being. Communities with strong interest groups revolving around conservation and primitive recreational activities could experience benefits from Alternatives B, C, and D. Communities with strong interest groups focused on livestock grazing or oil and gas development would likely experience adverse impacts from Alternatives B, C, and D, but especially Alternative C.

Alternative A-Management under Alternative A would have the fewest impacts on the capacity of communities to attract and retain populations. This would also be the alternative that would result in the fewest adverse impacts on business interest groups and small communities dependent on resources in GRSG habitat.

Alternative B-Social impacts from management under Alternative B have a greater hampering effect on population attraction and retention and to business interests than Alternative A but less than under Alternative C.

Alternative C-Management under Alternative C would have the most restricting impacts on the capacity of communities to attract and retain populations. This alternative would also result in the most adverse impacts on business interest groups and small communities dependent on resources in GRSG habitat. Interest groups associated with conservation and primitive recreation would benefit the most from this alternative.

Alternative D-Social impacts from management under Alternative D would fall between those described for Alternatives A and B. Because Alternative D would not result in dramatic changes to management of federal grazing lands, it would not be expected to have severe impacts on small ranching-dependent communities in the same way as Alternative C. In addition, restricting impacts resulting from management under Alternative D could be moderated by the potential for oil and gas production on state and private surface to increase, and also if horizontal drilling allows operators to access minerals under federal surface despite NSO stipulations.

Table 4.21. Social Impacts

Indicator	Alternative A	Alternative B	Alternative C	Alternative D
Population growth; demand for housing and public services	Current trend, highest	Between A and C	Lowest	Between A and B
Consistency with county LUPs	No Impact	No Impact	No Impact	No Impact
Impacts on interest groups and communities of place	Most benefit to business interests	Between A and C	Most benefits to conservation and primitive recreation groups	Between A and B

4.24.5. Environmental Justice Impacts

The BLM and USFS 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 USFS 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. One commenter in the Economic Strategies Workshop did call out a specific concern related to low-income populations: a resident of Walden, in Jackson County, provided the BLM with a copy of a comment letter he provided in January 2012 on the Kremmling Draft RMP/EIS. That comment letter quoted several passages of the Draft EIS, noting in particular the relatively high poverty rates and declining economic opportunities in Jackson County, and encouraged the BLM to pay special consideration to the economic situation of many residents (BLM 2013b).

The BLM and USFS also reviewed the scoping report to identify any comments related to environmental justice issues received in the scoping phase. The only scoping comments identified that related to minority or low-income populations were several comments pertaining to the cultural significance of the GRSG to Native American tribes. Commenters note that Native tribes in western Colorado used GRSG as a food source and that the bird also played a role in myths and inspiration for ceremonial dances. In this context, the preservation of GRSG habitat would result in beneficial effects for Native tribes that place a cultural value on the bird (BLM and USFS 2012). However, as described in **Chapter 3**, no federally recognized Indian tribes are present in the primary study area.

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, with the possible exception of the counties of Eagle and Garfield, where the proportion of total minorities is about 1 to 2 percentage points greater than for the State of Colorado, and the Hispanic presence is between 7 and 10 percentage points greater than in the State of Colorado. Smaller communities where minority presence is "meaningfully greater" than in the state as a whole, although not identified in **Chapter 3**, may also exist in the 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**.

The BLM and USFS reviewed the impacts of alternatives described in the respective sections of **Chapter 4**. Based on available information about the nature and geographic incidence of impacts, the BLM and USFS did not identify specific minority populations that would be exposed to disproportionately high and adverse impacts under the management alternatives considered, nor ways in which minority populations would be particularly vulnerable to such impacts.

This conclusion is based on a review of all available impact information, but one impact is relevant to call out in particular: the possibility that adverse impacts on employment and earnings could disproportionately affect minority populations. If employment losses – such as the estimated reduction of 6,000 jobs in Alternative C relative to Alternative A – were to affect minority populations disproportionately, this could be considered a disproportionately high and adverse impact on minority populations. However, these job losses would occur over a wide geographic area, and over many different economic sectors, from mining (including oil and gas) to agriculture, construction, manufacturing, wholesale trade, retail trade, and others. Given the sectoral and geographic dispersion of the impacts, and the fact that employment in these industries is not overly concentrated within any particular racial or ethnic group, the BLM and USFS find no evidence to support the idea that these job losses would affect minority populations disproportionately.

Potential Impacts on Low-Income Populations

The presence or absence of low income populations in the primary study area is discussed in **Chapter 3**. Because no communities were identified where there is a meaningfully greater presence of low-income people than that present in the state as a whole, no low-income communities were identified. It is possible, however, that there are small communities that do constitute low-income populations, given the large geographic coverage of this EIS. The extent to which low-income populations are disproportionately impacted by high and adverse human health or environmental effects depends on the existence of high and adverse human health or environmental effects from management alternatives on any of the resources analyzed, and whether low-income populations are specifically vulnerable to these impacts or more likely to be exposed to such impacts.

Accordingly, similar to the analysis for minority populations, the BLM and USFS reviewed the impacts of alternatives described in the respective sections of **Chapter 4**. Based on available information about the nature and geographic incidence of impacts, the BLM and USFS identified a potential concern about disproportionately high and adverse impacts on low-income populations in Jackson County, related to economic and social effects. In the county as a whole, the poverty rate (13.9 percent) is the highest of any county in the primary socioeconomic study area, though only slightly higher than the state (12.2 percent). Jackson County is also the only county in the primary study area, and one of the few counties in Colorado, that has experienced a decline in population in recent years, as reported in **Chapter 3**. Among the primary study area counties it also has the highest proportion of residents over the age of 65 (18.4 percent), which may indicate a relatively high number of residents who survive on a fixed income. As noted elsewhere

in this chapter, Jackson County is relatively strongly dependent economically on oil and gas development and ranching and grazing – both industries that utilize public lands – and some communities in the county (e.g., Walden, which has a 22 percent poverty rate according to the US Census Bureau) are nearly surrounded by federal lands.

With these considerations in mind, the BLM and USFS believe that Alternative C, in particular, could result in disproportionately high and adverse impacts on low-income populations in Jackson County, specifically related to impacts on employment and earnings. Impacts in Alternatives B and D would not be as severe. In particular, restrictions on livestock grazing and oil and gas, and associated economic and social impacts, would not be as great in Alternatives B and D, and therefore these alternatives would not have disproportionately high and adverse impacts on low-income populations in Jackson County.

The BLM and USFS also considered the possibility for employment losses to have disproportionately high and adverse effects on other communities. In particular, as in the analysis of effects on minority populations, the agencies considered the possibility that adverse impacts on employment and earnings – such as the estimated reduction of 6,000 jobs in Alternative C relative to Alternative A – could disproportionately affect low-income populations. In general, however, given the sectoral and geographic dispersion of the employment impacts, and the fact that employment in these industries is not overly concentrated within any particular income cohort, the BLM and USFS find no evidence to support the idea that these job losses would affect low-income populations disproportionately (with the exception of the impact identified above).

Table 4.22. Environmental Justice Impacts

Indicator	Alternative A	Alternative B	Alternative C	Alternative D
Disproportionately high and adverse impacts on minority populations	No Impact	No Impact	No Impact	No Impact
Disproportionately high and adverse impacts on low-income populations	No Impact	No Impact	Disproportionately high and adverse impact related to employment	No Impact

4.25. 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 result 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 and RDF/SDFs 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 and paleontological 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 or areas containing vertebrate or scientifically significant fossil resources. Such destruction would be irreversible and irretrievable. Alternative A would have the greatest potential for a loss of cultural and paleontological resources 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.

4.26. 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 as a result 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 under current BLM and USFS policies to foster multiple uses. 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. This 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. Because large portions of the crucial big game habitats coincide with areas of high oil and gas potential, unavoidable wildlife habitat loss would be most likely to occur under Alternative A. 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 and paleontological 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 and paleontological 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 paleontological resources would be expected to greatly reduce the probability of unavoidable adverse impacts on the resource.

Wildlife, livestock, and wild horses would contribute to soil erosion, compaction, and vegetation loss, which could be extensive during drought cycles and dormancy periods. Conversely, unavoidable losses or damage to forage from development of resources under the LUPA would affect livestock, wildlife, and wild horses. 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 LUPA 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.

4.27. 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 line construction, and mineral resource development would result in the greatest potential for impacts on long-term productivity. Management prescriptions and RDFs/PDFs/SDFs (**Appendix I**) 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, BLM-administered and National Forest System lands are managed to foster multiple uses, and some impacts on long-term productivity might occur, despite the prescriptions intended to reduce impacts on GRSG 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, and D. 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 severe winter range, birthing 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 as a result 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 surface disturbance caps in ADH.

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.

4.28. References

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Chapter 5. Cumulative Effects

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5.1. Introduction

This chapter presents the likely cumulative impacts on the human and natural environment that could occur from implementing the alternatives presented in **Chapter 2**, Alternatives. This chapter is organized by topic, similar to **Chapter 3**, Affected Environment, and **Chapter 4**, Environmental Consequences.

"Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Cumulative impacts are effects on the environment that result from the impact of implementing any one of the alternatives (**Chapter 2**) in combination with other actions outside the scope of this plan, either within the planning area or adjacent to it. Cumulative impact analysis is required by CEQ regulations because environmental conditions result from many different factors that act together. The total effect of any single action cannot be determined by considering it in isolation, but must be determined by considering the likely result of that action in conjunction with many other factors. Evaluation of potential impacts considers incremental impacts that could occur from the proposed project, as well as impacts from past, present, and reasonably foreseeable future actions. Management actions could be influenced by activities and conditions on adjacent public and nonpublic lands beyond the planning area boundary; therefore, assessment data and information could span multiple scales, land ownerships, and jurisdictions. These assessments involve determinations that often are complex and, to some degree, subjective.

5.2. Cumulative Analysis Methodology

The cumulative impacts discussion that follows considers the alternatives in the context of the broader human environment – specifically, actions that occur outside the scope and geographic area covered by the planning area. Cumulative impact analysis is limited to important issues of national, regional, or local significance.

Because of the programmatic nature of the LUPA and cumulative assessment, the analysis tends to be broad and generalized to address potential impacts that could occur from a reasonably foreseeable management scenario combined with other reasonably foreseeable activities or projects. Consequently, this assessment is primarily qualitative for most resources because of lack of detailed information that would result from project-level decisions and other activities or projects. Quantitative information is used whenever available and as appropriate to portray the magnitude of an impact. The analysis assesses the magnitude of cumulative impacts by comparing the environment in its baseline condition with the expected impacts of the alternatives and other actions in the same geographic area. The magnitude of an impact is determined through a comparison of anticipated conditions against the naturally occurring baseline as depicted in the affected environment (see **Chapter 3**, Affected Environment) or the long-term sustainability of a resource or social system.

The total effect of any single action cannot be determined by considering it in isolation, but must be determined by considering the likely result of that action in conjunction with many others. Evaluation of potential impacts considers incremental impacts that could occur from the proposed project, as well as impacts from past, present, and reasonably foreseeable future actions. Management actions could be influenced by activities and conditions on adjacent public and

non-public lands beyond the planning area boundary; therefore, assessment data and information could span multiple scales, land ownerships, and jurisdictions.

The following factors were considered in this cumulative impact assessment:

- Federal, nonfederal, and private actions
- Potential for synergistic impacts or synergistic interaction among or between impacts
- Potential for impacts across political and administrative boundaries
- Other spatial and temporal characteristics of each affected resource
- Comparative scale of cumulative impacts across alternatives

The geographic scope for the cumulative impact analysis varies by resource and is described within each resource section. For Special Status Species – Greater Sage-Grouse, the cumulative impact analysis is at the WAFWA Management Zone level in addition to the planning area analysis. WAFWA Management Zones are biologically based delineations that were determined by identifying GRSG populations and sub-populations within seven floristic provinces. Analysis at this level enables the decision maker to understand the impacts on GRSG at a biologically meaningful scale.

5.2.1. Past, Present and Reasonably Foreseeable Future Actions

Past, present, and reasonably foreseeable future actions are considered in the analysis to identify whether and to what extent the environment has been degraded or enhanced, whether ongoing activities are causing impacts, and trends for activities in and impacts on the area. Projects and activities are evaluated on the basis of proximity, connection to the same environmental systems, potential for subsequent impacts or activity, similar impacts, the likelihood a project will occur, and whether the project is reasonably foreseeable.

Projects and activities considered in the cumulative analysis were identified through meetings held with cooperators and BLM/USFS employees with local knowledge of the area. Each was asked to provide information on the most influential past, present, or reasonably foreseeable future actions. Additional information was obtained through discussions with agency officials and review of publicly available materials and websites.

Impacts of past actions and activities are manifested in the current condition of the resources, as described in the affected environment (see **Chapter 3**, Affected Environment). Reasonably foreseeable future actions are actions that have been committed to or known proposals that would take place within a 10-year planning period.

Reasonably foreseeable future action scenarios are projections made to predict future impacts – they are not actual planning decisions or resource commitments. Projections, which have been developed for analytical purposes only, are based on current conditions and trends and represent a best professional estimate. Unforeseen changes in factors such as economics, demand, and federal, state, and local laws and policies could result in different outcomes than those projected in this analysis.

Other potential future actions have been considered and eliminated from further analysis because there is a small likelihood these actions would be pursued and implemented within the life of the

plan or because so little is known about the potential action that formulating an analysis of impacts is premature. In addition, potential future actions protective of the environment (such as new regulations related to fugitive dust emissions) have less likelihood of creating major environmental consequences alone, or in combination with this planning effort. Federal actions such as species listing would require the BLM/USFS to reconsider decisions created from this action because the consultations and relative impacts might no longer be appropriate. These potential future actions may have greater capacity to affect resource uses within the planning area; however, until more information is developed, no reasonable estimation of impacts could be developed.

Data on the precise locations and overall extent of resources within the planning area are considerable, although the information varies according to resource type and locale. Furthermore, understanding of the impacts on and the interplay among these resources is evolving. As knowledge improves, management measures (adaptive or otherwise) would be considered to reduce potential cumulative impacts in accordance with law, regulations, and the existing LUPs for the areas included in the analysis.

Projects and activities identified as having the greatest likelihood to generate potential cumulative impacts when added to the alternatives are displayed in **Table 5–1, Past, Present, and Reasonably Foreseeable Projects, Plans or Actions that Comprise the Cumulative Impact Scenario**.

Table 5.1. Past, Present, and Reasonably Foreseeable Projects, Plans, or Actions that Comprise the Cumulative Impact Scenario

Other Land Use Plans	BLM Colorado River Valley RMP, In Progress
	BLM Grand Junction RMP, In Progress
	BLM Kremmling RMP, In Progress
	BLM Little Snake RMP (BLM 2011)
	BLM White River RMP (BLM 1997a)
	BLM White River Oil and Gas RMPA, In Progress
	Green River RMP (BLM 1997b)
	Wyoming Greater Sage-Grouse RMP Amendments (BLM 2010)
	Jack Morrow Hills Coordinated Activity Plan and Green River RMP Amendment (BLM 2006b)
	Rawlins RMP (BLM 2008a)
	Vernal RMP (BLM 2008b)
	Moab RMP (BLM 2008c)
	Routt National Forest Land and Resource Management Plan (USFS 1997)
	Final EIS for White River National Forest (USFS 2002)
	USFS Colorado Roadless Rule EIS (USFS 2012)
	Eagle County Comprehensive Plan (Eagle County 2005)
	Garfield County, Colorado, Land Use Resolution (Garfield County 2008)
	Grand County, Colorado, Master Plan (Grand County 2011)
	Jackson County, Colorado, Master Plan (Jackson County 1998)
	Larimer County Master, Colorado, Plan (Larimer County 1997)
	Mesa County, Colorado, Master Plan (Mesa County 2000)
	Moffat County, Colorado, Land Use Plan (Moffat County 2001)
	Rio Blanco County, Colorado, Master Plan (Rio Blanco County 2011)
	Routt County, Colorado, Master Plan (Routt County 2003)
	Summit County, Colorado, General Plan (Summit County 2006)
	Sublette County, Wyoming, Comprehensive Plan (Sublette County, amended 2005)
	Fremont County, Wyoming, Land Use Plan (Fremont County 2004)
	Carbon County, Wyoming, Land Use Plan (Carbon County 2012)

	Albany County, Wyoming, Comprehensive Plan (Albany County 2008)
	Laramie County, Wyoming, Land Use Plan (Laramie County 2001)
	Sweetwater County, Wyoming, Land Use Plan (Sweetwater County 2011)
	Daggett County, Utah, General Plan (Daggett County 2008)
	Duchesne County, Utah, General Plan (Duchesne County 2012)
	Grand County, Utah, General Plan (Grand County 2012)
	San Juan County, Utah, Master Plan (San Juan County 2008)
	Uintah County, Utah, General Plan (Uintah County 2005)
Energy and minerals development	Oil and Gas Leasing. The BLM routinely offers land parcels for competitive oil and gas leasing to allow exploration and development of oil and gas resources for public sale. Continued leasing is necessary for oil and gas companies to seek new areas for oil and gas production or to develop previously inaccessible/uneconomical reserves. **Table 5.2**, Estimated Number of Wells and Pads in ADH, shows the estimated number of oil and gas wells and pads in ADH by BLM field office and the Route National Forest based on reasonably foreseeable development scenarios.
	FLUID/LEASABLE MINERALS
	Oil Shale and Tar Sands Programmatic EIS.
	Hiawatha Regional Energy Development EIS (proposed). Decision expected in 2014. The project area is located in LSFO and Rock Springs Field Office, Wyoming.
	Monell Arch Oil and Gas Development Project (proposed). Decision expected in 2014. Rock Springs Field Office and Rawlins Field Office.
	Table Rock Oil and Gas Field Development Project (authorized). Rock Springs Field Office.
	Gasco Energy Inc. (authorized). Uinta Basin Natural Gas Development Project, Vernal Field Office. The project area is located in Uintah and Duchesne Counties in Utah, and encompasses approximately 206,826 acres west of the Green River and north of the Duchesne/Uintah and Carbon County line.
	Greater Natural Buttes Development Project (authorized). Vernal Field Office. The project area comprises 162,911 acres in Uintah County, Utah.
	Master Leasing Plan and Plan Amendments to the Moab and Monticello RMPs (proposed). Single EIS to consider leasing for oil and gas and potash on about 783,000 acres of public lands.
	AUM and KMOG Pipelines (proposed). Vernal Field Office. Kerr McGee Oil and Gas Onshore LP (KMOG) and Anadarko Uintah Midstream LLC (AUM) propose to install and bury in one trench the following pipelines: (1) 16-inch natural gas pipeline, (2) 6-inch liquids pipelines.
	Tar Sands Leasing Project (proposed). Vernal Field Office. Project proposal is to lease Tar Sands Lands described in the Asphalt Ridge Tract.
	Newfield's Monument Buttes Oil and Gas Development Project (proposed). Vernal Field Office. Proposed oil and gas development on approximately 119,669 acres.
	Koch's North Alger Oil and Gas development Project (proposed). Vernal Field Office. Proposed oil and gas development on approximately 2,390 acres.
	XTO Energy's Riverbend Directional Infill Project (proposed). Vernal Field Office. Proposed infill project on approximately 17,127 acres.
	ExxonMobil Exploration Company and Natural Soda Inholdings, Inc. Colorado Oil Shale Research, Development and Demonstration Lease Tracts Project (authorized). WRFO. Oil Shale lease tracts on 359 acres.
	Anadarko Atlantic Rim Natural Gas Project (authorized). Rawlins Field Office. Natural gas development over 270,420 acres.
	Petro-Canada Resources (USA), Inc. Rye Patch Oil and Gas Development (authorized). Vernal Field Office.
	BP Continental Divide-Creston Natural Gas Project (proposed). Rawlins Field Office. Proposed natural gas development on 1,028,334 acres.
	LaBarge Platform Exploration and Development Project (proposed). Rock Springs Field Office. Proposed development on approximately 218,000 acres.

	Normally-Pressured Lance Natural Gas Development Project (proposed). Rock Springs Field Office. Proposed development on approximately 141,080 acres.
	Bird Canyon Field Development Project (proposed). Rock Springs Field Office. Proposed development on approximately 18,464 acres.
	SOLID MINERALS
	Arch of Wyoming, LLC Carbon Basin Coal Mine (authorized). Rawlins Field Office. Coal mine on approximately 13,347 acres.
	Arch of Wyoming, LLC Medicine Bow Coal Mine (authorized). Rawlins Field Office. Coal mine on approximately 21,777 acres.
	Arch of Wyoming, LLC Seminole II Coal Mine (authorized). Rawlins Field Office. Coal mine on approximately 11,355 acres.
	Arch of Wyoming, LLC Shoshone Coal Mine (authorized). Rawlins Field Office. Coal mine on approximately 7,688 acres.
	Kennecott Uranium Company, Sweetwater Uranium Mine (authorized). Rawlins Field Office. Uranium mine on approximately 11,715 acres.
	Lost Creek Uranium Mine (authorized, but currently in litigation). Rawlins Field Office. Authorized uranium mine on approximately 4,250 acres.
	Ambre Energy Black Butte Coal Mine (authorized). Rock Springs Field Office. Coal mine on approximately 42,413 acres.
	PacifiCorp Jim Bridger Coal Mine (authorized). Rock Springs Field Office. Coal mine on approximately 26,640 acres.
	Level III/Anadarko Leucite Hills Coal Mine (authorized). Rock Springs Field Office. Coal mine on approximately 6,721 acres.
	PacifiCorp Trapper Coal Mine. LSFO (authorized). Coal mine on approximately 10,569 acres.
	TriState/Western Fuels-Colorado, LLC Colowyo Coal Mine, LSFO (authorized). Coal mine on approximately 8,156 acres.
	Blue Mountain Energy, Inc. Deserado Coal Mine, WRFO (authorized). Coal mine on 8,154 acres.
	Ambre Energy/Anadarko Rosebud Coal Mine (proposed). Rawlins Field Office. Proposed coal mine on approximately 12,644 acres.
	Ambre Energy Black Butte Coal Mine, Rock Springs Field Office (proposed). Proposed coal mine on 45,846 acres.
Vegetation Management	Treatments include prescribed fire, weed control, and mechanical treatments such as thinning, mastication, twist-spiking, and restoration of nonnative fields.
	Hazardous fuels reduction. Fuels treatments, including prescribed fires, chemical and mechanical treatment, and seeding, will likely continue and increase in the future.
Livestock grazing	Livestock grazing has a long history in the region. Generally, livestock use has decreased over the past 100 years. Grazing in portions of the planning area has either remained stable or declined in the recent past, and demand on BLM-administered and National Forest System lands has remained stable in the last 10 years. Grazing on private lands within the planning area is expected to remain stable or slightly decrease as residential and recreational development increases. Drought and water availability in the planning area, as well as in adjacent areas, has had a significant impact on livestock grazing.
Wild Horse Management	Adobe Town and Salt Wells Creek Wild Horse Gathers (proposed, decision expected in early 2013). Rawlins and Rock Springs Field Offices.
	Sand Wash Basin Wild Horse Gather (proposed, decision expected in fall of 2013). LSFO.
	BLM WRFO is planning a horse gather in winter 2013–2014 in the West Douglas Herd Area, which encompasses a small amount of PGH.

Recreation and visitor use, Travel and Transportation	The primary recreational activities in the planning area are hunting, fishing, hiking, horseback riding, sight-seeing, river-based recreation, and target shooting. Recreation-based visitor use in the planning area is expected to maintain or increase on BLM-administered and non-BLM lands.
	BLM Bangs Canyon Transportation Management Plan, GJFO (BLM 2007b)
	BLM Emerald Mountain Transportation Management Plan, LSFO (BLM 2007c)
	BLM North Fruita Desert Transportation Management Plan, GJFO (BLM 2005a)
	BLM Wilson Creek Travel Management Plan, WRFO (BLM 2005b)
	BLM Rock Springs Field Office Comprehensive Travel and Transportation Management Plan, ongoing, decision expected in 2014
	BLM Moab RMP (including Travel Management Plan) (BLM 2008c)
	BLM Vernal RMP (including Travel Management Plan) (BLM 2008b)
Lands and realty	Applications for ROWs may increase to accommodate development, such as residential development and renewable energy.
	Enterprise Western Expansion II Pipeline. GJFO, Moab Field Office, Vernal Field Office, and WRFO (authorized). Project includes 95-mile 16-inch pipeline to transport natural gas liquids.
	Quaking Aspen Wind Energy Project, Rock Springs Field Office (proposed). Proposed project encompasses approximately 3,698 acres of public, 3,865 acres of private, and 630 acres of state lands. The project will include up to 100 1.5 megawatt to 3 megawatt wind turbine generators with a nameplate capacity of 250 megawatts of power, and a 230-kilovolt transmission line.
	Sweeney Ranch Wind Park Wind Energy Project, Rock Springs Field Office (proposed). Proposed project comprises approximately 9,700 acres.
	White Mountain Wind Energy Project, Rock Springs Field Office (proposed). Proposed project comprises approximately 13,165 acres.
	Sand Hills Ranch Wind Farm (proposed). Rawlins Field Office. Proposed project would consist of 25 wind turbines.
	Teton Wind, LLC White Mountain Wind Farm, Rock Springs Field Office (proposed). Proposed project on approximately 13,165 acres.
	Miller Mountain Wind Farm, Rock Springs Field Office (proposed). Proposed project on approximately 5,088 acres.
	Hogback Ridge (Whirlwind I) Wind Energy Project (proposed). Rawlins Field Office. Proposed project on approximately 50,000 acres of land.
	Chokecherry- Sierra Madre Wind Farm (authorized). Rawlins Field Office. Project consists of over 100,000 wind turbines spaced over approximately 219,707 acres.
	Foote Creek Rim Wind Farm (authorized). Rawlins Field Office. The project consists of several thousand wind turbines spaced over approximately 60,619 acres.
	PacifiCorp Seven Mile Hill Wind Energy Facility (authorized). Rawlins Field Office. Wind farm on approximately 8,942 acres.
	PacifiCorp Dunlap I Wind Farm (authorized). Rawlins Field Office. Wind farm on approximately 16, 279 acres.
	Clark Power Services Wind Testing Project (proposed). WRFO.
	Proposed Green River Land Sale (ongoing). Proposed land sale of 970 acres in Sweetwater County, Rock Springs Field Office.
	Trans West Express 600-kilovolt Transmission Line (proposed, decision expected in 2014). Interstate transmission project with alternatives that cross northwest Colorado.
	Energy Gateway South 500-kilovolt Transmission Line (proposed, decision expected in 2014). Interstate transmission project with alternatives in northwest Colorado.
	Zephyr 500-kilovolt Transmission Line (proposed). Interstate transmission project with multiple alternatives through northwest Colorado.
	Gateway West Transmission Line (proposed; decision expected in 2013). Proposed 230-kilovolt /500-kilovolt transmission project with alternatives that cross southern Wyoming.

	Ashley Valley Compressor 25-kilovolt Powerline, Vernal Field Office (ongoing). PacifiCorp, doing business as Rocky Mountain Power, proposes to install a 25-kilovolt power line. Length of the line is 10,860 feet, or 2.06 miles.
	Blue Valley Land Exchange (ongoing, decision expected in 2014). KFO. Proposed exchange of 1,652 acres of federal lands for 2,005 acres of nonfederal lands in Grand and Summit Counties, Colorado.
	Wilderness Ranches Subdivision, Moffatt County (authorized). Subdivision in Moffatt County on approximately 14,318 acres.
	Many smaller subdivisions have been authorized on private lands in the cumulative effects analysis area. These range in size from 10 acres to 6,000 acres.
Spread of noxious/invasive weeds	Noxious weeds have invaded and will continue to invade many locations in the planning area. Noxious weeds are carried by wind, humans, machinery, and animals. The BLM and USFS currently manage weed infestations through integrated weed management, including biological, chemical, mechanical, manual, and educational methods.
	1991 and 2007 Records of Decision for Vegetation Treatment on BLM Lands in Thirteen Western States (BLM 2007a) and the 2007 Programmatic Environmental Report (BLM 2007d) guide the management of noxious weeds in western states.
Wildland fires	From 2002 to 2012, there have been 11,656 wildfires that have consumed 638,868 acres documented on all lands within the planning area. A total of 2,484 human-caused fires (102,417 acres) and 9,172 naturally occurring wildfires (534,541 acres) were reported during this time.
	Wildfires have been widely distributed in terms of frequency and severity. Increasing recurrence and severity of drought conditions have been predicted for this area as a result of climate change. This could, in turn, increase the occurrence and severity of wildfires on BLM-administered and National Forest System land.
	Northwest Colorado Fire Program Area Fire Management Plan (BLM 2012b).
Spread of forest insects and diseases	Several years of drought in western states have resulted in severe stress on forests. This stress has made trees less able to fend off attacks by insects such as mountain pine beetles. In recent years, forest diseases and infestations have been widespread throughout Northwest Colorado.
Drought	For much of the last decade, most of the western US has experienced drought. Crop production, rangeland, riparian, and forest health are all impacted by drought.
Climate change	Increased concern over greenhouse gas emissions and global warming issues may lead to future federal and state regulations limiting the emission of associated pollutants.

Table 5.2. Estimated Number of Wells and Pads in ADH

Alternative A Categories	Total Pads	Total Wells	BLM-Managed Pads in ADH	BLM-Managed Wells in ADH
Number of Wells Drilled (Short-Term Disturbance)				
Colorado River Valley Field Office RFD (Includes Roan Plateau)				
Alternative A – Projected Development: Wells and Pads	274	2,311	186	1,569
Alternative A – Existing Wells/Pads	N/A	172	2	0
Alternative A – Total Projected and Existing Wells/Projected Pads	274	2,483	188	1,569
Grand Junction Field Office RFD				
Alternative A – Projected Development: Wells and Pads	630	4,919	175	1,445
Alternative A – Existing Wells/Pads	N/A	342	N/A	4
Alternative A – Total Projected and Existing Wells/Projected Pads	630	5,261	175	1,449
Kremmling Field Office RFD				
Alternative A – Projected Development: Wells and Pads	182	337	182	182
Alternative A – Existing Wells/Pads	N/A	117	N/A	80
Alternative A – Total Projected and Existing Wells/Projected Pads	182	454	182	262
Little Snake Field Office RFD				
Alternative A – Projected Development: Wells and Pads	2,514	2,514	1,521	1,521
Alternative A – Existing Wells/Pads	N/A	456	N/A	336
Alternative A – Total Projected and Existing Wells/Projected Pads	2,514	2,970	1,521	1,857
White River Field Office RFD				
Alternative A – Projected Development: Wells and Pads	207	1,745	138	1,160
Alternative A – Existing Wells/Pads	N/A	405	N/A	261
Alternative A – Total Projected and Existing Wells/Projected Pads	207	2,150	138	1,421
Routt National Forest*				
Alternative A – Projected Development: Wells and Pads				
Alternative A – Existing Wells/Pads	0	0	0	0
Alternative A – Total Projected and Existing Wells/Projected Pads	0	0	0	0
Number of wells completed (Long-Term Disturbance)				
Colorado River Valley Field Office RFD (Includes Roan Plateau)				
Alternative A – Projected Development: Wells and Pads	274	2,195	186	1,491
Alternative A – Existing Wells/Pads	N/A	4	N/A	1
Alternative A – Total Projected and Existing Wells/Projected Pads	274	2,199	186	1,492
Grand Junction Field Office RFD				
Alternative A – Projected Development: Wells and Pads	630	4,673	175	1,373
Alternative A – Existing Wells/Pads	N/A	22	N/A	1
Alternative A – Total Projected and Existing Wells/Projected Pads	630	4,695	175	1,374
Kremmling Field Office RFD				

Alternative A Categories	Total Pads	Total Wells	BLM-Managed Pads in ADH	BLM-Managed Wells in ADH
Alternative A – Projected Development: Wells and Pads	320	320	173	173
Alternative A – Existing Wells/Pads	N/A	25	N/A	20
Alternative A – Total Projected and Existing Wells/Projected Pads	320	345	173	193
Little Snake Field Office RFD				
Alternative A – Projected Development: Wells and Pads	2,011	2,011	1,217	1,217
Alternative A – Existing Wells/Pads	N/A	79	N/A	27
Alternative A – Total Projected and Existing Wells/Projected Pads	2,011	2,090	1,217	1,244
White River Field Office RFD				
Alternative A – Projected Development: Wells and Pads	207	1,658	138	1,102
Alternative A – Existing Wells/Pads	N/A	46	N/A	25
Alternative A – Total Projected and Existing Wells/Projected Pads	207	1,704	138	1,127
Routt National Forest*				
Alternative A – Projected Development: Wells and Pads				
Alternative A – Existing Wells/Pads	0	0	0	0
Alternative A – Total Projected and Existing Wells/Projected Pads	0	0	0	0

Source: BLM 2006a, 2007e, 2008d, 2009, 2012a, 2012c, 2013

Note: Existing reasonably foreseeable development scenarios for each field office were used to determine the projected development levels. The Colorado Oil and Gas Conservation Commission data was used to gather the numbers of existing producing wells and completed wells. To determine wells that have been completed the following attributes were selected from the Colorado Oil and Gas Conservation Commission Data: SI (Shut in) and TA (Temporarily Abandoned). For wells that are producing PR (Producing) was selected. The Colorado Oil and Gas Conservation Commission wells were intersected with ADH to calculate number of wells.

Note: Existing Pad data is available for only one field office (CRVFO). Data for the other field offices and the Routt National Forest are not available at this time.

*The Routt National Forest does not have a recent reasonably foreseeable development scenario completed similar to the reasonably foreseeable development scenarios produced for the BLM field offices. Therefore, well and pad projections are not reported for the Routt National Forest.

N/A = Data Not Available

5.3. Fish and Wildlife

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect fish and wildlife are mineral exploration and development, residential and industrial development (including powerlines and other ROWs), forestry, grazing, recreation, road construction, water diversion and withdrawals, weed invasion and spread, prescribed and wildland fires, land planning efforts, vegetation treatments, habitat improvement projects, insects and disease, and drought.

Many of the activities described above can change habitat conditions, which then cause or favor other habitat changes. For example, wildland fire removes habitat, and affected areas are more susceptible to weed invasion, soil erosion, and sedimentation of waterways, all of which degrade habitats. In general, resource use activities have cumulatively caused habitat removal, fragmentation, noise, increased human presence, and weed spread. Land planning efforts and vegetation, habitat, and weed treatments have offset some of these effects by improving habitat connectivity, productivity, diversity, and health.

Climate change could cause an increase or decrease in temperatures and precipitation, which would affect soil conditions, vegetative health, and water flows and temperature. Such changes would alter habitat conditions, potentially creating conditions that could favor certain species or communities, weeds, or pests.

Under all of the alternatives, impacts on fish and wildlife would be minimized to the extent practicable and feasible through restrictions, stipulations, closures to mineral exploration and development, recreation, and motorized travel, COAs, and by concentrating development in previously disturbed areas.

Since Alternative A would emphasize more resource use and development than any of the action alternatives, impacts on fish and wildlife and habitats would be more likely to occur under this alternative. As a result, Alternative A could significantly contribute to cumulative impacts on fish and wildlife and their habitats. In contrast, under Alternatives B, C, and D, the BLM/USFS would place more restrictions on development than under Alternative A. Under all of the action alternatives, cumulative impacts on fish and wildlife as well as their habitats are expected to be less than significant.

5.4. Special Status Species - Greater Sage-Grouse

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect GRSG are mineral exploration and development, grazing, recreation, road construction, weed invasion and spread, prescribed and wildland fires, land planning efforts, vegetation treatments, and habitat improvement projects.

The cumulative effects analysis study area extends beyond the planning area boundary and consists of WAFWA GRSG Management Zones II and VII. This Draft EIS contains a quantitative cumulative effects analysis for GRSG habitat within the planning area boundary. At the larger WAFWA Management Zone level, the analysis is primarily qualitative in nature. Data and information that could become available between the Draft EIS and the Final EIS and enable a more comprehensive quantitative analysis may include the following: ongoing BLM and USFS LUP amendments and revisions, ongoing state and local land use plan amendments and revisions,

state plans that may not yet be completed, coordination with states, local governments, and agencies during consistency reviews, and data from non-BLM-administered and National Forest System lands. Those data that become available will be compiled and included in the quantitative cumulative effects analysis for GRSG in the Final EIS.

The timeframe for this analysis is 10 years. The assumptions and indicators follow those established for the analysis of direct and indirect effects in **Chapter 4**, Environmental Consequences.

5.4.1. WAFWA Management Zones II and VII

The cumulative effects analysis focuses on the four most substantial threats to GRSG habitats and populations in WAFWA Management Zones II and VII: infrastructure, energy, conifer expansion, and urbanization/conversion to agriculture (USFWS 2013). The analysis presents an overview of populations susceptible to these four threats within the Management Zones. The analysis also characterizes the cause-and-effect relationship between GRSG, their habitat, and the four major threats. Each alternative is examined within the framework of each major threat to determine whether the major threat would be reduced through implementation of that alternative in conjunction with trends and past, present, and reasonably foreseeable future actions in Management Zones II and VII.

Table 5.3, GRSG Habitat by Land Status, displays the acreage and percentage of PPH and PGH in Management Zones II and VII managed by federal, tribal, state, private, and other landowners. Overall, 57 percent of ADH in Management Zones II and VII are federally or tribally managed, with the BLM administering 49 percent of ADH, USFS administering 2 percent, and privately owned land covering 37 percent (Manier et al. 2013). Therefore, programs for conservation on private lands (conservation easements and farm bill programs) would need to be implemented in combination with programs affecting effective rehabilitation and restoration on public lands (Connelly et al. 2011).

Within the planning area boundary, the BLM and USFS manage approximately 43 percent of ADH (39 percent of PPH and 50 percent of PGH) (Manier et al. 2013).

Table 5.3. GRSG Habitat by Land Status

Surface Management Agency	Acres within PPH	Percentage within PPH	Acres within PGH	Percentage within PGH
BLM	9,021,200	52%	9,012,500	47%
USFS	162,000	1%	452,500	2%
Tribal and Other Federal	784,000	4%	1,354,600	7%
Private	6,233,900	36%	7,394,800	39%
State	1,244,800	7%	979,800	5%
Other	30,100	<1%	6,000	<1%
Total	17,476,000	100%	19,200,200	100%
Source: Manier et al. 2013				

Populations

WAFWA Management Zones II and VII include nine GRSG populations, with the bulk of the area (i.e., Management Zone II) comprising the Wyoming Basin population, which contains the largest regional extent and highest breeding density of GRSG in the western US. Several smaller areas occupied by GRSG are distributed around the Wyoming Basin population, especially to

the south on the Colorado Plateau (Garton et al. 2011). While GRSG are abundant and leks in northern portions of Management Zones II and VII are the most highly connected in the range (Knick and Hanser 2011), populations in southern portions of Management Zones II and VII (the Colorado Plateau) are less robust, with low lek connectivity and a 96 percent chance of populations declining below 200 males by 2037 (Garton et al. 2011; Knick and Hanser 2011).

WAFWA Management Zone II

The isolation of many of populations in Management Zones II and VII makes them particularly vulnerable to habitat loss and fragmentation. Subpopulation areas at greatest risk include the Eagle-South Routt and North Park subpopulation areas, which are in close proximity to limited energy development areas and face fragmentation risk from infrastructure. Eagle-South Routt, Middle Park, and Meeker-White River subpopulation areas are pressured by housing developments, energy development, and infrastructure.

Colorado's portion of the Wyoming Basin population area consists of the Northwest Colorado and North Park subpopulations. Northwest Colorado is Colorado's largest area of occupied GRSG habitat and is at low risk of extirpation (USFWS 2013). Habitat connectivity and condition are more intact in the northern portion, while the southeastern portion is more fragmented. North Park is located in Jackson County, Colorado, and is Colorado's most resilient area of occupied GRSG habitat. The population is considered stable or low risk, with no significant threats historically, though oil development may pose a risk in the future (USFWS 2013). As such, actions that restrict oil development in this area would disproportionately reduce threats facing this subpopulation.

The Eagle-South Routt population in Management Zone II is fairly small (with an average of 108 males) and at high risk because of its isolation. A random negative event, such as an outbreak of disease or drought, could greatly affect this population. Loss of habitat from subdivision and housing development, along with its associated infrastructure and roads, is considered the greatest threat to the Eagle-South Routt population (USFWS 2013).

The Middle Park population is located east of the Eagle-South Routt population. This population is isolated from adjacent populations by distance and terrain (Garton et al. 2011) but has connectivity to the North Park population. The greatest threat is from human development, which is anticipated to continue due to its proximity to ski resorts and summer recreational areas.

The Northwest Colorado subpopulation is on the edge of the species' range, and the subpopulations in this area are somewhat isolated. Connectivity between Colorado and Wyoming conservation areas could be improved (USFWS 2013). Enhancement of habitat linkage/connectivity areas between the subpopulations (Eagle-South Routt, Middle Park, North Park and Northwest Colorado) would increase GRSG movement, recruitment, and access to resources leading to more stabilized population dynamics in the area.

WAFWA Management Zone VII

Management Zone VII comprises two populations, Parachute-Piceance and Meeker-White River Colorado. The populations are linked to Management Zone II to the north, but there is no known linkage to Management Zone III (in Utah) to the west due to natural habitat fragmentation (USFWS 2013).

The Parachute-Piceance Basin population is relatively small and isolated on the very southern edge of GRSG range. Energy development and associated infrastructure, especially roads, are a threat in Management Zone VII; this population is considered at high risk (Manier et al. 2013).

The Northwest Colorado subpopulations in Management Zone VII are also small and isolated. The Meeker-White River Colorado subpopulation, discovered in 2004, contains only 1 known lek and has declined from 30 males in 2004 to 6 in 2012. The habitat is 90 percent privately owned and occurs in 2 disconnected patches on either side of the White River (USFWS 2013). This population is at high risk because of its small size and proximity to housing developments, urban areas, and associated infrastructure as well as conversion of habitat to agricultural uses (USFWS 2013).

Other Threats

Across Management Zones II and VII, livestock grazing ranks just below energy development and urbanization as a threat in eastern portions of the range of GRSG (Stiver et al. 2006). Additionally, a large portion of central regions of Management Zones II and VII (close to 5 million acres) is federally managed wild horse and burro range, resulting in potential for effects on GRSG from livestock grazing and the compounding effects of feral grazers (Manier et al. 2013).

Fire risk is generally low across Management Zones II and VII, with 10 percent of PPH and PGH at high risk for fire; however, areas in northern and southern portions of Management Zone VII are identified as having high fire risk (Manier et al. 2013). Cheatgrass is distributed across the region, but with less abundance than in the Great Basin region. Current levels of disturbance have been sufficient to spread invasive species, and the combination of drought-stress and over-utilization has allowed for local proliferation. In many areas, altering grazing rotations to increase the cover of native perennials may be sufficient to restore high-quality habitats (Manier et al. 2013).

Relevant Cumulative Actions

The planning area covers nine county LUPs and general plans. There are currently 6 authorized fluid mineral leasing projects covering 640,500 acres in the planning area and 12 additional proposed projects covering 2,328,000 acres (not all projects listed in **Table 5.1**, Past, Present, and Reasonably Foreseeable Projects, Plans, or Actions that Comprise the Cumulative Impact Scenario, include acreages). For solid minerals, 12 coal projects covering 172,800 acres have been authorized; 2 additional coal mines covering 58,500 acres are proposed.

Vegetation treatments in the planning area and across Management Zone II and VII include prescribed fire, weed control and mechanical treatments such as thinning, mastication, twist-spiking, and restoration of nonnative fields. Future projects would continue these activities. Fuels treatments, including prescribed fires, chemical and mechanical treatment, and seeding, will likely continue and potentially increase in the future.

Grazing in the planning area has either remained stable or declined in the recent past, and demand on BLM-administered and National Forest System lands has remained stable in the last 10 years. Grazing on private lands within the planning area is expected to remain stable or slightly decrease as residential and recreational development increases. Three wild horse gathers are proposed in the planning area, which would be expected to reduce grazing pressure on the range.

Recreation-based visitor use in the planning area is expected to continue at current levels or increase on BLM- and non-BLM-administered and National Forest System and non-National

Forest System lands. The primary recreational activities are hunting, fishing, hiking, horseback riding, sight-seeing, river recreation, and target shooting, Transportation management plans are being prepared at seven BLM field offices.

Currently, a 95-mile pipeline within the planning area has been authorized for natural gas transport. Five transmission lines have been proposed crossing northwest Colorado and southern Wyoming. Six wind farms have been proposed, which would impact a total of approximately 86,100 acres, and 4 wind farms have been authorized on 305,500 acres. A land sale for 970 acres and a land exchange of 1,700 acres of federal lands in exchange for 2,000 acres of nonfederal lands have been proposed; the land exchange or sale could impact GRSG habitat depending on the location of the lands involved. A subdivision (14,300 acres) has been authorized, and many smaller subdivisions have been built on private lands in the analysis area, ranging from 10 to 6,000 acres. In the future, applications for ROWs may increase to accommodate additional development, including residential development and renewable energy sites.

Noxious weeds have invaded and will continue to invade many locations in the planning area, carried by wind, humans, machinery, and animals. The BLM/USFS manages weed infestations through integrated weed management, including biological, chemical, mechanical, manual, and educational methods. This approach would continue under all alternatives.

From 2002 to 2012, 11,656 wildfires consumed 638,900 acres of lands within the planning area. A total of 2,484 human-caused fires burned 102,400 acres, while 534,500 acres were burned in naturally occurring wildfires. Wildfires have been widely distributed in terms of frequency and severity. Increasing recurrence and severity of drought conditions resulting from climate change have been predicted for this area; this could, in turn, increase the occurrence and severity of wildfires on BLM-administered and National Forest System land. Drought has also increased the vulnerability of forests to disease. Fire is managed under the 2012 Northwest Colorado Fire Program Area Fire Management Plan.

There are a number of other voluntary and regulatory efforts underway to conserve GRSG in Management Zones II and VII. For example, WAFWA is implementing its Sage-Grouse Strategy, which includes monitoring, research, outreach, and funding of conservation projects for GRSG. A basic premise of the WAFWA Sage-Grouse Strategy is that additional conservation capacity must be developed at all levels (i.e., local, state, and federal agency, and range-wide) for both the short-term (i.e., the first 3 to 5 years) and for the long term to ensure GRSG conservation.

The Colorado Department of Natural Resources is implementing a new Colorado GRSG Conservation Plan (Colorado Department of Natural Resources 2013) (**Appendix N**, Colorado Department of Natural Resources' Colorado Greater Sage-Grouse Conservation Plan: The Colorado Package), which identifies key issues facing GRSG conservation across the state, objectives to mitigate the issues, and specific strategies to implement the objectives. This plan includes responsible parties, timelines and costs where possible, and represents an effort to coordinate federal, state, and private land managers in GRSG conservation.

Estimates of GRSG populations indicate that Wyoming is home to the largest number of birds in the range of the species (USFWS 2010). The state's GRSG populations face many of the same major threats that are found throughout Management Zones II and VII: intensive energy development in the Powder River and Greater Green River Basins and extensive infrastructure, including transmission lines, fences, and roads (USFWS 2010). Eight local working groups around the state have completed conservation plans, many of which prioritize threats and prescribe management actions at the local working group scale.

In addition, Wyoming's Core Population Strategy seeks to balance GRSG conservation and development. It provides an approach to mitigating anthropogenic disturbances to GRSG. The USFWS believes that Wyoming's Core Population Strategy, if extended to all landowners via regulatory mechanisms, would provide adequate protection for GRSG (USFWS 2010). However, universal implementation remains uncertain due to variety in ownership and management. Wyoming's Industrial Siting Council (within the State's Department of Environmental Quality), which permits large development projects on all lands within the state regardless of ownership, is subject to the terms of the executive order. This could offer GRSG considerable regulatory protection in considering large wind energy and other development projects within Wyoming (USFWS 2010).

The US Department of Agriculture, Natural Resources Conservation Service's Sage-Grouse Initiative is working with private landowners in 11 western states to improve habitat for GRSG while simultaneously improving working ranches (Natural Resources Conservation Service undated). With approximately 31 percent of all sagebrush habitat across the range in private ownership (Stiver 2011a), a unique opportunity exists for the Natural Resources Conservation Service to benefit GRSG and ensure the persistence of large and intact rangelands through implementation of the Sage-Grouse Initiative (USFWS 2010).

Participation in the Natural Resources Conservation Service Sage-Grouse Initiative program is voluntary, but willing participants enter into binding contracts or easements to ensure that conservation practices that enhance GRSG habitat are implemented (USFWS 2010). Though participation is voluntary and, thus, not a traditional regulatory approach, participating landowners are bound by contract (usually 3 to 5 years in duration) to implement conservation practices in consultation with Natural Resources Conservation Service staff if they wish to receive the financial incentives offered by the Sage-Grouse Initiative. These financial incentives generally take the form of payments to offset costs of implementing conservation practices and easement or rental payments for long-term conservation (USFWS 2010). While potentially effective at conserving GRSG populations and habitat on private lands, incentive-based conservation programs that fund the Sage-Grouse Initiative generally require reauthorization from Congress under subsequent Farm Bills; therefore, these funding streams are potentially variable as they are subject to the political process.

As of 2012, the Sage-Grouse Initiative has secured conservation easements on 208,000 acres (840 square kilometers) across the GRSG range (Natural Resources Conservation Service 2012) with the largest percentage of easements occurring in Wyoming (120,700 acres; 490 square kilometers).

Major Threat: Infrastructure

Human developments, such as power lines, communication towers, fences, roads, and railroads, contribute to habitat loss and fragmentation, with power lines and roads having the greatest effects (Connelly et al. 2004; Naugle et al. 2011). Human disturbance is increased over the short term during infrastructure construction. In the long term, increased threats from predators perching on infrastructure may cause declines in lek attendance or nest success. GRSG population declines have resulted from avoidance of infrastructure, reduced productivity, and reduced survival in the vicinity of infrastructure (Naugle et al. 2011).

Power lines can directly affect GRSG by posing a collision and electrocution hazard, and can have indirect effects by decreasing lek attendance and recruitment, increasing predation, reducing connectivity, and facilitating the invasion of invasive plants (Braun 1998; Connelly et al. 2004). In particular, power poles and crossarms provide perches and nesting habitat for potential avian

predators, such as golden eagles and ravens. The frequency of raptor/GRSG interactions during the breeding season increased 65 percent and golden eagle interactions alone increased 47 percent in an area in pre- and post-transmission line comparisons (Ellis 1985). GRSG have been observed to avoid brood-rearing habitats within 3 miles of transmission lines (LaBeau 2012). Higher densities of power lines within 4 miles of a lek negatively influence lek attendance (Walker et al. 2007). Additionally, the tendency of GRSG to fly relatively low, and in low light or when harried, may put them at high risk of collision with power lines (Manier et al. 2013). In addition, power lines are linear and often extend for many miles. Thus, ground disturbance associated with power line construction, as well as vehicle and human presence during maintenance activities, may introduce or spread invasive weeds over large areas, thereby degrading habitat.

Cellular and other communications towers have the potential to cause GRSG mortality via collisions, to influence movements through avoidance of a tall structure or electromagnetic radiation, or to provide perches for corvids and raptors (Connelly et al. 2004). Wisdom et al. (2011) reported the mean distance to cellular towers in extirpated GRSG range (13 miles) was almost twice that of occupied range (7.5 miles).

Impacts from roads may include direct habitat loss from road construction and direct mortality from collisions with vehicles. Roads may also present barriers to migration corridors or seasonal habitats. Other impacts include facilitation of predator movements, spread of invasive plants, and human disturbance from noise and traffic (Forman and Alexander 1998). Research suggests that road traffic within 4.7 miles of leks negatively influence male lek attendance (Connelly et al. 2004). Lek count trends have been found to be lower near interstate, federal, or state highways compared to secondary roads (Johnson et al. 2011). Closing and reclaiming unused, minimally used, and/or unnecessary roads in and around sagebrush habitats during seasonal use by GRSG may reduce habitat loss to wildlife (NTT 2011). Railroads presumably have the same potential impacts on GRSG as roads because they create linear corridors within sagebrush habitats, promoting habitat fragmentation and other disturbance.

Fences also may cause direct mortality through collisions as GRSG fly fast and low across the landscape, particularly during the breeding season. In addition, fence poles create predator perch sites and potential predator corridors along fences, particularly if a road is adjacent. Fences and their associated roads may allow for the invasion or spread of invasive weeds along fenced corridor. Furthermore, fences may effectively cause habitat fragmentation, as GRSG may avoid habitat around the fences to escape predation (Braun 1998). The Natural Resources Conservation Service Sage-Grouse Initiative includes incentives for private landowners to mark or remove fences that have been deemed high-risk for GRSG injury or mortality.

Infrastructure, especially roads, represents a substantial threat to GRSG in Colorado. New road construction is required both for housing developments and for energy development, and exacerbates the habitat loss and fragmentation associated with these threats. Loss of habitat from subdivision and housing development, with its associated infrastructure and roads, is considered the greatest threat to the Eagle-South subpopulation of GRSG in Colorado (USFWS 2013). BLM and USFS actions and state and local plans that reduce new road construction or seasonally close existing roads can help alleviate risks to GRSG.

Table 5.1, Past, Present, and Reasonably Foreseeable Projects, Plans, or Actions that Comprise the Cumulative Impact Scenario, shows that ROW applications continue to increase in the planning area, and new road and transmission line projects are anticipated to support residential and energy developments. Four major interstate transmission lines are currently proposed in the

planning area. By managing ROW avoidance and exclusion areas, BLM/USFS would reduce or minimize impacts from infrastructure, as new ROWs would be prohibited (ROW exclusion) or would be sited to avoid sensitive areas (ROW avoidance), or designed to otherwise reduce or minimize direct and indirect effects on GRSG. Renewals or upgrades of existing facilities could incorporate additional conservation-oriented BMPs. Similar restrictions on state and private land and co-location or clustering of facilities would also reduce impacts or prevent disturbance in new areas.

Restrictions in Alternatives B and C would prevent ROWs from being located in PPH, while those in Alternative D would avoid siting in PPH, if possible, preserving management flexibility at the expense of potential localized habitat degradation. Current management, Alternative A, does not restrict the siting of ROWs, though existing policy does recommend co-locating ROWs when possible. Management under Alternatives B, C, or D would benefit GRSG more than Alternative A by siting ROW infrastructure such that it minimizes loss and fragmentation of habitat, predation risk, and other threats.

New roadways are often needed to support energy and residential developments. The action alternatives would limit road construction or collocate roads in PPH. ROW avoidance and exclusion areas established under Alternatives B, C, or D would prevent or reduce impacts from road construction in these areas. Similar actions on state lands would complement the action alternatives and provide the only source of threat amelioration under Alternative A. Thus, the action alternatives would be more protective of GRSG populations from impacts associated with roads compared to Alternative A.

Major Threat: Energy

Energy development is considered the greatest threat to GRSG in Management Zones II and VII (Manier et al. 2013). Development can result in direct habitat loss; fragmentation of important habitats by roads, pipelines, and power lines; noise; and direct human disturbance. There are currently approximately 5,500 acres of wells on federal mineral estate within the planning area. The effects of energy development often add to the impacts from other human development and result in GRSG population declines. Population declines associated with energy development result from the abandonment of leks, decreased attendance at leks that persist, lower nest initiation, poorer nest success, decreased yearling survival, and avoidance of energy infrastructure in important wintering habitat areas (Holloran 2005; Aldridge and Boyce 2007).

Nonrenewable (oil and gas) energy development impacts GRSG and sagebrush habitats through direct disturbance and habitat loss from well pads, access construction, seismic surveys, roads, power lines, and pipeline corridors; indirectly from noise, gaseous emissions, changes in water availability and quality, and human presence. The interaction and intensity of effects could cumulatively or individually lead to habitat fragmentation in the long term (Connelly et al. 2004; Holloran 2005). Renewable energy facilities, including solar and wind power, typically require many of the same features for construction and operation as do nonrenewable energy resources. Therefore, impacts from direct habitat losses, habitat fragmentation through roads and power lines, noise, and increased human presence will generally be similar to those for nonrenewable energy development (USFWS 2010).

Surface and subsurface mining for mineral resources (coal, uranium, copper, phosphate, and others) results in direct loss of habitat if they occur in sagebrush habitats. Surface mining usually has a greater impact than subsurface activity. Habitat loss from mining can be exacerbated by the storage of overburden (soil removed from mine shafts) in undisturbed habitat. If infrastructure

is necessary, additional direct loss of habitat could result from structures, staging areas, roads, railroad tracks, and power lines. GRSG and nests could be directly affected by trampling or vehicle collision. GRSG also could be impacted indirectly from an increase in human disturbance, ground shock, noise, dust, reduced air and water quality, and changes in vegetation and topography (Brown and Clayton 2004) See **Chapter 3**, **Table 3.37**, Active Coal Mines on BLM-Administered Lands, for locations of existing surface and subsurface coal mines.

Industrial activity associated with the development of surface mines and infrastructure could result in noise and human activity that disrupt the habitat and life cycle of GRSG. All studies which 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). Studies consistently reported that breeding populations of GRSG were negatively impacted at conventional well pad densities, with declines in lek attendance by male GRSG ranging from 13 to 79 percent associated with these well densities. 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 at distances up to 4 miles from the lek (Naugle et al. 2011). Declines in GRSG population growth (21 percent) between pre- and post-mine development were attributable to decreased nest success and adult female survival; the treatment effect was more noticeable closer to gas field infrastructure. Annual survival of individuals reared near gas field infrastructure (yearling females and males) was significantly lower than control individuals not reared near infrastructure (Holloran 2005).

Across Management Zones II and VII, energy development – primarily oil and gas development – and supporting infrastructure are the major threat to GRSG habitats and populations (USFWS 2013). Approximately 7.8 million acres (21 percent) of GRSG habitats in these management zones are currently leased for development of federal natural gas or oil reserves. The Management Zones also have leases for the research of oil shale extraction in the southern populations (Manier et al. 2013). Less than 1 percent of PPH and PGH are directly influenced by a natural gas or oil well, but 99 percent are within the likely effects buffer (11.8 miles) of these wells. The potential for coal mining, geothermal energy development, oil shale development, and wind energy development are widespread throughout the Management Zones (Manier et al. 2013).

The North Park area has potential for natural gas, coal-bed methane, and oil extraction, and energy development leases now cover 29 percent of the public land (USFWS 2013). Energy companies also own much of the conservation lands in Parachute-Piceance Basin, and advances in drilling technology and natural gas demand have led to a major increase in drilling activity (USFWS 2013).

Management under Alternative A would maintain current acreage open to leasing of fluid minerals, although most LUPs include some stipulations, such as NSO, CSU, or TL, applied to GRSG leks and important nesting and winter habitat. Management under Alternative A would also maintain current acreage open to locatable mineral development and acceptable for coal leasing (see **Chapter 2**, **Table 2.2**, Comparative Summary of Alternatives). Under Alternative B, the BLM/USFS would classify PPH unsuitable for surface coal mining. Under Alternative C, ADH would be unsuitable for surface coal mining, while management under Alternative D would treat the acres unacceptable for leasing. Under Alternatives B and C, locatable minerals would be petitioned for withdrawal from habitat areas. The BLM and USFS would close to fluid mineral leasing PPH under Alternative B and ADH under Alternative C. Under Alternative D, the BLM and USFS would not close any acreage to fluid mineral leasing but would place

most of it under NSO restriction. Management under Alternative D would not restrict locatable mineral exploration.

Table 5.1, Past, Present, and Reasonably Foreseeable Projects, Plans, or Actions that Comprise the Cumulative Impact Scenario, shows that substantial new well development is anticipated in the planning area, with more than 3,800 new wells and pads projected on BLM-administered and National Forest System land alone. It is unclear to what extent these numbers would be reduced under the action alternatives. Under Alternatives B and C, the BLM/USFS would close GRSG habitat to fluid mineral leasing, which would limit the amount of future development. Restrictions on future leasing in Alternatives B and C are intended to reduce well construction in GRSG habitat compared to Alternative A, and closing areas to mineral leasing would eliminate new disturbances in these areas. Thus, management under Alternatives B or C would be more protective of GRSG habitat areas than Alternatives A or D. On non-BLM-administered and non-National Forest System lands, state regulators and oil and gas leaseholders would try to avoid and establish buffers around leks and breeding areas, and reduce disturbance from existing energy development sites in Colorado and Wyoming. Given the high numbers of projected new wells and coal mines, wind farms, transmission lines and ROWs, energy development will likely remain a threat to GRSG under any of the alternatives throughout the Management Zones.

Major Threat: Conifer Expansion

Conifer woodlands (especially juniper, *Juniperus* spp.) may encroach into sagebrush ecosystems, which reduces and likely eventually eliminates GRSG occupancy in these areas. Juniper invasion eventually eliminates shrub cover, and the season of available succulent forbs is shortened due to soil moisture depletion (Crawford et al. 2004, p.8). In higher-elevation areas, Douglas-fir may also encroach into mountain big sagebrush communities. Expansion of conifer woodlands is also associated with increased bare ground and potential for erosion and offers additional perch sites for raptors; thus, woodland expansion may also represent expansion of raptor predation threat similar to perches on power lines and other structures (Connelly et al. 2004).

In addition, fire suppression policies in GRSG habitat may result in higher rates of conifer encroachment in some areas (USFWS 2013). In the initial stages of encroachment (phase 1), fuel loadings remain consistent with the sagebrush understory. As conifer encroachment advances (phases 2 and 3) and the understory begins to thin, the depleted understory causes the stands to become resistant to wildfire and further alters fire return intervals. During years of high fire danger, the resulting heavy fuel loadings in these stands can contribute to larger-scale wildfire events and confound control efforts due to extreme fire behavior.

The BLM/USFS implement vegetation treatments, such as mechanical, chemical, hand-cutting, and prescribed burning, to reduce conifer encroachment of sagebrush ecosystems. Given the limited distribution of sagebrush and the cost of habitat restoration, management plans that protect intact sagebrush and restore impacted areas strategically to enhance existing habitats (i.e., increase connectivity of intact sagebrush) have the best chance of increasing high-quality sagebrush cover (Connelly et al. 2004; Beck and Mitchell 2000, cited in Manier et al. 2013, p.183). Sagebrush-promoting vegetation treatments would increase the amount and quality of GRSG habitat. Prescribed burning is effective in reducing conifer expansion, but mechanical means are more often used in GRSG habitat areas.

Pinyon and juniper encroachment is a substantial threat to the Eagle-South Routt and Parachute-Piceance-Roan GRSG population areas, where much historic habitat has been lost (USFWS 2013). As shown in Table 5.1, Past, Present and Reasonably Foreseeable Projects,

Plans, or Actions that Comprise the Cumulative Impact Scenario, current vegetation treatments include prescribed fire, weed control, and mechanical treatments such as thinning, mastication, twist-spiking, and restoration of nonnative fields, as well as hazardous fuels reduction. Fuels treatments, including prescribed fires, chemical and mechanical treatment, and seeding, will likely continue and increase. Distribution of vegetation treatments can affect the distribution of GRSG and sagebrush habitats locally and across a region.

Alternative A does not take any specific actions to prevent conifer encroachment, but existing vegetation management and treatments could address conifer expansion along with other priorities. Under Alternatives B, C, and D, habitat-restoration projects would prioritize implementation in areas most likely to benefit GRSG, Treatments to control encroaching pinyon and juniper trees, as well as weed infestations, would likely provide the greatest long-term benefit.

Major Threat: Urbanization/Conversion to Agriculture

Over time, sagebrush habitats have been removed for development of urban or industrial areas or conversion to agriculture. Such conversion results in the loss of habitat available for GRSG use, decreases the connectivity between seasonal habitats, and increases population isolation. Isolation then increases the probability for the loss of genetic diversity and extirpation from disease and drought.

The loss of habitat from subdivision, conversion to cropland, housing development and associated infrastructure, such as roads, is potentially the greatest threat to GRSG populations in southern portions of Management Zones II and VII (i.e., Colorado) (USFWS 2013). Urban development, power lines, and other structures, although directly influencing individually less than 2.3 percent of the GRSG habitats in the Management Zones, are denser in Management Zones II and VII compared to western portions of the range. The proportion of GRSG habitat influenced directly by urban development in Management Zones I, II, and VII is 3.1 times higher than the proportion directly influenced in the other Management Zones (Manier et al. 2013).

Loss of habitat from subdivision and housing development, along with associated roads and other infrastructure, is a substantial threat to the Eagle-South Routt and Middle Park populations (USFWS 2013). Middle Park is located in close proximity to ski resorts and summer recreational areas and development pressure is anticipated to continue to increase. The tiny Meeker-White River Colorado population is also threatened by urban and agricultural expansion (USFWS 2013).

Habitat conversion for urbanization or agriculture can be reduced through BLM/USFS management and other federal, state, and local policies. On BLM-administered and National Forest System lands, special designations, such as ACECs and WSAs, provide protection to GRSG and their habitats, as they include special management prescriptions which provide broad protection from habitat fragmentation, loss and human disturbance. At the city and county level, master plans and zoning ordinances provide direct regulatory pathways for restricting or promoting urbanization. Thus, non-BLM/USFS actions would have a proportionally larger direct impact on the amelioration or exacerbation of the urbanization threat. Likewise, while BLM/USFS management provides a measure of consistency across the Management Zones, cumulative impacts from urbanization are likely to vary by county and city.

Although agriculture and urbanization would be primarily affected by local government policies, under Alternative C, PPH on BLM-administered and National Forest System lands would be designated as an ACEC/Zoological Area. However, this would not add any additional protections that are not already included in Alternative C. This would protect GRSG habitat

on BLM-administered and National Forest System land from surface disturbance across the Management Zones. Under all the action alternatives, land disposals in GRSG habitat would be restricted, providing additional, site-specific protection to habitat on public lands. At the state level, the Colorado Sage-Grouse Conservation Plan promotes the use of conservation easements, Farm Bill programs, land exchanges and acquisitions to preserve important GRSG habitats on private land (Colorado Department of Natural Resources 2013). In combination with the action alternatives (especially Alternative C), these voluntary programs would limit the loss of GRSG habitat to urban sprawl.

Overall, impacts from agricultural conversion and urbanization would be most prevalent where local government planning policies promote this type of land use. BLM/USFS actions, especially protecting GRSG habitat as an ACEC under Alternative C, would offset pro-urbanization policies, but populations on private land would continue to be at risk from this threat. The greatest amelioration of the urbanization threat would occur where cities or counties restrict development and where a high percentage of nearby GRSG habitat is on BLM-administered and National Forest System lands and protected by management restrictions.

Conclusion

Regardless of alternative, reduction of the four major threats in Management Zone II and VII is affected by regulations enforced on state, local, and private lands. Because 51 percent of ADH in Management Zone II and VII is comprised of BLM--administered and National Forest System lands, the relative ability of BLM and USFS actions to reduce the major threats-in terms of acres affected-is roughly equal to that of tribal, state, and local governments, and private land owners combined.

Some populations will be affected more than others because they are smaller or already at higher risk. Under any alternative, despite BLM, USFS, and state and local actions, overall trends toward habitat loss are likely to continue in the smaller and higher-risk population areas of the Colorado Plateau due to effects from energy, urbanization, habitat conversion, and infrastructure development pressures in GRSG habitat. The larger, less fragmented populations of Northwest Colorado and North Park are more resilient and may buffer the regional GRSG population against continuing decline.

Under Alternative A, current management would continue on BLM-administered and National Forest System lands and there would be less amelioration of major threats in Management Zones II and VII than under other alternatives. There would be limited interim protections within GRSG PPH or PGH, no new ROW avoidance or exclusion areas established, and no new areas closed or restricted to fluid mineral leasing. Current management does consider wildlife habitat value in decision-making, which provides limited protection for GRSG. Sixteen existing ACECs would be maintained that could protect some portions of GRSG habitat. State sagebrush protection and restoration efforts to restore habitat, improve rangeland, and establish or improve linkages/connectivity between habitat areas, in coordination with private landowners, oil and gas leaseholders, and federal and state agencies, would continue. In addition, the Natural Resources Conservation Service Sage-Grouse Initiative would continue to work with ranchers to reduce impacts on GRSG on private lands throughout Management Zone II and VII, potentially by supporting ranches to limit their conversion to croplands. As a result, any amelioration of threats would be most likely to occur on private and state lands. However, planned transmission lines and ROWs across federal, state, and private land would likely increase fragmentation of GRSG habitat, and a substantial number of new wells and pads are planned on BLM-administered and

National Forest System land, which would increase loss of habitat and disturbance of GRSG populations. Voluntary protections would continue to be implemented on private land (i.e., Natural Resources Conservation Service Sage-Grouse Initiative) and in Colorado (i.e., the Colorado Greater Sage-Grouse Conservation Plan), with regulation-based protections centered primarily in Wyoming. Habitat conversion from conifer expansion would continue to spread. Overall, the limited number and extent of regulatory mechanisms under Alternative A would result in continued degradation of habitat resulting from the major threats in Management Zone II and VII. Because of a stronger state plan in Wyoming, there may be some improvement in threat status in Wyoming on private and state lands. In Colorado, the less-restrictive statewide Conservation Plan would likely mean that threats would continue to worsen in that portion of the Management Zone unless local working groups developed protections that are consistently implemented across broad areas.

Under Alternative B, the BLM and USFS would implement a number of protections for GRSG, including designating PPH and PGH and managing new ROW exclusion and avoidance areas. Habitat would be protected by NSO stipulations or closed entirely to fluid mineral leasing. Existing ACECs would be maintained, but no new ACECs would be established. Land disposals and acquisitions would focus on maintaining sagebrush acreage and connectivity. Habitat-restoration projects would prioritize restoration in areas most likely to benefit GRSG populations. Under Alternative B, the BLM/USFS would site transmission lines in locations that minimize impacts on GRSG, and would close PPH to fluid mineral leasing, likely reducing the number of planned wells and anticipated acres of habitat disturbed by energy development, compared to Alternative A. These restrictions may dissuade developers from siting projects on BLM-administered and National Forest System lands and push development onto state or private lands with less ability to properly implement development that minimizes impacts on GRSG. Management under Alternative B would be sufficient to reduce threats on BLM--administered and National Forest System lands. Success on a cumulative scale would be achievable if voluntary programs, local working groups, and state plans are consistently implemented and enforced.

Under Alternative C, management actions would provide more protection to GRSG on BLM-administered and National Forest System land in Management Zone II and VII than any other alternative. However, strong restrictions in Alternative C may push development onto private or state lands with less stringent protections for GRSG. For example, under Alternative C, ACECs would be established on all PPH administered by the BLM/USFS, and habitat areas would be closed to fluid mineral leasing, dramatically reducing the amount of development allowed within GRSG habitat on BLM-administered and National Forest System lands. Grazing intensity would also be reduced in GRSG habitat. These policies would provide the most protection for GRSG habitat from loss and fragmentation and limit human disturbance; they would also place the greatest onus on other landowners to similarly restrict development or habitat conversion (or redirect development away from GRSG habitat) to more fully reduce the major threats.

Management under Alternative D would improve GRSG habitat protection over current management but with less stringent restrictions than Alternatives B or C. For example, under Alternative D, the BLM/USFS would not close habitat to fluid mineral leasing and would rely on CSU or TL stipulations, instead of a more restrictive NSO stipulation, to minimize negative impacts on GRSG. Similarly, the BLM/USFS would establish ROW avoidance areas but not more restrictive exclusion areas. These provisions would allow for limited development on BLM-administered and National Forest System lands, which would possibly reduce pressures on state and private lands that may be protected by only voluntary agreements. On a cumulative scale, management under Alternative D provides the most balanced approach to ameliorating

major threats in Management Zone II and VII across all land statuses. If allowing limited development within GRSG habitat on BLM-administered and National Forest System lands would alleviate development pressures on other lands with less-stringent protections, management under Alternative D would have the greatest ability to reduce major threats to GRSG.

Implementation of the action alternatives would reduce major threats faced by GRSG in Management Zones II and VII by varying degrees. While all action alternatives contain restrictions sufficient to reduce threats on BLM-administered and National Forest System lands, Alternative B and, to a greater extent, Alternative C, may be so restrictive that they push developments onto less protected state and private lands, thereby partially off-setting their beneficial effects on GRSG.

5.5. Special Status Species (Other Species of Issue)

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect special status species other than GRSG are mineral exploration and development, forestry, grazing, recreation, road construction, water diversion and withdrawals, weed invasion and spread, prescribed and wildland fires, land planning efforts, vegetation treatments, habitat improvement projects, insects and disease, and drought.

The cumulative impact analysis areas used to analyze potential impacts on special status fish, wildlife, and plants are comprised of the ranges for those species, which are listed in **Chapter 3**, Affected Environment, **Table 3.6**, Special Status Animal Species in the Planning Area, and **Table 3.7**, Special Status Plant Species in the Planning Area.

Cumulative impacts on other special status species of issue are related to those described for vegetation and fish and wildlife. Many of the activities listed above can change habitat conditions, which then can cause or favor other habitat changes. For example, wildland fire removes habitat, and affected areas are then more susceptible to weed invasion, soil erosion, and sedimentation of waterways, all of which degrade habitats for special status species. In general, resource use activities have cumulatively caused habitat removal, fragmentation, noise, increased human presence, and weed spread, whereas land planning efforts and vegetation, habitat, and weed treatments have countered these effects by improving habitat connectivity, productivity, diversity, and health.

Climate change could cause an increase or decrease in temperatures and precipitation, which would affect soil conditions, vegetative health, and water flows and temperature. Such changes would alter habitat conditions, potentially creating conditions that could favor certain species or communities, weeds, or pests. Since special status species often inhabit very specific microhabitats, small changes could cause increased effects on these species.

Under all of the alternatives, impacts on special status species would be minimized to the extent practical and feasible through compliance with the ESA and BLM Manual 6840. Habitat conditions would be improved through treatments, weed prevention and control, use of prescribed and wildland fire, forestry management, and grazing management. Since Alternative A would emphasize the most resource use and development, impacts on special status species would be more likely to occur under this alternative. As a result, management under Alternative A could contribute the most cumulative impacts on special status species. In contrast, the incremental contribution of management actions under Alternatives B, C, and D to cumulative impacts on

special status species is expected to be less than significant, due to restrictions on development and land uses specified under those alternatives.

5.6. Lands and Realty

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect the lands and realty program include new and existing ROWs for projects such as pipelines, transmission lines, communication sites, minerals and renewable energy developments, and housing subdivisions on private lands.

The cumulative impact analysis area used to analyze cumulative impacts on the uses administered by the lands and realty program is composed of the planning area, the Vernal and Moab BLM Field Offices in Utah, and the Rawlins and Rock Springs Field Offices in Wyoming.

Increasing interest in utility, mineral, and renewable energy development in the cumulative impact analysis area has placed and is expected to continue placing a greater demand on lands and realty actions. These demands create the need for land tenure adjustments and additional ROWs for pipelines, transmission lines, and other facilities supporting development. Restrictions on ROWs outlined in the alternatives, combined with restrictions from other management plans in the area, would have a significant cumulative effect by reducing routing options and possibly increasing project construction or implementation costs.

Roadway development activities, the Designation of Energy Corridors on Federal Lands in the 11 Western States PEIS, and ongoing climate changes and anticipated associated changes in the regulation of greenhouse gases would contribute direct and indirect long-term impacts on the utilization of solar and wind resources in the cumulative impact analysis area. Restrictions placed on wind and solar energy development in the alternatives would cumulatively reduce siting options and could increase project construction or implementation costs, especially in high wind and solar potential areas.

Cumulative impacts on lands and realty are expected to be the greatest under Alternative C, since it would place the most restrictions on development. In contrast, management under Alternative A would place the fewest restrictions on the lands and realty program and would therefore be expected to contribute the fewest cumulative impacts on lands and realty. Management under Alternatives B and D would also place restrictions on development, but to a lesser extent than under Alternative C. Management under Alternatives B and D would therefore be expected to cumulatively contribute fewer impacts on special designations than Alternative C.

5.7. Vegetation (Forest, Rangelands, Riparian and Wetlands, and Noxious Weeds)

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect vegetation are mineral exploration and development, livestock grazing, recreation, road construction, ROWs (including large transmission lines or pipelines), weed invasion and spread, prescribed and wildland fires, land planning efforts, vegetation treatments, habitat improvement projects, insects and disease, and drought. Many of these create conditions that cause or favor other vegetation changes. For

example, wildland fire causes vegetation removal, which makes affected areas more susceptible to weed invasion and soil erosion.

Drought conditions reduce vegetative health, which makes vegetation prone to insect infestation or disease. In general, resource use activities have cumulatively caused vegetation removal, fragmentation, weed spread, soil compaction, and erosion, whereas land planning efforts and vegetation and weed treatments have countered these effects by improving vegetative connectivity, productivity, diversity, and health.

Climate change within the cumulative impact analysis area could cause an increase or decrease in temperatures and precipitation, which would affect soil conditions, vegetative health, and water availability. Such changes would alter the conditions to which vegetative communities are adapted, potentially creating conditions that could favor certain species or communities, weeds, or pests.

Under the alternatives, impacts on vegetation would be minimized to the extent practical and feasible through restrictions; stipulations; closures to mineral exploration and development, recreation, and motorized travel; and by concentrating development in previously disturbed areas. Vegetative conditions would be improved through restrictions on development, treatments, weed prevention and control, habitat improvements, use of prescribed and wildland fire, and proper grazing practices.

In general, management under each alternative would work toward achieving land health but would differ in the time and methods used to reach that goal. Since existing management, Alternative A, emphasizes more resource use and development, impacts on vegetation are more likely to occur under this alternative. As a result, management under Alternative A could significantly contribute to cumulative impacts on vegetation. In contrast, under Alternatives B, C, and D, BLM and USFS management actions are expected to contribute to positive cumulative impacts on vegetation by placing restrictions on development and prioritizing fuels treatments and habitat treatments in GRSG habitat, for example.

5.8. Wildland Fire Ecology and Management

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect wildland fire ecology and management are the creation of wildland-urban interface areas, creation of recreation areas, fuels treatments, habitat treatments, and livestock grazing.

The cumulative impact analysis area for fire and fuels is delineated by the fourth-order watersheds that completely or partially overlap the planning area. Rather than following administrative boundaries, wildland fires burn based on fuels, weather, and topography. Because of continuous fuels and historic high fire occurrence, northwest Colorado fire management activities could affect fire management and resources outside of the planning area. For example, there is a high likelihood of fires burning from northwest Colorado to southwest Wyoming and from western Colorado to eastern Utah and vice versa. There is also the potential for wildland fires to impact private and state lands.

Past and present management actions and natural events within the cumulative impact analysis area have altered the condition of vegetation and natural fire regimes across the landscape. These include fire suppression, vegetation treatments, grazing, noxious and invasive weed spread,

drought, and insect and disease outbreaks. In some cases, areas have become more prone to large intense fires.

Urban development and recreational activities in the cumulative impact analysis area are expected to increase over the life of the LUPA, creating additional potential ignition sources and the probability of wildland fire occurrence. Of these two factors, urbanization, especially the expansion of residential areas, is expected to be the larger contributor on cumulative wildland fire impacts. Additional wildland-urban interface would increase the need for hazardous fuels projects to reduce the risk of wildland fires burning from BLM-administered and National Forest System lands into the wildland-urban interface. Increased wildland-urban interface can also increase costs associated with suppression and is more dangerous to firefighters and the public. Additional fire suppression resources could be needed, including federal, state, and local agency resources.

Changing land use patterns and increased recreation and visitation would also result in the modification of vegetation communities; both trends present new vectors for the introduction of noxious weeds and nonnative vegetation species lacking adequate vegetative cover. These introduced species could eventually alter the fire regime of certain areas and potentially increase the frequency, size, and intensity of wildland fires.

Prioritization of fuels treatments and suppression in GRSG habitat areas could cumulatively affect areas inside and outside of the planning area by placing a lower priority on non-GRSG habitat areas. This prioritization could cause more fires in non-habitat areas due to fewer fuels treatments and suppression efforts.

Cumulative impacts on wildland fire ecology and management are expected to be the greatest under Alternative C, because the BLM and USFS would place the most restrictions on fire management in the most areas. Management under Alternative A would result in the fewest cumulative impacts on fire management because it would place the fewest restrictions on that program in the fewest areas. Under Alternatives B and D, the BLM and USFS would place fewer restrictions on fire management in a smaller area than Alternative A.

5.9. Minerals (Leasable, Locatable, Salable, and Non Energy Leasable)

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect leasable, locatable, salable, and nonenergy leasable minerals are: market fluctuations, pipeline capacity, available markets for distribution, regulatory constraints, new technologies, and reservoir/reserve depletion.

The cumulative impact analysis area for leasable, locatable, salable, and nonenergy leasable minerals is the planning area, the Moab and Vernal Field Offices in eastern Utah, and the Rawlins and Rock Springs Field Offices in southwest Wyoming, regardless of land ownership. Impacts on the ability to develop and extract mineral resources could cumulatively reduce exploration and production of commodities from BLM-administered and National Forest System lands.

Impacts on mineral resources that are individually minor may cumulatively reduce exploration and production of commodities from BLM-administered and National Forest System lands. The BLM and USFS have no control over many of the factors that affect mineral extraction and prospecting. These factors include regulatory policy, public perception and concerns, transportation, well spacing, low commodity prices, taxes, and housing and other necessities for workers.

Coal exploration and development would continue under all alternatives on existing leases. However, new coal leases and development would be impacted from an increase in the amount of lands allocated as unacceptable for coal leasing and development. Restrictions on new coal developments across all of the alternatives would reduce exploration opportunities.

Interest in domestic oil and gas exploration and development mirrors the swings in the mineral commodity prices. As the price increases, the development of existing leases increases, as well as the demand for new leases, even in areas with less development potential. Restrictions on oil and gas leasing would have a cumulative effect on the ability to develop these resources. Under Alternative A, oil and gas exploration and development is expected to continue as correlated with mineral commodity prices. Under all of the action alternatives (Alternatives B, C, and D), oil and gas production would be expected to decrease due to restrictions placed on development. Decreases in production would be expected to be greatest under Alternative C, under which the BLM/USFS would close all PPH to fluid mineral leasing.

Locatable mineral development is an ongoing enterprise in the cumulative impact analysis area and is expected to continue under Alternative A. As prices for gold remain high, exploration for gold is expected to increase. Under all of the action alternatives (Alternatives B, C, and D), locatable mineral development would be expected to decrease due to restrictions placed on development. Decreases in production would be expected to be greatest under Alternatives B and C, under which the BLM and USFS would recommend that all PPH be withdrawn from mineral entry.

Salable mineral extraction and use is expected to increase, along with increasing mining activity, commercial development, recreation, and private property development, especially along the Interstate 70, Interstate 80 (Wyoming), and state highway corridors. As the amount of BLM-administered and National Forest System land available for disposition of salable materials is reduced, it is expected that demand for salable minerals would increase in other areas adjacent to the cumulative impact analysis area.

Nonenergy leasable mineral development is also an ongoing enterprise in the cumulative impact analysis area and is expected to continue as such under Alternative A. Under all of the action alternatives (Alternatives B, C, and D), nonenergy leasable mineral development would be expected to decrease due to restrictions placed on development. Decreases in production would be expected to be greatest under Alternatives B and C, under which the BLM and USFS would close all PPH to nonenergy leasable mineral development.

Mineral exploration and development would be expected to continue to occur under all alternatives. However, acreages open to exploration and development would vary by alternative. Overall, management under Alternative C would be the most restrictive to mineral development and could result in the greatest number of cumulative impacts on mineral exploration and development in the cumulative impact analysis area.

5.10. Recreation and Travel Management

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect recreation are increased visitation (especially from residents within the planning area and those from the surrounding region), urbanization of communities in northwest Colorado, advances in outdoor recreation equipment, management in existing Recreation Management Areas, and energy development.

The cumulative impact analysis area used to analyze cumulative impacts on recreation resources includes the planning area. The cumulative impact analysis area for travel and transportation extends along major roads and trails where management inside the planning area could impact use outside the planning area boundary.

At the broadest level, the physical, social, and operational recreation character of National Forest System and BLM-administered lands are quickly changing from natural to more developed, from less crowded to more contacts with others, and from less restrictive to more rules and regulations. These changes are expected to impact the activity opportunities that can be offered and the recreation experience and benefit opportunities that can be produced.

Forest plans for adjacent National Forest System lands and RMPs for adjacent BLM-administered lands have closed areas and routes to motorized recreation, causing users to move to other National Forest System and BLM-administered lands in the planning area. Increasing urban and suburban populations proximate to and within the planning area have greatly increased the level of recreational and route use on National Forest System and BLM-administered lands. The combination of the region's growing population and the bounty of desirable recreation settings have combined to greatly increase use in northwest Colorado.

There is a strong correlation between population growth, visitation, and recreation in large part because many new residents have moved to the area specifically because of easy access to recreation opportunities on BLM-administered and National Forest System lands. The expanding suburban development footprint has also placed many new neighborhoods directly adjacent to BLM and USFS boundaries, resulting in increased trespass onto private property and resource impacts from private property owners accessing public lands from adjoining private land (e.g., social trailing, etc.).

Advances in technology are at least partly responsible for increased recreation across the planning area. Motorized vehicles are more capable of accessing previously remote areas of northwest Colorado.

Reasonably foreseeable trends that would result in cumulative impacts on recreation, travel and transportation include continued growth patterns in demand for all recreation experiences, increased demand for close-to-home recreation opportunities for local residents, continued and increased visitation from a growing regional population, and increased popularity of adjacent public lands. However, restrictions on development of public lands to protect GRSG habitat could cumulatively benefit recreation.

Issuance of SRPs and management of travel and transportation will continue as they are managed currently under Alternative A. Under Alternative B, the BLM and USFS would place some restrictions on recreation, travel and transportation, which could cumulatively add to a decrease in this resource use. Under Alternative C, the BLM and USFS would place the most restrictions on recreation, travel, and transportation, resulting in the greatest number of cumulative impacts. Under Alternative D, the BLM and USFS would place fewer restrictions on recreation, travel, and transportation than under Alternatives B and C, but would place more restrictions than under Alternative A, resulting in fewer cumulative impacts than Alternatives B and C, but more than Alternative A.

5.11. Range Management

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect range management are wildfires, surface-disturbing activities, the presence and abundance of grazing wildlife and/or wild horses, increased recreational demands, and protections for sensitive resources.

The cumulative impact analysis area used to analyze cumulative impacts on range management includes allotments located entirely or partially within the planning area. Past actions that have affected livestock grazing include human-caused surface disturbances (mineral development, recreation, prescribed burning, mechanical vegetation treatments, WSAs and historic grazing practices) and wildland fires that have contributed to current ecological conditions.

Cumulative projects that increase human disturbance in grazing areas could also indirectly impact grazing by increasing weeds and invasive species. As stated above, weed invasion can reduce preferred livestock and wildlife forage and increase the chance of weeds being dispersed by roaming cattle. Cumulative projects that increase human disturbance in grazing areas could also directly impact grazing by displacing, injuring, or killing animals.

Present actions affecting livestock grazing are mainly those that reduce available grazing acreage, restrict management actions or the level of forage production in those areas. Key examples include wildland fires, land disposals, motorized vehicle use, recreation, habitat restoration, fuels reduction, and special designations that restrict grazing. Future actions affecting livestock grazing would be similar to present actions, except under Alternative C, under which the BLM and USFS would close ADH to livestock grazing.

The cumulative impacts under each alternative would parallel the impacts of the alternatives in the general impact analysis, above. In general, management actions in every alternative would result in short- and/or long-term availability of forage due to treatment activities, other surface-disturbing and disruptive activities, human disturbance, special designations, and the presence of grazing wildlife, threatened, or endangered species. Although forage would be expected to increase over the long term under Alternative C if grazing were restricted in ADH, Alternative C would also have the greatest impact on livestock grazing. Under Alternatives A, B, and D, forage would be utilized annually at various levels relative to the protections provided in the three alternatives. Management under Alternative A would contribute the most cumulative effects to range management by allowing the most surface disturbance, which would cumulatively decrease forage availability.

5.12. Wild Horse Management

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area for BLM-administered lands that have affected and will likely to continue to affect wild horse and burro management are wildfires, surface-disturbing activities, the presence and abundance of grazing wildlife, increased recreational demands, and protections for sensitive resources. No wild horses occupy or are known to occupy National Forest System lands within the planning area.

The cumulative impact analysis area used to analyze cumulative impacts on wild horses includes the entire planning area because impacts are expected to be limited to those actions originating within the planning area.

Cumulative impacts on wild horse and burro management are expected to be the greatest under Alternative A since it allows the highest level of development, which could disrupt wild horses in the planning area the most. However, Alternative A also allows the most development of range improvement projects, which cumulatively benefits wild horses. Management under Alternatives B, C, and D would place restrictions on development and would therefore contribute fewer cumulative impacts on wild horses than Alternative A.

The prioritization of gathers in PPH under Alternatives B and C could cumulatively affect herd areas and HMAs outside of habitat by delaying gathers in those areas, and potentially causing more impacts from overpopulation of horses in those areas.

5.13. Special Designations

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect special designations are wildfires, surface-disturbing activities, increased recreational demands, and protections for sensitive resources.

The cumulative impact analysis area for special designations includes the planning area. Cumulative impacts on special designations could result from non-BLM and USFS actions and decisions on lands adjacent to WSAs and ACECs. While protections exist within WSAs and ACECs, population growth, development, and recreation throughout the planning area may, over time, encroach upon these areas, causing potential degradation of the important and relevant resources, such as through displacement of species, habitat fragmentation, and changes to the visual landscape that could indirectly affect resources within WSAs and ACECs. Impacts would be greater in areas where recreation areas, such as SRMAs or ERMAs, or development were adjacent to a WSA or ACEC. The BLM and USFS would adaptively manage to protect WSA and ACEC values and minimize impacts where applicable and feasible.

Cumulative impacts on special designations are expected to be the greatest under Alternative A, since it would allow the highest level of development. Alternatives B, C and D would all place restrictions on development and would therefore be expected to cumulatively contribute fewer impacts on special designations than Alternative A.

5.14. Soil and Water Resources

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect soil and water resources are mineral development, livestock grazing, infrastructure development, vegetation treatments, wildfires, recreation, and travel and transportation activities.

The cumulative impact analysis area used to analyze cumulative impacts on soils includes the entire planning area. Surface-disturbing activities occurring within the planning area are not expected to affect soil resources outside of the planning area. The cumulative impact analysis area used to analyze cumulative impacts on water quality and watershed resources extends outside of the planning area, following fourth-order watershed boundaries. Given that the hydrologic influence of the surrounding area is primarily focused in the stream channels and that delineation of the cumulative impact analysis area was based on watershed boundaries, the area of analysis is

sufficient. The hydrologic influence of the planning area on areas outside the planning area is primarily the result of hydrograph alteration and quality of the water flowing from the area.

Combined with the proposed management actions, cumulative impacts on soil resources could present challenges to meeting BLM Colorado Public Land Health Standard 1. Impacts on soil resources would not be as substantial under Alternative B, C, or D when compared with Alternative A. Management under Alternative C would provide the greatest protection of soil resources, followed by Alternative B and D, respectively. Alternative A would provide the lowest level or protection of soil resources.

Mineral development, including oil and gas, coal, and other minerals, could cause localized impacts on soils. Intensive mechanical vegetation treatments likely have and would continue to impact soils resources locally, but they would increase vegetation cover, and thus soil health, over the long term. Past livestock grazing has impacted soil resources. Active management of grazing allotments has led to improvements in soil health over time in the planning area.

An important trend in the planning area is rapidly increasing recreational use. This growth in recreation on public lands is due to local population growth, as well as the planning area's reputation as a national and international recreation destination. All forms of recreational activities can increase potential for erosion, sedimentation, gully creation, biologic soil crust damage, and riparian and upland vegetation damage. Recreation activities may also directly and indirectly impact water quality due to erosion and sediment production potential. However, the significance of such impacts varies with the nature and degree of disturbance as well as site specific environmental conditions. Typically larger disturbances represent greater potential to damage soils and vegetation, degrade water quality, and impair overall watershed function and condition than smaller disturbances.

Potential cumulative impacts on water resources in the planning area would result from alteration of functional vegetative communities and could lead to increased runoff and sediment/contaminant delivery. Activities with impacts on water resources include management actions attributed to the alteration of natural vegetative communities (e.g., pinyon-juniper invasion and cheatgrass), historic grazing practices, surface-disturbing actions in areas of low reclamation potential, conversion of native rangelands to irrigated agricultural lands (on non-BLM-administered and non-National Forest System lands), improper maintenance of transportation facilities, spills/leaks of substances used to develop mineral resources, and recreational use. These activities cause surface disturbances by removing vegetation cover, displacing and compacting soils, and altering soil structure and chemistry. The result is exposed surfaces that increase the potential for runoff and erosion, which delivers sediment and contaminants to nearby waterways. Sedimentation in waterways can cause changes in water chemistry as well as geomorphic adjustments that could have negative effects on stream function.

Urban growth and development in the planning area is anticipated to have impacts on water quantity and water quality. The demand for water is anticipated to increase with urban expansion. The number of water right applications for waters flowing from or through BLM-administered and National Forest System lands is also expected to rise along with the demand. Additionally, demand and use of water flowing to BLM-administered and National Forest System lands is expected to continue to rise. This includes water used on National Forest System and private lands upstream of BLM-administered and National Forest System lands in the planning area.

Impacts on water quantity could affect wildlife habitat (e.g., riparian areas and wetlands, aquatic habitat, wildlife, water quality, and fisheries). Loss of vegetation and disturbed soils associated

with construction and development projects would leave denuded surfaces susceptible to soil detachment and transport during runoff. Increased runoff and erosion following runoff events and mass wasting could further deliver sediment and contaminants to nearby waterways. In addition, agricultural runoff would introduce nutrients, pesticides, and herbicides to shallow groundwater and adjacent hydrologic features.

Unavoidable water quality impacts would include temporary increases in suspended load in flowing streams as a result of culvert installation, vehicle use of low-water crossings, and livestock, wildlife, and wild horse use of stream banks and wetlands; permitted channel fills resulting from construction of oil and gas pads, roads, and pipelines; and the introduction of nutrients from irrigation practices occurring on private lands. Water quantity impacts would include water withdrawals for livestock use, oil and gas and other mineral resource exploration, development and production, and watering of roads for dust mitigation. Dust on snow resulting from fugitive dust production outside of the planning area would continue to impact the timing of melt out and the quantity of water available for downstream users.

Under all alternatives, water resources would be protected due to management in accordance with the Clean Water Act, the Fundamentals of Rangeland Health and Standards and Guidelines for Grazing Administration, and other applicable state and federal water quality standards. Site-specific mitigation and RDFs, PDFs, and SDFs for surface-disturbing activities would further reduce impacts on water resources. Adherence to these standards would reduce many of the impacts from future actions.

Alternative actions that allow the least amount of soil disturbance, loss of vegetation, energy and minerals development, recreational use, and roadway and transportation facilities development would be the least impactful on water resources. Alternative C would cause the fewest cumulative impacts on water, followed by Alternatives B and D. Management under Alternative C, which includes the most restoration of plant communities, revegetation, and protected areas (such as ACECs), would have the most beneficial cumulative impacts on water resources. Management under Alternative A allows the most surface disturbance and is expected to contribute the most cumulative effects on soil and water resources.

5.15. Air Quality

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect air quality are mineral development, livestock grazing, travel and transportation, and recreation.

The cumulative impact analysis area used to analyze potential impacts on air quality includes the planning area and adjacent BLM field office RMP planning areas in Utah (Moab and Vernal Field Offices) and Wyoming (Rock Springs and Rawlins Field Offices). The cumulative impact analysis area was extended beyond the planning area to include reasonably foreseeable oil and gas development from adjacent areas that have the potential to affect or be affected by air quality in the planning area. In addition, the cumulative analysis included reasonably foreseeable oil and gas development for private and fee (i.e., nonfederal) minerals within the planning area.

The Colorado Department of Public Health and Environment compiles a statewide emissions inventory of air pollutants from several source categories every 3 years as required by the US EPA. The most recent statewide emissions inventory available was compiled for 2008 actual emissions. The 2008 emissions data for Eagle, Garfield, Grand, Jackson, Larimer, Mesa, Moffat,

Rio Blanco, Routt, and Summit counties, as well as statewide emissions, can be obtained from the US EPA's National Emissions Inventory (US EPA 2011).

BLM and USFS actions combined with nonfederal oil and gas development within the planning area are expected to increase emissions of air pollutants in the planning area over the life of the plan under Alternative A. Under all of the action alternatives, emissions of air pollutants would be expected to decrease due to restrictions on development and land uses prescribed under those alternatives.

Total cumulative emissions from BLM and USFS and nonfederal actions and anticipated emissions from other source categories in Eagle, Garfield, Grand, Jackson, Larimer, Mesa, Moffat, Rio Blanco, Routt, and Summit counties combined with existing background concentrations of air pollutants have the potential to cause or contribute to adverse impacts within the planning area and affected areas outside of the planning area under Alternative A. Elevated levels of PM_{10} and $PM_{2.5}$ background concentrations measured within the planning area, and elevated levels of winter ozone concentrations measured adjacent to the planning area in conjunction with estimated future cumulative emission increases may result in increased ambient concentrations of these pollutants as well as impacts on visibility, atmospheric deposition, and human health under Alternative A.

Cumulative impacts on air quality are anticipated to be the least under Alternative C due to proposed restrictions on surface management actions and lower predicted development. Cumulative estimated emissions under Alternative A could result in air quality impacts. Alternative A cumulative impacts are predicted to be the greatest of the four alternatives and most likely to contribute to adverse impacts on air quality.

Potential cumulative emissions of CO, and sulfur dioxide could cause ambient concentrations of these pollutants to increase slightly, but would be unlikely to exceed air quality standards. Ozone, nitrous oxide, and particulate matter concentrations could be an issue of concern during the life of the plan, particularly under Alternative A which includes the most allowable oil and gas development.

Potential cumulative emissions of nitrogen oxide, sulfur dioxide, and particulate matter under Alternatives B, C, and D are likely to have minimal impacts on atmospheric deposition, including total nitrogen deposition, total sulfur deposition, and precipitation pH, would likely stay about the same and would be unlikely to exceed levels of concern. Potential cumulative emissions under Alternative A have the potential to result in increased nitrogen and sulfur loadings and may contribute towards impacts in sensitive areas and lakes.

Potential cumulative emissions of nitrogen oxide, sulfur dioxide, and $PM_{2.5}$ could result in impacts on visibility to stay about the same or degrade slightly under Alternatives B, C, and D. Visibility degradation in Class I areas downwind of the planning area could be an issue of concern under Alternative A due to the allowance of oil and gas development.

5.16. Climate Change

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect climate change are mineral development, livestock grazing, travel and transportation, and recreation.

Concentrations of certain gases in the earth's atmosphere have been identified as being effective at trapping heat reflected off the earth's surface thereby creating a "greenhouse effect." As

concentrations of these greenhouse gases increase, the earth's surface warms, the composition of the atmosphere changes and global climate is affected. Concentrations of greenhouse gases have increased dramatically in the earth's atmosphere in the past century. Anthropogenic (human-made) sources and activities have been attributed to these increases particularly for carbon dioxide, methane, nitrous oxide, and fluorinated gases (US EPA 2010).

The US EPA has determined that six greenhouse gases are air pollutants and subject to regulation under the Clean Air Act: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Of these greenhouse gases, CO, methane, and nitrous oxide are commonly emitted by the types of activities included in this analysis, while the remaining three greenhouse gases are emitted in extremely small quantities or are not emitted at all.

As the major component of natural gas, methane emissions from underground mining operations and oil and gas exploration and development can be considerable. Emissions of carbon dioxide and nitrous oxide from fossil fuel combustion and fire can also be of concern.

Greenhouse gas emissions are estimated to increase over estimated base year emissions under Alternative A. Management under Alternative A is expected to cause the greatest increase of greenhouse gas emissions from the base year. Management under Alternatives B and C would be expected to show greater increases over the base year than under Alternative D, but less than under Alternative A. Under Alternative D, increases would be expected to be greater over the base year than under Alternatives B and C, but less than Alternative A.

Coal mining activities are predicted to be the largest contributor to greenhouse gas emissions in the planning area, followed by oil and gas development. Coal mining greenhouse gas emissions are primarily from fugitive methane emissions. The largest sources of greenhouse gas emissions within the oil and gas sector include carbon dioxide emissions from natural gas compressors and drill rig engines, and fugitive methane emissions from wellhead equipment, pneumatic devices, and tanks.

Several activities contribute to the phenomena of climate change, including emissions of greenhouse gas (especially carbon dioxide and methane) from fossil fuel development, large wildland fires and activities using combustion engines; changes to the natural carbon cycle; and changes to radiative forces and reflectivity (albedo). It is important to note that greenhouse gas will have a sustained climatic impact over different temporal scales. For example, recent emissions of carbon dioxide can influence climate for 100 years.

It may be difficult to discern whether global climate change is already affecting resources in the analysis area of the plan. It is important to note that projected changes are likely to occur over several decades to a century. Therefore, many of the projected changes associated with climate change may not be measurably discernible within the reasonably foreseeable future. Existing climate prediction models are global or continental in scale; therefore they are not appropriate to estimate potential impacts of climate change on the planning area. The current state of the science involves calculating potential quantities of greenhouse gases that may be added to the atmosphere from a particular activity. However, tools to analyze or predict how global or regional climate systems may be affected by a particular activity or activities within the planning area are not currently available. Assessing the impacts of greenhouse gas emissions on global climate change requires modeling on a global scale which is beyond the scope of this analysis. Potential impacts on climate change are influenced by greenhouse gas emission sources from around the globe, and it is not possible to distinguish the impacts on global climate.

5.17. Visual Resources

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect visual resources are wildland fires, wildland fire management activities, timber harvesting, mining, cross-country travel, noxious weed invasion, urban and suburban sprawl, and road construction.

The cumulative impact analysis area for visual resources is composed of those fourth-order watersheds that completely or partially overlap the planning area. Fourth-order watersheds were used as the basic unit of analysis because impacts from management actions proposed under this document and other existing activity plans are not expected to have cumulative influence beyond this scale.

Actions likely to have the greatest future effect on visual resources in the cumulative impact analysis area are activities associated with energy and minerals development, continued urbanization, road construction, vegetation management, developed recreation, and utility development.

Energy development, primarily dependent upon a variety of external factors, could have widespread and long-term effects on visual resources, and although sites are required to be reclaimed, some visual impacts remain (e.g., well caps). Urbanization has and is expected to continue to result in residential and/or commercial development expanding incrementally closer to National Forest System and BLM-administered lands.

Continued urban growth and development of lands in the vicinity of National Forest System and BLM-administered lands could also lead to an increased demand for energy resources, building materials, utilities, and minerals, all of which could spur development that would affect visual resources.

Cumulative impacts on visual resources are expected to be the greatest under Alternative A, since it would allow the highest level of development. Under Alternatives B, C, and D, the BLM and USFS would place restrictions on development and would therefore be expected to cumulatively contribute fewer impacts on visual resources than Alternative A.

5.18. Lands with Wilderness Characteristics

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect lands with wilderness characteristics are wildland fires, wildland fire management activities, mining, energy development, noxious weed invasion, urban and suburban sprawl, and road construction.

The cumulative impact analysis area used to analyze cumulative impacts on lands with wilderness characteristics includes the planning area and all adjacent BLM/USFS-identified lands with wilderness characteristics that are adjacent or overlap the planning area boundary.

Many past, present, and reasonably foreseeable actions have impacted or have the potential to impact the wilderness characteristics of lands with wilderness characteristics. For example, continued residential development in the planning area will likely increase visitor use on BLM-administered and National Forest System lands including lands with wilderness characteristics, potentially impacting wilderness characteristics by reducing opportunities for

solitude. Development of energy and minerals resources could introduce sights, noises, and infrastructure in or adjacent lands with wilderness characteristics, which could degrade their wilderness characteristics. In addition, vegetation management activities on public and private lands may alter landscape appearance and setting in the short and long term, protecting or degrading wilderness characteristics depending on the activity. Noxious weed infestations could degrade wilderness characteristics over time in the planning area. Impacts on lands with wilderness characteristics would be mitigated where those lands are managed to protect their wilderness characteristics and where management actions governing other resources complement wilderness characteristics.

Cumulative impacts on lands with wilderness characteristics are expected to be the greatest under Alternative A. Management under Alternatives B, C, and D would be expected to protect wilderness character to some degree by placing restrictions on development and land uses that could degrade the wilderness character.

5.19. Soundscapes

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect soundscapes are activities associated with energy and minerals development, continued urbanization, road construction, vegetation management, developed recreation, and utility development.

The cumulative impact analysis area used to analyze cumulative effects on soundscapes includes the planning area since activities outside of the decision area could influence soundscapes inside of the decision area and vice versa.

Energy development (including wind energy development) primarily dependent upon a variety of external factors could have widespread and long-term effects on soundscapes since energy infrastructure such as wind turbines and compressor stations produce high levels of sound. Urbanization has and is expected to continue to result in residential and commercial development expanding incrementally closer to National Forest System and BLM-administered lands.

Continued urban growth and development of lands in the vicinity of National Forest System and BLM-administered lands could also lead to an increased demand for energy resources, building materials, utilities, and minerals, all of which could spur development that would affect soundscapes.

Cumulative impacts on soundscapes are expected to be the greatest under Alternative A. Management under Alternatives B, C, and D would be expected to protect soundscapes to some degree by placing restrictions on development and land uses that could generate noise and degrade the soundscape.

5.20. Cultural Resources

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect cultural resources are destruction of cultural resources, loss of integrity due to physical or other disturbances, loss of setting, degradation from natural processes such as erosion and weathering, incremental disturbance from use or access, and effects from vandalism and unauthorized collection.

The cumulative impact analysis area used to analyze cumulative effects on cultural resources extends outside the planning area, following fourth-order watershed boundaries that completely or partially overlap the planning area. Fourth-order watersheds were used as the basic unit of analysis because effects from most management actions proposed under the LUPA and other existing activity plans are not expected to have cumulative influence beyond this scale.

Current and future trends in the cumulative impact analysis area include population growth, urban encroachment, increases in mining, fluid mineral leasing, leasable minerals, renewable energy development, ongoing grazing, increase in recreational demand, road construction, water diversions, invasive species, erosion, wildland fire, forest disease and insects, drought, and climate change. These trends would be most likely to occur in the future under Alternative A. Trends would continue to affect cultural resources and cultural landscapes through loss or disturbance of resources that are not or cannot be protected, changes in setting, pressure from incremental use, loss of access for Native Americans to resources, and theft or vandalism of cultural resources.

Cultural resources adjacent to areas of growth and development would be most susceptible to future effects. Development near public lands is also increasing as adjacent agricultural lands are being converted into subdivisions, increasing the risk of effects on cultural resources. The effects on cultural resources on adjacent private lands would be greater than on federal lands since they would not be subject to the same requirements or protections. The construction of buildings, roads, and associated structures increases ground disturbance, causing effects on cultural resources and their settings. In general, more people and development in an area increases the potential for disturbance and increased cumulative effects on cultural resources. These impacts would be expected to be greatest under Alternative A.

Areas where motorized use is allowed would continue to expose cultural resources to effects. Limiting travel to designated routes can protect cultural resources located off the routes, but restrictions are difficult to enforce, especially as population and recreational use grows and other areas are closed. Increased use of GPS and off-road vehicles can facilitate vandalism and unauthorized collecting. Increased use of the internet to disseminate site location and encourage visitation to sites that are unrecorded or have not been allocated to public use will continue to expose cultural resources to impacts.

Actions related to recreation, grazing, vegetation treatment, wildland fire, mineral development, and energy development have had past effects and are expected to continue to affect cultural resources. Increased frequency of wildland fire due to drought and climate change may lead to additional direct loss of cultural resources and effects due to suppression.

Decisions from this document would have effects that, when combined with other past, present, and reasonably foreseeable actions, could produce cumulative effects on cultural resources and religious, traditional, or other sensitive Native American resources. Cumulative effects would result from the destruction and loss of known and unrecorded resources and unanticipated discoveries. The continued documentation of new cultural resources from undertakings and permitted actions that would require inventory for compliance would result in additional information to expand and explain the area's cultural history. Restrictions on development and land use under Alternatives B, C, and D would improve current management of cultural resources in the decision area. Restrictions on open, cross-country use would drastically reduce the amount of land where cultural resources would be affected. Alternative C would be the most protective of the cultural resource base through measures targeting resource protection and restrictions on development. In addition, all undertakings would be subject to the Section

106 process of the NHPA and other applicable laws and regulations. Adherence to appropriate predevelopment, development, and post-development protective measures would reduce most effects to an insignificant level.

5.21. Paleontological Resources

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect paleontological resources are destruction or damage of resources without the benefit of scientific study or interpretation due to construction, recreation, theft, vandalism, and the effects of natural processes without the benefit of recovery, scientific study, or interpretation.

The cumulative impact analysis area used to analyze cumulative impacts on paleontological resources extends outside the decision area, following fourth-order watershed boundaries that completely or partially overlap the planning area. The fourth-order watersheds were used as the basic unit of analysis because impacts from most management actions proposed under the LUPA and other existing activity plans are not expected to have cumulative influence beyond this scale.

Current and future trends include population growth, urbanization, mining, fluid mineral leasing, renewable energy development, increase in recreational demand, road construction, and erosion. These trends are expected to be most likely to occur under Alternative A. For actions on public land and the mineral estate managed by the BLM and USFS, impacts would be minimized through existing laws, regulations, and stipulations addressing surface-disturbing activities within Potential Fossil Yield Class 4 and 5 areas and other sensitive areas. Other ground-disturbing activities such as road construction, real estate development, and utility infrastructure in the cumulative impact analysis area may be reviewed by other federal, state, or local agencies for the presence and scientific value of paleontological resources and steps taken to recover or avoid significant finds. Actions on private land could result in the inadvertent destruction of paleontological resources or the removal of fossils without any scientific study. Population growth and increasing recreational demand can impact resources from unauthorized removal, vandalism, incremental damage of surface resources, and subsequent erosion.

Management actions in this document could contribute to cumulative impacts on paleontological resources when combined with other past, present, and reasonably foreseeable actions. The cumulative effects of surface-disturbing activities such as mineral development and lands and realty actions within Potential Fossil Yield Class 2, 3, 4, and 5 areas have the potential to damage or destroy some resources. Some fossils would be destroyed in the course of legitimate uses of public lands, as well as through natural weathering and erosion. Measures to identify resources in areas of high potential would allow evaluation by paleontologists in areas that had not been previously studied. Fossils that would have otherwise been destroyed would be avoided or recovered and made available for study in university and museum repositories. Beyond authorized ground disturbance, cumulative impacts could occur from intensive travel, dispersed recreation, wildfire suppression activities, erosion, unauthorized collection, and vandalism. These could result in the unmitigated loss of scientific information and could reduce the educational and interpretative potential of the resource. Management actions under Alternatives B, C, and D would reduce the potential effects on paleontological resources through restrictions on development and land uses. Adherence to appropriate predevelopment, development, and post-development protective measures would be expected to reduce most impacts to an insignificant level.

5.22. Social and Economic Conditions (Including Environmental Justice)

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely continue to affect social and economic conditions are chiefly mining and mineral exploration and development, lands, realty, transportation, ROWs, renewable energy development, recreation, and livestock grazing.

The cumulative impact analysis area used to analyze potential impacts on social and economic conditions consists of the eight counties identified as the primary socioeconomic study area (Eagle, Garfield, Grand, Jackson, Mesa, Moffat, Rio Blanco, and Routt). Although the BLM and USFS considered adding the secondary study area to the cumulative impact analysis area for socioeconomics, as documented in **Chapter 4**, Environmental Consequences, **Section 4.24**, Social and Economic Impacts (Including Environmental Justice), and **Appendix M**, Socioeconomics Data and Methodology, the impacts on the secondary study area are consistently very small (see **Chapter 4**, **Section 4.24**, Social and Economic Impacts [Including Environmental Justice]). In addition, the approach for analyzing cumulative socioeconomic impacts relies on economic forecast data specific to Colorado, and adding counties in Utah and Wyoming that constitute the secondary study area would create substantial analytical challenges. The cumulative impact analysis area does address forecasted social and economic development for private and fee (i.e., nonfederal) surface lands within the eight counties.

Changes to social and economic conditions result when individuals, businesses, governments, and other organizations initiate actions. Millions of decisions will be made by thousands of state residents and others, over the next several decades, that will affect trends in employment, income, housing, and property presented in **Chapter 3**, **Section 3.24**, Social and Economic Conditions (Including Environmental Justice). Projections published by the State Demography Office within the Colorado Department of Local Affairs account for these individual decisions in the aggregate, and provide a baseline for comparing effects of alternatives in the future. The Colorado Department of Local Affairs projections represent a regional forecast taking a wide range of actions into account – management actions by the BLM and USFS as well as many other government entities, private citizens, and businesses. As a result, they incorporate the past, present, and reasonably foreseeable future projects that will form the basis of future economic and social trends in the cumulative impact analysis area. Current and future trends in the cumulative impact analysis area include population growth, increases in mining activity, including oil and gas development, renewable energy development, increases in recreational demand, and ongoing livestock grazing.

As noted in **Chapter 4**, **Section 4.24**, Social and Economic Impacts (Including Environmental Justice), some of the predicted employment and income effects of the actions considered in this EIS could be quantified, including the indirect and induced impacts of these actions (calculated using IMPLAN, a regional economic model). **Table 5.4**, Projected Employment by Alternative for Eight-County Primary Socioeconomic Study Area, shows projected employment for 2030, as forecast by Colorado Department of Local Affairs. Because Alternative A represents current management plans, employment would correspond most closely to the existing Colorado Department of Local Affairs forecasts. By contrast, employment under Alternatives B, C, and D would be expected to change from the Colorado Department of Local Affairs projections, with the best estimate for those changes being the quantities shown in **Chapter 4**, Environmental Consequences. Thus, **Table 5.4**, Projected Employment by Alternative for Eight-County Primary

Socioeconomic Study Area, shows the estimated change in employment for these alternatives, based on modifying the projected 2030 employment by the estimated changes for the eight-county socioeconomic study area (from IMPLAN). **Table 5.5**, Projected Labor Income ($ millions) by Alternative for State of Colorado, shows a similar calculation for labor income (earnings) at the state level. Colorado Department of Local Affairs does not provide county-level projections for labor income.

Table 5.4. Projected Employment by Alternative for Eight-County Primary Socioeconomic Study Area

Item	Alternative A	Alternative B	Alternative C	Alternative D
Employment (2010)	177,805	177,805	177,805	177,805
Change in employment (2030) related to oil and gas	N/A	-1,858	-5,541	-929
Change in employment (2030) related to grazing (based on active AUMs)	N/A	-185	-370	-92
Change in employment (2030) related to recreation	N/A	-61	-134	-7
Overall change in 2030 employment	N/A	-2,104	-6,045	-1,029
Projected 2030 employment	274,491	272,387	268,446	273,462
% change, 2010 to 2030	54.4%	53.2%	51.0%	53.8%

Source: Colorado Department of Local Affairs 2013 (data for the eight counties of the primary socioeconomic study area), modified by estimates from IMPLAN. The values for Alternatives B and D represent midpoints over a range of possible values, as described in **Chapter 4**, **Section 4.24**, Social and Economic Impacts (Including Environmental Justice).

Changes related to specific sectors include direct, indirect, and induced effects from IMPLAN; see **Appendix M**, Socioeconomics Data and Methodology, for a detailed description of this model.

Note: The source of 2010 employment data used in this table (Colorado Department of Local Affairs 2013) differs from that used in **Chapter 3, Section 3.24**, Social and Economic Conditions (Including Environmental Justice), so there may be differences between the two estimates.

As noted in **Chapter 4**, **Section 4.24**, Social and Economic Impacts (Including Environmental Justice), quantitative estimates were not produced for oil and gas for Alternative D or livestock grazing for Alternatives B or D.

As noted in **Chapter 4**, **Section 4.24**, Social and Economic Impacts (Including Environmental Justice), the main driver of changes in employment and earnings in the study area is oil and gas activity. This is also evident in **Table 5.4**, Projected Employment by Alternative for Eight-County Primary Socioeconomic Study Area. Recreation and livestock grazing impacts were also measured quantitatively to the degree data were available. Trends in recreation that will influence social and economic conditions in a cumulative impacts context include continued growth patterns in demand for all recreation experiences, increased demand for close-to-home recreation opportunities for local residents, continued and increased visitation from a growing regional population, and increased popularity of adjacent public lands. Because the differences among the alternatives are relatively minor, the effect in context of overall economic activity associated with recreation would be relatively small. In addition, although restrictions to recreational activities imposed by Alternatives B, C, or D could limit certain activities such as motorized recreation, they would also favor recreational activities requiring less disturbed and more primitive or natural settings. This is one of the reasons that the economic impacts associated with recreational activities are similar across all alternatives.

Table 5.5. Projected Labor Income ($ millions) by Alternative for State of Colorado

Item	Alternative A	Alternative B	Alternative C	Alternative D
Labor income (2010)	$114,319	$114,319	$114,319	$114,319
Change in labor income (2030) related to oil and gas	N/A	-$105.2	-$313.4	-$52.6
Change in labor income (2030) related to grazing (based on active AUMs)	N/A	-$5.5	-$10.9	-$2.7
Change in labor income (2030) related to recreation	N/A	-$0.6	-$4.7	-$0.3
Overall change in 2030 labor income	N/A	-$112.8	-$329.0	-$55.6
Projected 2030 labor income	$343,437	$343,324	$343,108	$343,381
% change, 2010 to 2030	200.4%	200.3%	200.1%	200.4%

Source: Colorado Department of Local Affairs 2013 (statewide data), modified by estimates from IMPLAN (presenting estimated impacts for the eight-county primary study area). The values for Alternatives B and D represent midpoints over a range of possible values, as described in **Chapter 4**, **Section 4.24**, Social and Economic Impacts (Including Environmental Justice).

Changes related to specific sectors include direct, indirect, and induced effects from IMPLAN; see **Appendix M**, Socioeconomics Data and Methodology, for a detailed description of this model.

Note: The source of 2010 employment data used in this table (Colorado Department of Local Affairs 2013) differs from that used in **Chapter 3, Section 3.24,** Social and Economic Conditions (Including Environmental Justice), so there may be differences between the two estimates.

Present actions affecting livestock grazing are mainly those that reduce available grazing acreage or restrict management actions or the level of forage production in those areas. Alternative C would have the greatest impact on livestock grazing: Under Alternative C, the BLM and USFS would close ADH to grazing and contribute the most to adverse cumulative impacts on economic conditions. Although the impacts on employment and earnings appear small in **Table 5.4**, Projected Employment by Alternative for Eight-County Primary Socioeconomic Study Area, shows the estimated change in employment for these alternatives, and **Table 5.5**, Projected Labor Income ($ millions) by Alternative for State of Colorado, the impacts in local areas could be dramatic and significant, especially areas where livestock grazing forms the foundation of regular (i.e., non-seasonal) economic activity and areas where the economy is relatively concentrated in livestock-related businesses. Additionally, the livestock grazing and ranching sector across Northwest Colorado is quite influential in terms of establishing community character, identity, and social values. Thus, land management decisions caused by the proposed action affecting livestock grazing, especially in Alternative C, have the potential to have far-reaching effects on the social structure in the planning area. **Table 5.4**, Projected Employment by Alternative for Eight-County Primary Socioeconomic Study Area, and **Table 5.5**, Projected Labor Income ($ millions) by Alternative for State of Colorado, which provide more of a broad regional context, do not capture these effects.

Mineral exploration and development, including the development of minerals other than oil and gas (e.g., coal and several salable and locatable minerals), would be expected to continue to occur under all alternatives. However, acreages open to exploration and development would vary by alternative. Since management under Alternative C would be the most restrictive alternative on mineral development, it would likely result in the greatest cumulative impacts on mineral exploration and development. Because mineral exploration and development is a sizeable contributor to employment, output, earnings, and tax revenues in the study area, Alternative

C would also have the greatest contribution to cumulative impacts on social and economic conditions related to mining exploration and development, especially oil and gas. However, as noted in **Chapter 4**, **Section 4.24**, Social and Economic Impacts (Including Environmental Justice), exploration and development activity on state and private land may offset reductions on federal lands. This is true for Alternatives B and D as well as Alternative C.

Management actions that affect development of infrastructure, including limitations on new ROWs and access routes or restrictions to route construction and to travel on existing roads, could increase the cost of new economic investments or make them no longer economically viable in the cumulative impact analysis area. These restrictions could deter renewable energy development in the cumulative impact analysis area. Management under Alternative A includes the fewest restrictions on ROW development and route construction and leaves the largest area open to travel. BLM and USFS management of renewable energy development would continue along current trends (with development considered on a case by case basis). Under Alternative C, the BLM and USFS would impose the most limitations, which could result in the most added costs to future economic investment in renewable energy development. Management under Alternative B would be very similar to Alternative C. Restrictions and the costs of infrastructure development under Alternative D would be greater than under Alternative A but less than under Alternatives B or C.

Decisions from this document would have effects that, when combined with other past, present, and reasonably foreseeable actions, would produce cumulative effects on social and economic conditions. However, if Alternative A is selected, current and future trends in social and economic conditions would not be impacted. Restrictions on development and land use under Alternatives B, C, and D could impair economic growth in some sectors as measured by employment and income in the cumulative impact analysis area. Based on the data from the IMPLAN model and qualitative analysis of economic activity from other sectors, cumulative impacts on earnings, output, employment, and tax revenues due to activities on BLM-administered and National Forest System lands would be greatest under Alternative C. In the context of overall employment and earnings projections, and from a regional perspective, the impacts would be relatively minor. However, as documented in **Chapter 4**, **Section 4.24**, Social and Economic Impacts (Including Environmental Justice), there are impacts on specific communities and local geographic areas that must be taken into account, even if they are not visible at the regional level. This is especially a concern for smaller communities that are adjacent to large areas of federally managed GRSG habitat, such as the town of Walden in Jackson County, and that have economies focused on ranching or oil and gas development.

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Chapter 6. Consultation and Coordination

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6.1. Introduction

This chapter describes the public outreach and participation opportunities made available through the development of this draft LUPA/EIS and consultation and coordination efforts with tribes, government agencies, and other stakeholders. This chapter also lists the agencies, organizations, and individuals that received a copy of the draft LUPA and associated EIS.

The BLM land use planning activities are conducted in accordance with NEPA requirements, CEQ regulations, and Department of the Interior and BLM policies and procedures implementing NEPA. The NEPA and associated laws, regulations, and policies require the BLM to seek public involvement early in, and throughout, the planning process to develop a reasonable range of alternatives to proposed actions and to prepare environmental documents that disclose the potential impacts of proposed actions and alternatives. Public involvement and agency consultation and coordination, which have been at the heart of the planning process leading to this draft LUPA/EIS, were achieved through Federal Register notices, public and informal meetings, individual contacts, media releases, planning bulletins, and the Northwest Colorado GRSG website (http://www.blm.gov/co/st/en/BLM_Programs/wildlife/sage-grouse.html).

6.2. Collaboration

Federal laws require the BLM and FS to consult with certain federal and state agencies and entities and Native American tribes (40 CFR 1502.25) during the NEPA decision-making process. The BLM and FS area also directed to integrate NEPA requirements with other environmental review and consultation requirements to reduce paperwork and delays (40 CFR 1500.4-5).

In addition to formal scoping (**Section 6.5.1**, Scoping Process), as summarized below, the BLM has implemented an extensive collaborative outreach and public involvement process that has included coordinating with cooperating agencies, holding public scoping meetings, and holding a socioeconomic workshop. The BLM will continue to meet with interested agencies and organizations throughout the planning process, as appropriate, and will continue coordinating closely with cooperating partners.

6.2.1. Native American Tribal Consultation

The BLM began tribal consultation for cultural resources for the planning process through a consultation initiation letter that was sent to the following tribes on June 19, 2012:

- Eastern Shoshone Tribe (Wind River Reservation)
- Northern Arapaho Tribe
- Northern Cheyenne Tribe
- Southern Ute Indian Tribe
- Ute Indian Tribe (Uintah and Ouray Reservation)
- Ute Mountain Ute Tribe

No written comments were received from tribal agencies during the scoping period or after the consultation initiation letters were sent; tribal concerns or issues have been typically presented in

oral format. Government-to-government consultation will continue throughout the LUPA process to ensure that tribal groups' concerns are considered during LUPA development.

The draft LUPA/EIS will be provided to the tribes concurrently with its release to the public.

6.2.2. Colorado State Historic Preservation Officer Consultation

The draft LUPA/EIS will be provided to the Colorado State Historic Preservation Office concurrently with its release to the public.

[Note: Additional Information on State Historic Preservation Office Consultation Will Be Added To The Final LUPA/EIS.]

6.2.3. U.S. Fish and Wildlife Service Consultation

To comply with Section 7(c) of the ESA, the BLM consulted USFWS early in the planning process. USFWS provided input on planning issues, data collection and review, and alternatives development in their role as a cooperating agency. The BLM and USFS have consulted with USFWS to develop the draft Biological Assessment, which is being prepared concurrently with the draft LUPA/EIS.

6.3. Cooperating Agencies

A cooperating agency is any federal, state, or local government agency or Native American tribe that enters into a formal agreement with the lead federal agency to help develop an environmental analysis. More specifically, cooperating agencies "work with the BLM, sharing knowledge and resources, to achieve desired outcomes for public lands and communities within statutory and regulatory frameworks" (BLM Land Use Planning Handbook H-1601-1).

On January 20, 2012, the BLM wrote to 80 local, state, federal, and tribal representatives, inviting them to participate as cooperating agencies for the Northwest Colorado GRSG LUPA/EIS. Twenty-two agencies agreed to participate on the EIS as designated cooperating agencies, all of which have signed MOUs with the Northwest District Office (**Table 6.1,** Cooperating Agencies). Some agencies are participating as Cooperating Agencies under the larger umbrella of the national-level MOUs described below.

Table 6.1. Cooperating Agencies

Agencies and Tribes Invited to be Cooperators	Agencies that Accepted	Agencies that signed MOUs
Counties		
Garfield County	X	X
Eagle County		
Grand County	X	X
Jackson County	X	X
Mesa County	X	X
Moffat County	X	X
Rio Blanco County	X	X
Routt County	X	X
Summit County		
Municipalities		

Agencies and Tribes Invited to be Cooperators	Agencies that Accepted	Agencies that signed MOUs
City of Fruita		
Town of Craig		
Town of Debeque		
Town of Eagle	X	
City of Glenwood Springs		
City of Grand Junction		
Town of Gypsum		
Town of Hayden		
Town of Hot Sulphur Springs		
Town of Kremmling		
Town of Meeker	X	
Town of New Castle		
Town of Oak Creek		
Town of Palisade		
Town of Parachute		
Town of Rangely		
Town of Rifle		
Town of Silt		
Town of Steamboat Springs		
Town of Walden		
Town of Yampa		
State Agencies		
Colorado Department of Natural Resources	X	X
Colorado Department of Transportation-State Office		
Colorado Department of Transportation-Region 3		
Colorado Department of Parks and Wildlife [1]	X	X
Colorado Oil and Gas Commission		
CPW-Meeker	X	X
CPW-Glenwood Springs	X	X
CPW-Hot Sulphur Springs	X	X
CPW-Steamboat Springs	X	X
Colorado Public Utilities Commission		
Colorado Division of Reclamation Mining and Safety [2]		
Colorado River Water Conservation District		
Colorado State Historic Preservation Officer		
Colorado Water Conservation Board		
Colorado Water Science Center		
Colorado Air Pollution Control Division		
Denver Water Board	X	X
Federal Railway Administration Region 6 Headquarters		
Northern Colorado Water Conservation District		
Juniper Water Conservation District		
White River and Douglas Creek Conservation Districts	X	X
Federal Agencies		
Arapaho National Wildlife Refuge [3]	X	X
Dinosaur National Monument		
Natural Resource Conservation Service State Office	X	X
Natural Resource Conservation Service Kremmling Field Office	X	X
Natural Resource Conservation Service Walden Field Office	X	X
Office of Surface Mining Reclamation and Enforcement		

Agencies and Tribes Invited to be Cooperators	Agencies that Accepted	Agencies that signed MOUs
US Bureau of Reclamation		
US Army Corps of Engineers		
US EPA NEPA Program		
USFWS	X	X
Arapahoe/Roosevelt National Forest		
White River National Forest		
Medicine Bow-Routt National Forest [4]	X	X
US Geographical Survey		
Tribes		
Eastern Shoshone Tribe-Wind River Reservation		
Northern Arapaho Tribe		
Northern Cheyenne Tribe		
Ute Indian Tribe-Uintah and Ouray Reservation		
Southern Ute Indian Tribe		
Ute Mountain Ute Tribe		
Other		
Associated Governments of Northwest Colorado	X	X

[1] All branches of CPW are participating as a cooperating agency under the umbrella of the Colorado Department of National Resources.

[2] Colorado Division of Reclamation, Mining and Safety are participating as a cooperating agency under the umbrella of the Colorado Department of Natural Resources.

[3] Arapaho National Wildlife Refuge is participating as a cooperating agency under the umbrella of the USFWS National MOU.

[4] The Medicine Bow-Routt National Forest is participating as a cooperating agency under the umbrella of the USFS National MOU.

The USFS and USFWS are participating in the EIS process as cooperating agencies at a national level, and both agencies have signed MOUs at a national level.

Since starting on May 18, 2012, the BLM has conducted eight meetings to date with cooperating agencies. Cooperating agencies were also encouraged to attend the scoping open houses and provide comments during the scoping period (**Section 6.5.1**, Scoping Process). These agencies have been engaged throughout the planning process, including during alternatives development.

6.4. Coordination and Consistency

The BLM's planning regulations (43 CFR 1610) require that its RMPs be consistent with officially approved or adopted resource-related plans of other federal, state, local, and tribal governments, to the extent that those plans are consistent with federal laws and regulations applicable to public lands. Plans formulated by federal, state, local, and tribal governments that relate to management of lands and resources have been reviewed and considered as the LUPA/EIS has been developed. These plans can be found in **Chapter 1**, **Section 1.7**, Relationship to Other Policies, Plans, and Programs.

6.5. Public Involvement

Public involvement is a vital and legal component of both the LUPA and EIS processes. Public involvement vests the public in the decision-making process and allows for full environmental

disclosure. Guidance for implementing public involvement under NEPA is codified in 40 CFR Section 1506.6, thereby ensuring that federal agencies make a diligent effort to involve the public in the NEPA process. Section 202 of the FLPMA directs the Secretary of the Interior to establish procedures for public involvement during land use planning actions on public lands. These procedures can be found in the BLM's Land Use Planning Handbook (H-1601-1). Public involvement for the Northwest Colorado GRSG LUPA/EIS includes the following four phases:

- Public scoping before NEPA analysis begins to determine the scope of issues and alternatives to be addressed in the LUPA/EIS
- Public outreach via news releases
- Collaboration with federal, state, local, and tribal governments and cooperating agencies
- Public review of and comment on the draft LUPA/EIS, which analyzes likely environmental effects and identifies the BLM's preferred alternative.

The public scoping phase of the process has been completed and is described in **Section 6.5.1**, Scoping Process. The public outreach and collaboration phases are ongoing throughout the LUPA/EIS process. Information about the process can be obtained by the public at any time on the Northwest Colorado GRSG website (http://www.blm.gov/co/st/en/BLM_Programs/wildlife/sage-grouse.html). This website contains background information about the project, a public involvement timeline and calendar, maps and photos of the planning area, and copies of public information documents released throughout the LUPA/EIS process.

6.5.1. Scoping Process

The formal public scoping process for the LUPA/EIS began on December 9, 2011, with the publication of the Notice of Intent in the Federal Register (76 *Federal Register* 2011-31652, December 9, 2011). The Notice of Intent notified the public of the BLM's intent to develop an LUPAs for the management of GRSG and initiated the public scoping period, which closed on March 23, 2012.

News Release

A news release was provided to local news organizations on January 15, 2012. This news release announced the scoping period for the LUPA/EIS process and provided information about the open houses.

Scoping Open Houses

The BLM hosted four open houses to provide the public with opportunities to become involved, learn about the project and the planning process, meet the LUPA team leaders, and offer written comments. The public was notified of the open houses by news release and on the Northwest Colorado GRSG website (http://www.blm.gov/co/st/en/BLM_Programs/wildlife/sage-grouse.html). Information on the open houses is provided in **Table 6.2**, Scoping Open House Information.

Table 6.2. Scoping Open House Information

Venue	Location (Colorado)	Date	Number of Attendees
The Wattenburg Center	Walden	January 31, 2012	36
Sheraton Denver West	Lakewood	February 1, 2012	17
Colorado River Valley Field Office	Silt	February 2, 2012	12
Little Snake Field Office	Craig	February 3, 2012	24
		Total	**89**
Note: All meetings were held from 4:00 to 7:00 pm.			

Scoping meetings were held in an open house format to encourage participants to discuss concerns and questions with the BLM staff representatives. The BLM gave a short presentation to provide an overview of the LUPA process and present information about public involvement opportunities. GRSG occupied habitat maps were shown to give an idea of the lands that might be affected by the planning decisions. Copies of the NTT Report and scoping comment forms were available. A total of 89 people attended the open houses.

Scoping Comments Received

The BLM Colorado received over 100 unique written submissions containing 516 separate comments during the public scoping period. Detailed information about the comments received and about the public outreach process can be found in the National Greater Sage-Grouse Planning Strategy Scoping Summary Report, finalized in May 2012 (BLM 2012). The issues identified during public scoping and outreach helped refine the list of planning issues, included in **Section 1.5.2**, Issue Identified for Consideration in the Northwest Colorado Greater Sage-Grouse Land Use Plan Amendments, which guided the development of alternative management strategies for the LUPA.

6.5.2. Project Website

The BLM maintains an interactive website to provide the public with the latest information about the LUPA/EIS process. The website, available at http://www.blm.gov/co/st/en/BLM_Programs/wildlife/sage-grouse.html, provides background information about the project, a public involvement timeline and calendar, maps of the planning area, and copies of public information documents such as the Notice of Intent and press releases.

6.5.3. Mailing List

The BLM compiled a mailing list of several hundred individuals, agencies, and organizations that had participated in past BLM projects within the Northwest District. Attendees at the scoping open houses were added to the mailing list if they chose to receive or continue to receive project information. In addition, all individuals or organizations who submitted scoping comments were added to the mailing list. Requests to be added to or to remain on the official LUPA distribution list will continue to be accepted throughout the planning process.

6.5.4. Future Public Involvement

Public participation efforts will be ongoing throughout the remainder of the LUPA process. One substantial part of this effort is the opportunity for members of the public to comment on this

draft LUPA/EIS during the comment period. The proposed LUPA/final EIS will respond to all substantive comments received during the 90-day comment period. RODs will then be issued by the BLM and the USFS after the release of the proposed LUPA/final EIS, the Governor's Consistency Review, and any resolution of protests received on the proposed LUPA/final EIS.

6.6. List of Preparers

Specialists who prepared this LUPA/EIS are provided in **Table 6.3**, Preparers.

Table 6.3. Preparers

Name	Role/Responsibility
Northwest District Office	
Jim Cagney	Northwest District Manager
Erin Jones*	LUPA/EIS Lead
Bridget Clayton	Interdisciplinary Team Lead
Jerome Fox*	Wild Horse and Burro Management
Northwest Colorado Fire Management Unit	
James Michels*	Wildland Fire Ecology and Management
Colorado River Valley Field Office	
Steve Bennett	Field Manager
Pauline Adams	Minerals – Locatable and Salable, Soil Resources
Everett Bartz	Range Management
D. J. Beaupert	Lands and Realty
Allen Crockett*	Minerals – Leasable and Coal
Carla DeYoung	Vegetation (Noxious Weeds, Riparian, Wetlands)
Lathan Johnson	Wild land Fire Ecology and Management
Shauna Kocman	Water Resources
Erin Leifeld*	Cultural Resources, Paleontological Resources
Julie McGrew	Visual Resources, Soundscapes
Kim Miller	Recreation, Special Designations
Christina O'Connell	GIS
Sylvia Ringer	Special Status Species, Fish and Wildlife
Todd Sieber	Minerals – Leasable and Coal, Paleontological Resources
Greg Wolfgang	Travel Management
Grand Junction Field Office	
Catherine Robertson	Field Manager (former)
Nate Dieterich	Water Resources, Soil Resources
Doug Diekman	GIS
Scott Gerwe	Minerals – Leasable, Coal, Locatable, Salable, Paleontological Resources
Lathan Johnson	Wild land Fire Ecology and Management
Robin Lacy	Lands and Realty
Alissa Leavitt-Reynolds	Cultural Resources
Anna Lincoln	Vegetation (Noxious Weeds, Riparian, Wetlands)
Jacob Martin	Range Management, Wild Horse and Burro Management
Chris Pipkin	Travel Management, Recreation, Special Designations, Visual Resources, Soundscapes
Heidi Plank	Special Status Species, Fish and Wildlife
Kremmling Field Office	
Dave Stout	Field Manager (former)
Paula Belcher	Vegetation (Noxious Weeds, Riparian, Wetlands), Water Resources, Soil Resources
Kelly Elliott	Minerals – Leasable, Coal

Zach Hughes	Vegetation (Noxious Weeds, Riparian, Wetlands)
Cynthia (Cookie) Landing*	Range Management
Megan McGuire	Special Status Species, Fish and Wildlife,
John Monkouski*	Travel Management, Recreation, Special Designations, Soundscapes
Hannah Schechter	Visual Resources
Annie Sperandio	Lands and Realty
Kevin Thompson	Wild land Fire Ecology and Management
Sue Valente	GIS
Bill Wyatt	Cultural Resources, Paleontological Resources
Little Snake Field Office	
Wendy Reynolds	Field Manager
Desa Ausmus	Special Status Species, Fish and Wildlife
Dale Beckerman	Wild land Fire Ecology and Management
Pam Levitt	GIS
Jennifer Maiolo*	Minerals – Locatable and Salable
Kathy McKinstry	Wild Horse and Burro Management
Louise McMinn	Lands and Realty
Gina Robison	Travel Management, Recreation, Special Designations, Visual Resources, Soundscapes
Hunter Seim	Noxious Weeds and General Vegetation, Range Management
Emily Spencer*	Riparian, Wetlands, Water Resources, Soil Resources
Shawn Wiser	Minerals – Leasable and Coal
White River Field Office	
Kent Walter	Field Manager
Eric Allen	GIS
Lisa Belmonte*	Special Status Species, Fish and Wildlife
Kristen Bowen	Cultural Resources, Paleontological Resources
Stacey Burke*	Lands and Realty
Matt Dupire*	Vegetation (Noxious Weeds, Riparian, Wetlands), Range Management
Paul Kelley	Minerals – Leasable, Coal, Locatable, Salable
Melissa Kindall	Wild Horse and Burro Management
Bob Lange	Water Resources, Soil Resources
James Roberts	Soundscapes
Chad Schneckenburger	Travel Management, Recreation, Special Designations, Visual Resources
Colorado State Office/National Operations Center	
Helen Hankins	State Director
David Epstein*	Socioeconomics, Environmental Justice
Chad Meister*	Air Quality and Climate Change
Josh Sidon	Socioeconomics, Environmental Justice
Megan Stouffer	NEPA/Planning Oversight
USFS Team	
Glen Stein	Management Oversight/Special Designations
Robert Skorkowsky	USFS Colorado Liaison
Pam Bode	Planning Oversight, Climate Change
Chris Colt	Special Status Species, Fish and Wildlife, Water Resources
Dustin Bambrough	Vegetation, Range Management, Soil Resources
Madelyn Dillon	Lands and Realty
Kolleen Kralick	Cultural Resources, Paleontological Resources
Tim Metzger	Wildland Fire Ecology
Chris Miller	Social and Economic Conditions
David Reis	Travel Management, Recreation, Visual Resources, Soundscapes
Apple Snider	Special Status Species
EMPSi Team	
Angie Adams	Project Manager

Annie Daly	Project Support
Kate Krebs	Project Support
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Cindy Schad	Word Processor
Drew Vankat	Project Support for BER and Cumulative Impacts
Randy Varney	Editor
Jennifer Whitaker	Project Support
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Meredith Zaccherio	GRSG Cumulative Impacts Reviewer
ICF International Team	
Rob Fetter	Project Manager – Socioeconomics
Alex Uriarte	Project Assistance
Roy Allen	Project Assistance
* Denotes BLM Core Team Member	

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Chapter 7. References

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Glossary

2008 WAFWA Sage-grouse MOU. A memorandum of understanding (MOU) among Western Association of Fish and Wildlife Agencies, US Department of Agriculture, Forest Service, US Department of the Interior, Bureau of Land Management, US Department of the Interior, Fish and Wildlife Service, US Department of the Interior, Geological Survey, US Department of Agriculture, Natural Resources Conservation Service, and the US Department of Agriculture, Farm Service Agency. The purpose of the MOU is to provide for cooperation among the participating state and federal land, wildlife management and science agencies in the conservation and management of sage-grouse (*Centrocercus urophasianus*) sagebrush (*Artemisia* spp.) habitats and other sagebrush-dependent wildlife throughout the western US and Canada and a commitment of all agencies to implement the 2006 WAFWA Conservation Strategy.

2011 Partnership MOU: A partnership agreement among the United States Department of Agriculture, Natural Resources Conservation Service, Forest Service, United States Department of the Interior, Bureau of Land Management, and Fish and Wildlife Service in 2011. This MOU is for range management – to implement NRCS practices on adjacent federal properties.

Acquisition. Acquisition of lands can be pursued to facilitate various resource management objectives. Acquisitions, including easements, can be completed through exchange, Land and Water Conservation Fund purchases, donations, or receipts from the Federal Land Transaction Facilitation Act sales or exchanges.

Activity plan. A type of implementation plan (see *Implementation plan*); an activity plan usually describes multiple projects and applies best management practices to meet land use plan objectives. Examples of activity plans include interdisciplinary management plans, habitat management plans, recreation area management plans, and grazing plans.

Actual use. The amount of animal unit months consumed by livestock based on the numbers of livestock and grazing dates submitted by the livestock operator and confirmed by periodic field checks by the BLM.

Adaptive management. A type of natural resource management in which decisions are made as part of an ongoing science-based process. Adaptive management involves testing, monitoring, and evaluating applied strategies, and incorporating new knowledge into management approaches that are based on scientific findings and the needs of society. Results are used to modify management policy, strategies, and practices.

Administrative access. A term used to describe access for resource management and administrative purposes such as fire suppression, cadastral surveys, permit compliance, law enforcement and military in the performance of their official duty, or other access needed to administer BLM-managed lands or uses.

Air basin. A land area with generally similar meteorological and geographic conditions throughout. To the extent possible, air basin boundaries are defined along political boundary lines and include both the source and receptor areas.

Air pollution. Degradation of air quality resulting from unwanted chemicals or other materials occurring in the air.

All designated habitat (ADH). Includes preliminary priority habitat (PPH), preliminary general habitat (PGH), and linkage/connectivity habitat.

Allotment. An area of land in which one or more livestock operators graze their livestock. Allotments generally consist of BLM lands but may include other federally managed, state-owned, and private lands. An allotment may include one or more separate pastures. Livestock numbers and periods of use are specified for each allotment.

Allotment management plan. A concisely written program of livestock grazing management, including supportive measures if required, designed to attain specific, multiple-use management goals in a grazing allotment. An AMP is prepared in consultation with the permittee(s), lessee(s), and other affected interests. Livestock grazing is considered in relation to other uses of the range and to renewable resources, such as watershed, vegetation, and wildlife. An AMP establishes seasons of use, the number of livestock to be permitted, the range improvements needed, and the grazing system.

Alluvial soil. A soil developing from recently deposited alluvium and exhibiting essentially no horizon development or modification of the recently deposited materials.

Alluvium. Clay, silt, sand, gravel, or other rock materials transported by moving water. Deposited in comparatively recent geologic time as sorted or semi-sorted sediment in rivers, floodplains, lakes, and shores, and in fans at the base of mountain slopes.

Ambient air quality. The state of the atmosphere at ground level as defined by the range of measured and/or predicted ambient concentrations of all significant pollutants for all averaging periods of interest.

Amendment. The process for considering or making changes in the terms, conditions, and decisions of approved Resource Management Plans or management framework plans. Usually only one or two issues are considered that involve only a portion of the planning area.

Animal unit month (AUM). The amount of forage necessary for the sustenance of one cow or its equivalent for a period of one month.

Anthropogenic disturbances. Features include but are not limited to paved highways, graded gravel roads, transmission lines, substations, wind turbines, oil and gas wells, geothermal wells and associated facilities, pipelines, landfills, agricultural conversion, homes, and mines.

Aquatic. Living or growing in or on the water.

Area of Critical Environmental Concern (ACEC). Special Area designation established through the BLM's land use planning process (43 CFR 1610.7-2) where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards. The level of allowable use within an ACEC is established through the collaborative planning process. Designation of an ACEC allows for resource use limitations in order to protect identified resources or values.

Atmospheric deposition. Air pollution produced when acid chemicals are incorporated into rain, snow, fog, or mist and fall to the earth. Sometimes referred to as "acid rain" and comes from sulfur oxides and nitrogen oxides, products of burning coal and other fuels and from certain

industrial processes. If the acid chemicals in the air are blown into the area where the weather is wet, the acids can fall to earth in the rain, snow, fog, or mist. In areas where the weather is dry, the acid chemicals may become incorporated into dust or smoke.

Attainment area. A geographic area in which levels of a criteria air pollutant meet the health-based National Ambient Air Quality Standard for that specific pollutant.

Authorized /authorized use. This is an activity (i.e., resource use) occurring on the public lands that is either explicitly or implicitly recognized and legalized by law or regulation. This term may refer to those activities occurring on the public lands for which the BLM, Forest Service, or other appropriate authority (e.g., Congress for RS 2477 rights-of-way, FERC for major, interstate rights-of-way), has issued a formal authorization document (e.g., livestock grazing lease/permit; right-of-way grant; coal lease; oil and gas permit to drill; etc.). Formally authorized uses typically involve some type of commercial activity, facility placement, or event. These formally authorized uses are often spatially or temporally limited. Unless constrained or bounded by statute, regulation, or an approved land use plan decision, legal activities involving public enjoyment and use of the public lands (e.g., hiking, camping, hunting, etc.) require no formal BLM or Forest Service authorization.

Avoidance/avoidance area. These terms usually address mitigation of some activity (i.e., resource use). Paraphrasing the CEQ Regulations (40 CFR 1508.20), avoidance means to circumvent, or bypass, an impact altogether by not taking a certain action, or parts of an action. Therefore, the term "avoidance" does not necessarily prohibit a proposed activity, but it may require the relocation of an action, or the total redesign of an action to eliminate any potential impacts resulting from it. Also see *"right-of-way avoidance area"* definition.

Best Management Practices (BMPs): A suite of techniques that guide or may be applied to management actions to aide in achieving desired outcomes. BMPs are often developed in conjunction with land use plans, but they are not considered a planning decision unless the plans specify that they are mandatory.

Big game. Indigenous, ungulate (hoofed) wildlife species that are hunted, such as elk, deer, bison, bighorn sheep, and pronghorn antelope.

Biodiversity (biological diversity). The variety of life and its processes, and the interrelationships within and among various levels of ecological organization. Conservation, protection, and restoration of biological species and genetic diversity are needed to sustain the health of existing biological systems. Federal resource management agencies must examine the implications of management actions and development decisions on regional and local biodiversity.

Biological soil crust. A complex association between soil particles and cyanobacteria, algae, microfungi, lichens, and bryophytes that live within or atop the uppermost millimeters of soil.

BLM Sensitive Species. Those species that are not federally listed as endangered, threatened, or proposed under the Endangered Species Act, but that are designated by the BLM State Director under 16 USC 1536(a)(2) for special management consideration. By national policy, federally listed candidate species are automatically included as sensitive species. Sensitive species are managed so they will not need to be listed as proposed, threatened, or endangered under the Endangered Species Act.

Candidate species. Taxa for which the US Fish and Wildlife Service has sufficient information on their status and threats to propose the species for listing as endangered or threatened under the Endangered Species Act, but for which issuance of a proposed rule is currently precluded by higher priority listing actions. Separate lists for plants, vertebrate animals, and invertebrate animals are published periodically in the Federal Register (BLM Manual 6840, Special Status Species Manual).

Casual Use. Casual use means activities ordinarily resulting in no or negligible disturbance of the public lands, resources, or improvements. For examples for rights of ways see 43 CFR 2801.5. For examples for locatable minerals see 43 CFR 3809.5.

Categorical exclusion. A category of actions (identified in agency guidance) that do not individually or cumulatively have a significant effect on the human environment, and for which neither an environmental assessment nor an environmental impact statement is required (40 CFR 1508.4), but a limited form of NEPA analysis is performed.

Checkerboard. This term refers to a land ownership pattern of alternating sections of federally owned lands with private- or state-owned lands for 20 miles on either side of a land grant railroad (e.g., Union Pacific, Northern Pacific, etc.). On land status maps this alternating ownership is either delineated by color coding or alphabetic code resulting in a "checkerboard" visual pattern.

Chemical vegetation treatment. Application of herbicides to control invasive species/noxious weeds and/or unwanted vegetation. To meet resource objectives the preponderance of chemical treatments would be used in areas where cheatgrass or noxious weeds have invaded sagebrush steppe.

Clean Air Act of 1963 (as amended). Federal legislation governing air pollution control.

Clean Water Act of 1972 (as amended). Federal legislation governing water pollution control.

Climate change. Any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from:

- natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun;
- natural processes within the climate system (e.g., changes in ocean circulation); and
- human activities that change the atmosphere's composition (e.g., driving automobiles) and the land surface (e.g., deforestation, reforestation, urbanization, desertification, etc.).

Closed area. An area where one or more uses are prohibited either temporarily or over the long term. Areas may be closed to uses such as, but not limited to, off-road vehicles, mineral leasing, mineral or vegetative material collection, or target shooting. In off-road vehicle use closed areas, motorized and mechanized off-road vehicle use is prohibited. Use of motorized and mechanized off-road vehicles in closed areas may be allowed for certain reasons; however, such use shall be made only with the approval of the authorized officer (43 CFR 8340.0-5).

Collaboration. A cooperative process in which interested parties, often with widely varied interests, work together to seek solutions with broad support for managing public and other

lands. Collaboration may take place with any interested parties, whether or not they are a cooperating agency.

Comprehensive trails and travel management. The proactive interdisciplinary planning; on-the-ground management and administration of travel networks (both motorized and non-motorized) to ensure public access, natural resources, and regulatory needs are considered. It consists of inventory, planning, designation, implementation, education, enforcement, monitoring, easement acquisition, mapping and signing, and other measures necessary to provide access to public lands for a wide variety of uses (including uses for recreational, traditional, casual, agricultural, commercial, educational, landing strips, and other purposes).

Condition class (fire regimes). Fire regime condition classes are a measure describing the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components, such as species composition, structural stage, stand age, canopy closure, and fuel loadings. One or more of the following activities may have caused this departure: fire suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plant species, introduced insects or disease, or other management activities.

Conformance. A proposed action shall be specifically provided for in the land use plan or, if not specifically mentioned, shall be clearly consistent with the goals, objectives, or standards of the approved land use plan.

Conservation measures. Measures to conserve, enhance, and/or restore Greater Sage-Grouse habitat by reducing, eliminating, or minimizing threats to that habitat.

Conservation plan. The recorded decisions of a landowner or operator, cooperating with a conservation district, on how the landowner or operator plans, within practical limits, to use his/her land according to its capability and to treat it according to its needs for maintenance or improvement of the soil, water, animal, plant, and air resources.

Conservation strategy. A strategy outlining current activities or threats that are contributing to the decline of a species, along with the actions or strategies needed to reverse or eliminate such a decline or threats. Conservation strategies are generally developed for species of plants and animals that are designated as BLM sensitive species or that have been determined by the US Fish and Wildlife Service or National Oceanographic and Atmospheric Administration-Fisheries to be federal candidates under the ESA.

Controlled surface use (CSU). CSU is a category of moderate constraint stipulations that allows some use and occupancy of public land while protecting identified resources or values and is applicable to fluid mineral leasing and all activities associated with fluid mineral leasing (e.g., truck-mounted drilling and geophysical exploration equipment off designated routes, construction of wells and/or pads). CSU areas are open to fluid mineral leasing but the stipulation allows the BLM to require special operational constraints, or the activity can be shifted more than 200 meters (656 feet) to protect the specified resource or value.

Communication site. Sites that include broadcast types of uses (e.g., television, AM/FM radio, cable television, broadcast translator) and non-broadcast uses (e.g., commercial or private mobile radio service, cellular telephone, microwave, local exchange network, passive reflector).

Cooperating agency. Assists the lead federal agency in developing an environmental assessment or environmental impact statement. These can be any agency with jurisdiction by law or special

expertise for proposals covered by NEPA (40 CFR 1501.6). Any tribe or Federal, State, or local government jurisdiction with such qualifications may become a cooperating agency by agreement with the lead agency.

Council on Environmental Quality. An advisory council to the President of the US established by the National Environmental Policy Act of 1969. It reviews federal programs to analyze and interpret environmental trends and information.

Criteria pollutant. The US EPA uses six "criteria pollutants" as indicators of air quality, and has established for each of them a maximum concentration above which adverse effects on human health may occur. These threshold concentrations are called National Ambient Air Quality Standards. The criteria pollutants are ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter and lead.

Crucial wildlife habitat. The environment essential to plant or animal biodiversity and conservation at the landscape level. Crucial habitats include, but are not limited to, biological core areas, severe winter range, winter concentration areas, reproduction areas, and movement corridors.

Cultural resources. Locations of human activity, occupation, or use. Cultural resources include archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and locations of traditional cultural or religious importance to specified social and/or cultural groups.

Cumulative effects. The direct and indirect effects of a proposed project alternative's incremental impacts when they are added to other past, present, and reasonably foreseeable actions, regardless of who carries out the action.

Decision area. Public lands and mineral estate managed by the United States Department of the Interior, Bureau of Land Management, and public lands managed by the United States Department of Agriculture, Forest Service, Routt National Forest, that are within the planning area and that are encompassed by all designated habitat (ADH) (which includes preliminary priority habitat [PPH], preliminary general habitat [PGH], and linkage/connectivity habitat).

Deferred/deferred use: To set-aside, or postpone, a particular resource use(s) or activity(ies) on the public lands to a later time. Generally when this term is used the period of the deferral is specified. Deferments sometimes follow the sequence timeframe of associated serial actions (e.g., action B will be deferred until action A is completed, etc.).

Degraded vegetation. Areas where the plant community is not complete or is under threat. Examples include missing components such as perennial forbs or cool season grasses, weed infestations, or lack of regeneration of key species such as sagebrush or cottonwoods trees.

Designated roads and trails. Specific roads and trails identified by the BLM (or other agency) where some type of motorized/nonmotorized use is appropriate and allowed, either seasonally or year-long (H-1601-1, BLM Land Use Planning Handbook).

Desired future condition. For rangeland vegetation, the condition of rangeland resources on a landscape scale that meet management objectives. It is based on ecological, social, and economic considerations during the land planning process. It is usually expressed as ecological status or management status of vegetation (species composition, habitat diversity, and age and size class of species) and desired soil qualities (soil cover, erosion, and compaction). In a general context,

desired future condition is a portrayal of the land or resource conditions that are expected to result if goals and objectives are fully achieved.

Desired outcomes. A type of land use plan decision expressed as a goal or objective.

Direct impacts. Direct impacts are caused by an action or implementation of an alternative and occur at the same time and place.

Directional drilling. A drilling technique whereby a well is deliberately deviated from the vertical in order to reach a particular part of the oil- or gas-bearing reservoir. Directional drilling technology enables the driller to steer the drill stem and bit to a desired bottom hole location. Directional wells initially are drilled straight down to a predetermined depth and then gradually curved at one or more different points to penetrate one or more given target reservoirs. This specialized drilling usually is accomplished with the use of a fluid-driven downhole motor, which turns the drill bit. Directional drilling also allows multiple production and injection wells to be drilled from a single surface location such as a gravel pad, thus minimizing cost and the surface impact of oil and gas drilling, production, and transportation facilities. It can be used to reach a target located beneath an environmentally sensitive area (Alaska Department of Natural Resources, Division of Oil and Gas 2009).

Disposal lands. Transfer of public land out of federal ownership to another party through sale, exchange, Recreation and Public Purposes Act of 1926, Desert Land Entry or other land law statutes.

Disruptive activities. Those public land resource uses/activities that are likely to alter the behavior, displace, or cause excessive stress to existing animal or human populations occurring at a specific location and/or time. In this context, disruptive activity(ies) refers to those actions that alter behavior or cause the displacement of individuals such that reproductive success is negatively affected, or an individual's physiological ability to cope with environmental stress is compromised. This term does not apply to the physical disturbance of the land surface, vegetation, or features. When administered as a land use restriction (e.g., *No Disruptive Activities*), this term may prohibit or limit the physical presence of sound above ambient levels, light beyond background levels, and/or the nearness of people and their activities. The term is commonly used in conjunction with protecting wildlife during crucial life stages (e.g., breeding, nesting, birthing, etc.), although it could apply to any resource value on the public lands. The use of this land use restriction is not intended to prohibit all activity or authorized uses.

Diversity. The relative abundance of wildlife species, plant species, communities, habitats, or habitat features per unit of area.

Easement. A right afforded a person or agency to make limited use of another's real property for access or other purposes.

Ecological Site. A distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.

Emergency stabilization. Planned actions to stabilize and prevent unacceptable degradation to natural and cultural resources, to minimize threats to life or property resulting from the effects of a fire, or to repair/replace/construct physical improvements necessary to prevent degradation of land or resources. Emergency stabilization actions must be taken within one year following containment of a wildfire.

Endangered species. Any species that is in danger of extinction throughout all or a significant portion of its range (BLM Manual 6840, Special Status Species Manual). Under the Endangered Species Act in the US, "endangered" is the more-protected of the two categories. Designation as endangered (or threatened) is determined by USFWS as directed by the Endangered Species Act.

Endangered Species Act of 1973 (as amended). Designed to protect critically imperiled species from extinction as a consequence of economic growth and development untempered by adequate concern and conservation. The Act is administered by two federal agencies, USFWS and the National Oceanic and Atmospheric Administration. The purpose of the Act is to protect species and also the ecosystems upon which they depend (16 US Code 1531-1544).

Enhance. The improvement of habitat by increasing missing or modifying unsatisfactory components and/or attributes of the plant community to meet sage-grouse objectives.

Environmental assessment. A concise public document prepared to provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. It includes a brief discussion of the need for the proposal, alternatives considered, environmental impact of the proposed action and alternatives, and a list of agencies and individuals consulted.

Environmental impact statement (EIS). A detailed statement prepared by the responsible official in which a major federal action that significantly affects the quality of the human environment is described, alternatives to the proposed action are provided, and effects are analyzed (BLM National Management Strategy for OHV Use on Public Lands).

Evaluation (plan evaluation). The process of reviewing the land use plan and the periodic plan monitoring reports to determine whether the land use plan decisions and National Environmental Policy Act of 1969 analysis are still valid and whether the plan is being implemented.

Exchange. A transaction whereby the federal government receives land or interests in land in exchange for other land or interests in land.

Exclusion Areas. An area on the public lands where a certain activity(ies) is prohibited to insure protection of other resource values present on the site. The term is frequently used in reference to lands/realty actions and proposals (e.g., rights-of-way, etc.), but is not unique to lands and realty program activities. This restriction is functionally analogous to the phrase "no surface occupancy" used by the oil and gas program, and is applied as an absolute condition to those affected activities. The less restrictive analogous term is avoidance area. Also see *"right-of-way exclusion area"* definition.

Exemplary (vegetation). An area of vegetation that does not show signs of degradation and which may serve as a comparison to illustrate what the vegetation potential is for a given type of environment. Exemplary vegetation meets A-ranked viability criteria as described by the Colorado Natural Heritage Program.

Existing routes. The roads, trails, or ways that are used by motorized vehicles (jeeps, all-terrain vehicles, motorized dirt bikes, etc.), mechanized uses (mountain bikes, wheelbarrows, game carts), pedestrians (hikers), and/or equestrians (horseback riders) and are, to the best of BLM's knowledge, in existence at the time of RMP/EIS publication.

Exploration. Active drilling and geophysical operations to:

1. Determine the presence of the mineral resource; or
2. Determine the extent of the reservoir or mineral deposit.

Extensive recreation management area (ERMA). Administrative units that require specific management consideration in order to address recreation use, demand, or Recreation and Visitor Services program investments. ERMAs are managed to support and sustain the principal recreation activities and the associated qualities and conditions of the ERMA. ERMA management is commensurate and considered in context with the management of other resources and resource uses.

Federal Land Policy and Management Act of 1976 (FLPMA). Public Law 94-579, October 21, 1976, often referred to as the BLM's "Organic Act," which provides most of the BLM's legislated authority, direction policy, and basic management guidance.

Federal mineral estate. Subsurface mineral estate owned by the US and administered by the BLM. Federal mineral estate under BLM jurisdiction is composed of mineral estate underlying BLM lands, privately owned lands, and state-owned lands.

Fire frequency. A general term referring to the recurrence of fire in a given area over time.

Fire management plan (FMP). A plan that identifies and integrates all wildland fire management and related activities within the context of approved land/resource management plans. It defines a program to manage wildland fires (wildfire, prescribed fire, and wildland fire use). The plan is supplemented by operational plans including, but not limited to, preparedness plans, preplanned dispatch plans, and prevention plans. Fire Management Plans assure that wildland fire management goals and components are coordinated.

Fire Regime Condition Classification System (FRCCS). Measures the extent to which vegetation departs from reference conditions, or how the current vegetation differs from a particular reference condition.

Fire suppression. All work and activities connected with control and fire-extinguishing operations, beginning with discovery and continuing until the fire is completely extinguished.

Fluid minerals. Oil, gas, coal bed natural gas, and geothermal resources.

Forage. All browse and herbaceous foods that are available to grazing animals.

Forage base. The amount of vegetation available for wildlife and livestock use.

Fragile soils. Soils having a shallow depth to bedrock, minimal surface layer of organic material, textures that are more easily detached and eroded, or are on slopes over 35 percent.

Fugitive dust. Significant atmospheric dust arises from the mechanical disturbance of granular material exposed to the air. Dust generated from these open sources is termed "fugitive" because it is not discharged to the atmosphere in a confined flow stream. Common sources of fugitive dust include unpaved roads, agricultural tilling operations, aggregate storage piles, and heavy construction operations.

General sage-grouse habitat. Is occupied (seasonal or year-round) habitat outside of priority habitat. These areas have been identified by the BLM in coordination with respective state wildlife agencies.

Geographic Information System (GIS). A system of computer hardware, software, data, people, and applications that capture, store, edit, analyze, and display a potentially wide array of geospatial information.

Geophysical exploration. Efforts to locate deposits of oil and gas resources and to better define the subsurface.

Geothermal energy. Natural heat from within the Earth captured for production of electric power, space heating, or industrial steam.

Goal. A broad statement of a desired outcome; usually not quantifiable and may not have established timeframes for achievement.

Grandfathered right. The right to use in a non-conforming manner due to existence prior to the establishment of conforming terms and conditions.

Grazing preference. Grazing preference or preference means the total number of animal unit months on public lands apportioned and attached to base property owned or controlled by a permittee, lessee, or an applicant for a permit or lease. Grazing preference includes active use and use held in suspension. Grazing preference holders have a superior or priority position against others for the purpose of receiving a grazing permit or lease (43 CFR 4100.0-5).

Grazing system. Scheduled grazing use and non-use of an allotment to reach identified goals or objectives by improving the quality and quantity of vegetation. Include, but are not limited to, developing pastures, utilization levels, grazing rotations, timing and duration of use periods, and necessary range improvements.

Groundwater. Water held underground in soil or permeable rock, often feeding springs and wells.

Guidelines. Actions or management practices that may be used to achieve desired outcomes, sometimes expressed as BMPs. Guidelines may be identified during the land use planning process, but they are not considered a land use plan decision unless the plan specifies that they are mandatory. Guidelines for grazing administration must conform to 43 CFR 4180.2.

Habitat. An environment that meets a specific set of physical, biological, temporal, or spatial characteristics that satisfy the requirements of a plant or animal species or group of species for part or all of their life cycle.

Hazardous material. A substance, pollutant, or contaminant that, due to its quantity, concentration, or physical or chemical characteristics, poses a potential hazard to human health and safety or to the environment if released into the workplace or the environment.

Impact. The effect, influence, alteration, or imprint caused by an action.

Impairment. The degree to which a distance of clear visibility is degraded by man-made pollutants.

Implementation decisions. Decisions that take action to implement land use planning; generally appealable to Interior Board of Land Appeals under 43 CFR 4.410.

Implementation plan. An area or site-specific plan written to implement decisions made in a land use plan. Implementation plans include both activity plans and project plans.

Indicators. Factors that describe resource condition and change and can help the BLM determine trends over time.

Indirect impacts. 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.

Intermittent stream. An intermittent stream is a stream that flows only at certain times of the year when it receives water from springs or from some surface sources such as melting snow in mountainous areas. During the dry season and throughout minor drought periods, these streams will not exhibit flow. Geomorphological characteristics are not well defined and are often inconspicuous. In the absence of external limiting factors, such as pollution and thermal modifications, species are scarce and adapted to the wet and dry conditions of the fluctuating water level.

Invertebrate. An animal lacking a backbone or spinal column, such as insects, snails, and worms. The group includes 97 percent of all animal species.

Key wildlife ecosystems. Specific areas within the geographic area occupied by a species in which are found those physical and biological features 1) essential to the conservation of the species, and 2) which may require special management considerations or protection.

Land health condition. A classification for land health which includes these categories: "Meeting Land Health Standard(s)" and "Not Meeting Land Health Standard(s)".

- Meeting Land Health Standard(s): Lands for which health indicators are currently in acceptable condition such that basic levels of ecological processes and functions are in place. This rating includes the following subcategories:

- Fully Meeting Standard(s): Lands for which there are no substantive concerns with health indicators

- Exceeding Standard(s): Lands for which health indicators are in substantially better conditions than acceptable levels.

- Meeting Standard(s) with Problems: Lands which have one or more concerns with health indicators to the degree that they are categorized as meeting the Land Health Standards, but have some issues which make them at risk of becoming "not meeting."

- Not Meeting Land Health Standard(s): Lands for which one or more health indicators are in unacceptable conditions such that basic levels of ecological processes and functions are no longer in place.

Land health trend is used to describe these classes further. It includes these categories: upward, static, and downward.

- Upward Trend: lands which have shown improving indicator conditions over time.

- Static Trend: lands which have shown no clear improvement or decline in indicator conditions over time.

- Downward Trend: lands which have shown declining indicator conditions over time.

Land tenure adjustments. Land ownership or jurisdictional changes. To improve the manageability of the BLM lands and their usefulness to the public, the BLM has numerous authorities for repositioning lands into a more consolidated pattern, disposing of lands, and entering into cooperative management agreements. These land pattern improvements are completed primarily through the use of land exchanges but also through land sales, through jurisdictional transfers to other agencies, and through the use of cooperative management agreements and leases.

Land treatment. All methods of artificial range improvement arid soil stabilization such as reseeding, brush control (chemical and mechanical), pitting, furrowing, water spreading, etc.

Land use allocation. The identification in a land use plan of the activities and foreseeable development that are allowed, restricted, or excluded for all or part of the planning area, based on desired future conditions (H-1601-1, BLM Land Use Planning Handbook).

Land use plan. A set of decisions that establish management direction for land within an administrative area, as prescribed under the planning provisions of FLPMA; an assimilation of land use plan level decisions developed through the planning process outlined in 43 CFR 1600, regardless of the scale at which the decisions were developed. The term includes both RMPs and management framework plans (from H-1601-1, BLM Land Use Planning Handbook).

Land use plan decision. Establishes desired outcomes and actions needed to achieve them. Decisions are reached using the planning process in 43 CFR 1600. When they are presented to the public as proposed decisions, they can be protested to the BLM Director. They are not appealable to Interior Board of Land Appeals.

Large transmission lines. The movement or transfer of electric energy over an interconnected group of lines and associated equipment between points of supply and points at which it is transformed for delivery to customers, or is delivered to other electrical systems. Transmission is considered to end when the energy is transformed for distribution to the customer. For purposes of this EIS, large transmission lines are considered to be 230 kilovolts or higher. 230-kilovolt lines generally require a larger disturbance footprint to accommodate larger infrastructure.

Late brood-rearing area. Habitat includes mesic sagebrush and mixed shrub communities, wet meadows, and riparian habitats as well as some agricultural lands (e.g. alfalfa fields, etc.).

Leasable minerals. Those minerals or materials designated as leasable under the Mineral Leasing Act of 1920. These include energy-related mineral resources such as oil, natural gas, coal and geothermal, and some non-energy minerals, such as phosphate, sodium, potassium, and sulfur. Geothermal resources are also leasable under the Geothermal Steam Act of 1970.

Lease. Section 302 of the Federal Land Policy and Management Act of 1976 provides the BLM's authority to issue leases for the use, occupancy, and development of public lands. Leases are issued for purposes such as a commercial filming, advertising displays, commercial or noncommercial croplands, apiaries, livestock holding or feeding areas not related to grazing permits and leases, native or introduced species harvesting, temporary or permanent facilities for commercial purposes (does not include mining claims), residential occupancy, ski resorts, construction equipment storage sites, assembly yards, oil rig stacking sites, mining claim occupancy if the residential structures are not incidental to the mining operation, and water pipelines and well pumps related to irrigation and nonirrigation facilities. The regulations establishing procedures for processing these leases and permits are found in 43 CFR 2920.

Lease stipulation. A modification of the terms and conditions on a standard lease form at the time of the lease sale.

Lek. A traditional courtship display area attended by male sage-grouse in or adjacent to sagebrush dominated habitat. A lek is designated based on observations of two or more male sage-grouse engaged in courtship displays. Sub-dominant males may display on itinerant strutting areas during population peaks. Such areas usually fail to become established leks. Therefore, a site where less than five males are observed strutting should be confirmed active for two years before meeting the definition of a lek (Connelly et al 2000, Connelly et al. 2003, 2004). Each state may have a slightly different definition of lek, active lek, inactive lek, occupied lek, and unoccupied leks. Regional planning will use the appropriate definition provided by the state of interest.

Lek Complex. A lek or group of leks within 2.5 km (1.5 mi) of each other between which male sage-grouse may interchange from one day to the next. Fidelity to leks has been well documented. Visits to multiple leks are most common among yearlings and less frequent for adult males, suggesting an age-related period of establishment (Connelly et al. 2004).

Active Lek. Any lek that has been attended by male sage-grouse during the strutting season.

Inactive Lek. Any lek where sufficient data suggests that there was no strutting activity throughout a strutting season. Absence of strutting grouse during a single visit is insufficient documentation to establish that a lek is inactive. This designation requires documentation of either: 1) an absence of sage-grouses on the lek during at least 2 ground surveys separated by at least seven days. These surveys must be conducted under ideal conditions (April 1-May 7, or other appropriate date based on local conditions), no precipitation, light or no wind, half-hour before sunrise to one hour after sunrise) or 2) a ground check of the exact known lek site late in the strutting season (after April 15) that fails to find any sign (tracks, droppings, feathers) of strutting activity. Data collected by aerial surveys should not be used to designate inactive status as the aerial survey may actually disrupt activities.

Occupied Lek. A lek that has been active during at least one strutting season within the prior 10 years.

Unoccupied Lek. A lek that has either been "destroyed" or "abandoned."

Destroyed Lek. A formerly active lek site and surrounding sagebrush habitat that has been destroyed and is no longer suitable for sage-grouse breeding.

Abandoned Lek. A lek in otherwise suitable habitat that has not been active during a period of 10 consecutive years. To be designated abandoned, a lek must be "inactive" (see above criteria) in at least four non-consecutive strutting seasons spanning the 10 years. The site of an "abandoned" lek should be surveyed at least once every 10 years to determine whether it has been re-occupied by sage-grouse.

Lentic. Pertaining to standing water, such as lakes and ponds.

Linkage Habitat (connectivity/linkage areas, linkages). Areas that have been identified as broader regions of connectivity important to facilitate the movement of Greater Sage-Grouse and to maintain ecological processes.

Locatable minerals. Minerals subject to exploration, development, and disposal by staking mining claims as authorized by the Mining Law of 1872, as amended. This includes deposits of gold, silver, and other uncommon minerals not subject to lease or sale.

Long-term effect. The effect could occur for an extended period after implementation of the alternative. The effect could last several years or more.

Lotic. Pertaining to moving water, such as streams or rivers.

Management decision. A decision made by the BLM to manage public lands. Management decisions include both land use plan decisions and implementation decisions.

Management zone. Two types of management zones are addressed:

- **Colorado Management Zones** – 21 Greater sage-grouse management zones comprised of preliminary priority habitat (PPH), preliminary general habitat (PGH), and linkage/connectivity habitat in order to manage disturbance caps and be able to identify specific habitat areas.
- **Western Association of Fish and Wildlife Agencies (WAFWA) Management Zones** – 7 Greater Sage-grouse management zones established based on populations across the entire range of the Greater Sage-grouse. Northwest Colorado falls into WAFWA Management Zones II and VII. WAFWA management zones are used in the cumulative effects analysis.

Master Development Plans. A set of information common to multiple planned wells, including drilling plans, Surface Use Plans of Operations, and plans for future production.

Mechanized transport. Any vehicle, device, or contrivance for moving people or material in or over land, water, snow, or air that has moving parts.

Mineral. Any naturally formed inorganic material, solid or fluid inorganic substance that can be extracted from the earth, any of various naturally occurring homogeneous substances (as stone, coal, salt, sulfur, sand, petroleum, water, or natural gas) obtained usually from the ground. Under federal laws, considered as locatable (subject to the general mining laws), leasable (subject to the Mineral Leasing Act of 1920), and salable (subject to the Materials Act of 1947).

Mineral entry. The filing of a claim on public land to obtain the right to any locatable minerals it may contain.

Mineral estate. The ownership of minerals, including rights necessary for access, exploration, development, mining, ore dressing, and transportation operations.

Mineralize. The process where a substance is converted from an organic substance to an inorganic substance.

Mineral materials. Common varieties of mineral materials such as soil, sand and gravel, stone, pumice, pumicite, and clay that are not obtainable under the mining or leasing laws but that can be acquired under the Materials Act of 1947, as amended.

Mining claim. A parcel of land that a miner takes and holds for mining purposes, having acquired the right of possession by complying with the Mining Law and local laws and rules. A mining claim may contain as many adjoining locations as the locator may make or buy. There are four categories of mining claims: lode, placer, millsite, and tunnel site.

Mining Law of 1872. Provides for claiming and gaining title to locatable minerals on public lands. Also referred to as the "General Mining Laws" or "Mining Laws."

Mitigation. Includes specific means, measures or practices that could reduce, avoid, or eliminate adverse impacts. Mitigation can include avoiding the impact altogether by not taking a certain action or parts of an action, minimizing the impact by limiting the degree of magnitude of the action and its implementation, rectifying the impact by repairing, rehabilitation, or restoring the affected environment, reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action, and compensating for the impact by replacing or providing substitute resources or environments.

Modification. A change to the provisions of a lease stipulation, either temporarily or for the term of the lease. Depending on the specific modification, the stipulation may or may not apply to all sites within the leasehold to which the restrictive criteria are applied.

Monitoring (plan monitoring). The process of tracking the implementation of land use plan decisions and collecting and assessing data necessary to evaluate the effectiveness of land use planning decisions.

Motorized vehicles or uses. Vehicles that are motorized, including but not limited to jeeps, all-terrain vehicles (all-terrain vehicles, such as four-wheelers and three-wheelers), trail motorcycles or dirt bikes, and aircrafts.

Multiple-use. The management of the public lands and their various resource values so that they are used in the combination that will best meet the present and future needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to changing needs and conditions; the use of some land for less than all of the resources; a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output (FLPMA) (BLM Manual 6840, Special Status Species Manual).

Municipal watershed. A watershed area that provides water for use by a municipality as defined by the community and accepted by the State.

National Environmental Policy Act of 1969 (NEPA). Public Law 91-190. Establishes environmental policy for the nation. Among other items, NEPA requires federal agencies to consider environmental values in decision-making processes.

National Register of Historic Places. A listing of architectural, historical, archaeological, and cultural sites of local, state, or national significance, established by the Historic Preservation Act of, 1966 and maintained by the National Park Service.

Native vegetation. Plant species which were found here prior to European settlement, and consequently are in balance with these ecosystems because they have well developed parasites, predators, and pollinators.

Natural processes. Fire, drought, insect and disease outbreaks, flooding, and other events which existed prior to European settlement, and shaped vegetation composition and structure.

Non-energy leasable minerals. Those minerals or materials designated as leasable under the Mineral Leasing Act of 1920. Non-energy minerals include resources such as phosphate, sodium, potassium, and sulfur.

Nonfunctional condition. Riparian-wetland areas that clearly are not providing adequate vegetation, landform, or woody debris to dissipate energies associated with flow events, and thus are not reducing erosion, improving water quality, etc.

No surface occupancy (NSO). A major constraint where use or occupancy of the land surface for fluid mineral exploration or development and all activities associated with fluid mineral leasing (e.g., truck-mounted drilling and geophysical exploration equipment off designated routes, construction of wells and/or pads) are prohibited to protect identified resource values. Areas identified as NSO are open to fluid mineral leasing, but surface occupancy or surface-disturbing activities associated with fluid mineral leasing cannot be conducted on the surface of the land. Access to fluid mineral deposits would require horizontal drilling from outside the boundaries of the NSO area.

Noxious weeds. A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or nonnative, new, or not common to the US.

Objective. A description of a desired outcome for a resource. Objectives can be quantified and measured and, where possible, have established timeframes for achievement.

Off-highway vehicle (OHV) (off-road vehicle). Any motorized vehicle capable of, or designated for travel on or immediately over land, water or other natural terrain, excluding: (1) any non-amphibious registered motorboat; (2) any military, fire, emergency, or law enforcement vehicle while being used for emergency purposes; (3) any vehicle whose use is expressly authorized by the authorized officer, or otherwise officially approved; (4) vehicles in official use; and (5) any combat or combat support vehicle when used for national defense emergencies (43 CFR 8340.0-5).

Open. Generally denotes that an area is available for a particular use or uses. Refer to specific program definitions found in law, regulations, or policy guidance for application to individual programs. For example, 43 CFR 8340.0-5 defines the specific meaning of "open" as it relates to OHV use.

Ozone. A faint blue gas produced in the atmosphere from chemical reactions of burning coal, gasoline, and other fuels and chemicals found in products such as solvents, paints, and hairsprays.

Paleontological resources. The physical remains or other physical evidence of plants and animals preserved in soils and sedimentary rock formations. Paleontological resources are important for correlating and dating rock strata and for understanding past environments, environmental change, and the evolution of life.

Particulate matter (PM). One of the six "criteria" pollutants for which the US EPA established National Ambient Air Quality Standards. Particulate matter is defined as two categories, fine particulates, with an aerodynamic diameter of 10 micrometers (PM_{10}) or less, and fine particulates with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$).

Perennial stream. A stream that flows continuously. Perennial streams are generally associated with a water table in the localities through which they flow.

Permitted use. The forage allocated by, or under the guidance of, an applicable land use plan for livestock grazing in an allotment under a permit or lease and expressed in AUMs (43 CFR 4100.0-5) (from H-4180-1, BLM Rangeland Health Standards Manual).

Permittee. A person or company permitted to graze livestock on public land.

Physiography. The study and classification of the surface features of the earth.

Plan of Operations. A Plan of Operations is required for all mining activity exploration greater than 5 acres or surface disturbance greater than casual use on certain special category lands. Special category lands are described under 43 CFR 3809.11(c) and include such lands as designated Areas of Critical Environmental Concern, lands within the National Wilderness Preservation System, and areas closed to off-road vehicles, among others. In addition, a plan of operations is required for activity greater than casual use on lands patented under the Stock Raising Homestead Act with Federal minerals where the operator does not have the written consent of the surface owner (43 CFR 3814). The Plan of operations needs to be filed in the BLM field office with jurisdiction over the land involved. The Plan of Operations does not need to be on a particular form but must address the information required by 43 CFR 3809.401(b).

Planning area. The geographical area for which resource management plans are developed and maintained. The Northwest Colorado Greater Sage-Grouse LUPA/EIS planning area boundary encompasses approximately 15 million acres in Eagle, Garfield, Grand, Jackson, Larimer, Mesa, Moffat, Rio Blanco, Routt, and Summit Counties in northwestern Colorado. The planning area includes approximately 8.5 million acres of public lands managed by five BLM field offices (Colorado River Valley, Grand Junction, Kremmling, Little Snake, and White River) and the Routt National Forest, and approximately 7 million acres of National Park Service, US Department of Defense, USFWS, State of Colorado, County, City, and private lands.

Planning criteria. The standards, rules, and other factors developed by managers and interdisciplinary teams for their use in forming judgments about decision making, analysis, and data collection during planning. Planning criteria streamlines and simplifies the resource management planning actions.

Planning issues. Concerns, conflicts, and problems with the existing management of public lands. Frequently, issues are based on how land uses affect resources. Some issues are concerned with how land uses can affect other land uses, or how the protection of resources affects land uses.

Policy. This is a statement of guiding principles, or procedures, designed and intended to influence planning decisions, operating actions, or other affairs of the BLM or Forest Service. Policies are established interpretations of legislation, executive orders, regulations, or other presidential, secretarial, or management directives.

Preliminary Priority Habitat (PPH). Areas that have been identified as having the highest conservation value to maintaining sustainable Greater Sage-Grouse populations; include breeding, late brood-rearing, and winter concentration areas.

Preliminary General Habitat (PGH). Areas of seasonal or year-round Greater Sage-Grouse habitat outside of preliminary priority habitat (PPH).

Prescribed fire. A wildland fire originating from a planned ignition to meet specific objectives identified in a written, approved, prescribed fire plan for which NEPA requirements (where applicable) have been met prior to ignition.

Primitive route. Any transportation linear feature located within areas that have been identified as having wilderness characteristics and not meeting the wilderness inventory road definition (BLM Manual 6310 – Conducting Wilderness Characteristics Inventory on BLM Lands).

Priority sage-grouse habitat. Areas that have been identified as having the highest conservation value to maintaining sustainable sage-grouse populations. These areas would include breeding, late brood-rearing, and winter concentration areas. These areas have been identified by the BLM in coordination with respective state wildlife agencies.

Project area. Encompasses the United States Department of the Interior, Bureau of Land Management Northwest Colorado District boundary, including all lands, regardless of ownership.

Proper functioning condition. A term describing stream health that is based on the presence of adequate vegetation, landform and debris to dissipate energy, reduce erosion and improve water quality.

Public domain. The term applied to any or all of those areas of land ceded to the Federal Government by the Original States and to such other lands as were later acquired by treaty, purchase or cession, and are disposed of only under the authority of Congress.

Public land. Land or interest in land owned by the US and administered by the Secretary of the Interior through the BLM without regard to how the US acquired ownership, except lands located on the Outer Continental Shelf and land held for the benefit of Indians, Aleuts, and Eskimos (H-1601-1, BLM Land Use Planning Handbook).

Range Improvement. The term range improvement means any activity, structure or program on or relating to rangelands which is designed to improve production of forage; change vegetative composition; control patterns of use; provide water; stabilize soil and water conditions; and provide habitat for livestock and wildlife. The term includes, but is not limited to, structures, treatment projects, and use of mechanical means to accomplish the desired results.

Range improvement project. An authorized physical modification or treatment which is designed to improve production of forage; change vegetation composition; control patterns of use; provide water; stabilize soil and water conditions; restore, protect and improve the condition of rangeland ecosystems to benefit livestock, wild horses and burros, and fish and wildlife. This definition includes, but is not limited to: structures, treatment projects and use of mechanical devices, or modifications achieved through mechanical means.

Raptor. Bird of prey with sharp talons and strongly curved beaks, such as hawks, owls, falcons, and eagles.

Reasonable foreseeable development scenario. The prediction of the type and amount of oil and gas activity that would occur in a given area. The prediction is based on geologic factors, past history of drilling, projected demand for oil and gas, and industry interest.

Reclamation. The suite of actions taken within an area affected by human disturbance, the outcome of which is intended to change the condition of the disturbed area to meet pre-determined

objectives and/or make it acceptable for certain defined resources (e.g., wildlife habitat, grazing, ecosystem function, etc.).

Recreation management area. Includes special recreation management areas (SRMAs) and extensive recreation management areas (ERMAs); see SRMA and ERMA definitions.

Recreation experiences. Psychological outcomes realized either by recreation-tourism participants as a direct result of their on-site leisure engagements and recreation-tourism activity participation or by nonparticipating community residents as a result of their interaction with visitors and guests within their community or interaction with the BLM and other public and private recreation-tourism providers and their actions.

Recreation opportunities. Favorable circumstances enabling visitors' engagement in a leisure activity to realize immediate psychological experiences and attain more lasting, value-added beneficial outcomes.

Recreation settings. The collective distinguishing attributes of landscapes that influence and sometimes actually determine what kinds of recreation opportunities are produced.

Reference State. The reference state is the state where the functional capacities represented by soil/site stability, hydrologic function, and biotic integrity are performing at an optimum level under the natural disturbance regime. This state usually includes, but is not limited to, what is often referred to as the potential natural plant community.

Rehabilitate. Returning disturbed lands as near to its predisturbed condition as is reasonably practical or as specified in approved permits.

Renewable Energy. Energy resources that constantly renew themselves or that are regarded as practically inexhaustible. These include solar, wind, geothermal, hydro, and biomass. Although particular geothermal formations can be depleted, the natural heat in the Earth is a virtually inexhaustible reserve of potential energy.

Required Design Features. Means, measures, or practices intended to reduce or avoid adverse environmental impacts. A suite of features that would establish the minimum specifications for certain activities (i.e., water developments, mineral development, and fire and fuels management) and mitigate adverse impacts. These design features would be required to provide a greater level of regulatory certainty than through implementation of Best Management Practices. In general, the design features are accepted practices that are known to be effective when implemented properly at the project level. However, their applicability and overall effectiveness cannot be fully assessed except at the project-specific level when the project location and design are known. Because of site-specific circumstances, some features may not apply to some projects (e.g., a resource is not present on a given site) and/or may require slight variations from what is described in the EIS/RMP amendment (e.g., a larger or smaller protective area). All variations in design features would require appropriate analysis and disclosure as part of future project authorizations. Additional mitigation measures may be identified and required during individual project development and environmental review.

Resource management plan (RMP). A land use plan as prescribed by the Federal Land Policy and Management Act that establishes, for a given area of land, land-use allocations, coordination guidelines for multiple-use, objectives, and actions to be achieved.

Restore/restoration. Implementation of a set of actions that promotes plant community diversity and structure that allows plant communities to be more resilient to disturbance and invasive species over the long term. The long-term goal is to create functional, high quality habitat that is occupied by sage-grouse. Short-term goal may be to restore the landform, soils and hydrology and increase the percentage of preferred vegetation, seeding of desired species, or treatment of undesired species.

Restriction/restricted use. A limitation or constraint on public land uses and operations. Restrictions can be of any kind, but most commonly apply to certain types of vehicle use, temporal and/or spatial constraints, or certain authorizations.

Revegetate/revegetation. The process of putting vegetation back in an area where vegetation previously existed, which may or may not simulate natural conditions.

Revision. The process of completely rewriting the land use plan due to changes in the planning area affecting major portions of the plan or the entire plan.

Right-of-way (ROW). Public lands authorized to be used or occupied for specific purposes pursuant to a right-of-way grant, which are in the public interest and which require ROWs over, on, under, or through such lands.

Right-of-way avoidance area. An area identified through resource management planning to be avoided but may be available for ROW location with special stipulations.

Right-of-way exclusion area. An area identified through resource management planning that is not available for ROW location under any conditions.

Riparian area. A form of wetland transition between permanently saturated wetlands and upland areas. Riparian areas exhibit vegetation or physical characteristics that reflect the influence of permanent surface or subsurface water. Typical riparian areas include lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels. Excluded are ephemeral streams or washes that lack vegetation and depend on free water in the soil.

Riparian zone. An area one-quarter mile wide encompassing riparian and adjacent vegetation.

Road. A linear route declared a road by the owner, managed for use by low-clearance vehicles having four or more wheels, and maintained for regular and continuous use.

Rotation. Grazing rotation between pastures in the allotment for the permitted time.

Routes. Multiple roads, trails and primitive roads; a group or set of roads, trails, and primitive roads that represents less than 100 percent of the BLM transportation system. Generically, components of the transportation system are described as “routes.”

Sale (public land). A method of land disposal pursuant to Section 203 of FLPMA, whereby the US receives a fair-market payment for the transfer of land from federal ownership. Public lands determined suitable for sale are offered on the initiative of the BLM. Lands suitable for sale must be identified in the RMP. Any lands to be disposed of by sale that are not identified in the current RMP, or that meet the disposal criteria identified in the RMP, require a plan amendment before a sale can occur.

Saturated soils. Occur when the infiltration capacity of the soil is exceeded from above due to rainfall or snowmelt runoff. Soils can also become saturated from groundwater inputs.

Scenic byways. Highway routes that have roadsides or corridors of special aesthetic, cultural, or historical value. An essential part of the highway is its scenic corridor. The corridor may contain outstanding scenic vistas, unusual geologic features, or other natural elements.

Scoping process. An early and open public participation process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action.

Season of use. The time during which livestock grazing is permitted on a given range area, as specified in the grazing lease.

Seeding. Seeding is a vegetation treatment that includes the application of grass, forb, or shrub seed, either aerially or from the ground. In areas of gentle terrain, ground applications of seed are often accomplished with a rangeland drill. Seeding allows the establishment of native species or placeholder species and restoration of disturbed areas to a perennial-dominated cover type, thereby decreasing the risk of subsequent invasion by exotic plant species. Seeding would be used primarily as a follow-up treatment in areas where disturbance or the previously described treatments have removed exotic plant species and their residue.

Short-term effect. The effect occurs only during or immediately after implementation of the alternative.

Special recreation management area (SRMA). An administrative public lands unit identified in land use plans where the existing or proposed recreation opportunities and recreation setting characteristics are recognized for their unique value, importance, and/or distinctiveness, especially as compared to other areas used for recreation.

Special recreation permit (SRP). Authorization that allows for recreational uses of public lands and related waters. Issued as a means to control visitor use, protect recreational and natural resources, and provide for the health and safety of visitors. Commercial SRPs are also issued as a mechanism to provide a fair return for the commercial use of public lands.

Special status species. BLM special status species are: (1) species listed, candidate, or proposed for listing under the Endangered Species Act; and (2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the Endangered Species Act that are designated as BLM sensitive by the BLM State Director(s). All federally listed candidate species, proposed species, and delisted species in the five years following delisting are conserved as BLM sensitive species.

Split estate. This is the circumstance where the surface of a particular parcel of land is owned by a different party than the minerals underlying the surface. Split estates may have any combination of surface/subsurface owners: federal/state; federal/private; state/private; or percentage ownerships. When referring to the split estate ownership on a particular parcel of land, it is generally necessary to describe the surface/subsurface ownership pattern of the parcel.

Stabilize. The process of stopping further damage from occurring.

Standard. A description of the physical and biological conditions or degree of function required for healthy, sustainable lands (e.g., land health standards). To be expressed as a desired outcome (goal).

Standard lease terms and conditions. Areas may be open to leasing with no specific management decisions defined in a Resource Management Plan; however, these areas are subject to lease terms and conditions as defined on the lease form (Form 3100-11, Offer to Lease and Lease for Oil and Gas; and Form 3200-24, Offer to Lease and Lease for Geothermal Resources).

State. A state is comprised of an integrated soil and vegetation unit having one or more biological communities that occur on a particular ecological site and that are functionally similar with respect to the three attributes (soil/site stability, hydrologic function, and biotic integrity) under natural disturbance regimes.

Stipulation (general). A term or condition in an agreement or contract.

Stipulation (oil and gas). A provision that modifies standard oil and gas lease terms and conditions in order to protect other resource values or land uses and is attached to and made a part of the lease. Typical lease stipulations include No Surface Occupancy (NSO), Timing Limitations (TL), and Controlled Surface Use (CSU). Lease stipulations are developed through the land use planning (RMP) process.

Surface disturbance. Suitable habitat is considered disturbed when it is removed and unavailable for immediate sage-grouse use.

1. Long-term removal occurs when habitat is physically removed through activities that replace suitable habitat with long term occupancy of unsuitable habitat such as a road, power line, well pad or active mine. Long-term removal may also result from any activities that cause soil mixing, soil removal, and exposure of the soil to erosive processes.

2. Short–term removal occurs when vegetation is removed in small areas, but restored to suitable habitat within a few years (< 5) of disturbance, such as a successfully reclaimed pipeline, or successfully reclaimed drill hole or pit.

3. Suitable habitat rendered unusable due to numerous anthropogenic disturbances

4. Anthropogenic surface disturbance are surface disturbances meeting the above definitions which result from human activities.

Surface-disturbing activities. An action that alters the vegetation, surface/near surface soil resources, and/or surface geologic features, beyond natural site conditions and on a scale that affects other public land values. Examples of surface disturbing activities may include: operation of heavy equipment to construct well pads, roads, pits and reservoirs; installation of pipelines and power lines; and the conduct of several types of vegetation treatments (e.g., prescribed fire, etc.). Surface disturbing activities may be either authorized or prohibited.

Surface use(s). These are all the various activities that may be present on the surface or near-surface (e.g., pipelines), of the public lands. It does not refer to those subterranean activities (e.g., underground mining, etc.) occurring on the public lands or federal mineral estate. When administered as a use restriction (e.g., *No Surface Use [NSU]*), this phrase prohibits all but specified resource uses and activities in a certain area to protect particular sensitive resource values and property. This designation typically applies to small acreage sensitive resource sites (e.g., plant community study exclosure, etc.), and/or administrative sites (e.g., government ware-yard, etc.) where only authorized, agency personnel are admitted.

Sustained yield. The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the public lands consistent with multiple uses.

Temporary/temporary use. This term is used as the opposite of the term permanent/ permanent use. It is a relative term and has to be considered in the context of the resource values affected and the nature of the resource use(s)/activity(ies) taking place. Generally, a temporary activity is considered to be one that is not fixed in place and is of short duration.

Terrestrial. Living or growing in or on the land.

Threatened species. Any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range (BLM Manual 6840, Special Status Species Management). Under the Endangered Species Act in the US, "threatened" is the lesser-protected of the two categories. Designation as threatened (or endangered) is determined by USFWS as directed by the Endangered Species Act.

Timber. Standing trees, downed trees, or logs which are capable of being measured in board feet.

Timing Limitation (TL). The TL stipulation, a moderate constraint, is applicable to fluid mineral leasing, all activities associated with fluid mineral leasing (e.g., truck-mounted drilling and geophysical exploration equipment off designated routes, construction of wells and/or pads), and other surface-disturbing activities (i.e., those not related to fluid mineral leasing). Areas identified for TL are closed to fluid mineral exploration and development, surface-disturbing activities, and intensive human activity during identified time frames. This stipulation does not apply to operation and basic maintenance activities, including associated vehicle travel, unless otherwise specified. Construction, drilling, completions, and other operations considered to be intensive in nature are not allowed. Intensive maintenance, such as workovers on wells, is not permitted. TLs can overlap spatially with NSO and CSU, as well as with areas that have no other restrictions. Administrative activities are allowed at the discretion of the Authorized Officer.

Total dissolved solids. Salt, or an aggregate of carbonates, bicarbonates, chlorides, sulfates, phosphates, and nitrates of calcium, magnesium, manganese, sodium, potassium, and other cations that form salts.

Total maximum daily load. An estimate of the total quantity of pollutants (from all sources: point, nonpoint, and natural) that may be allowed into waters without exceeding applicable water quality criteria.

Trail. A linear route managed for human-power (e.g., hiking or bicycling), stock (e.g., equestrian), or off-highway vehicle forms of transportation or for historical or heritage values. Trails are not generally managed for use by four-wheel drive or high-clearance vehicles.

Transition. A shift between two states. Transitions are not reversible by simply altering the intensity or direction of factors that produced the change. Instead, they require new inputs such as revegetation or shrub removal. Practices, such as these, that accelerate succession are often expensive to apply.

Transmission. The movement or transfer of electric energy over an interconnected group of lines and associated equipment between points of supply and points at which it is transformed for delivery to consumers, or is delivered to other electric systems. Transmission is considered to end when the energy is transformed for distribution to the consumer.

Transportation system. The sum of the BLM's recognized inventory of linear features (roads, primitive roads, and trails) formally recognized, designated, and approved as part of the BLM's transportation system.

Travel management areas. Polygons or delineated areas where a rational approach has been taken to classify areas open, closed or limited, and have identified and/or designated a network of roads, trails, ways, landing strips, and other routes that provide for public access and travel across the planning area. All designated travel routes within travel management areas should have a clearly identified need and purpose as well as clearly defined activity types, modes of travel, and seasons or timeframes for allowable access or other limitations (BLM Handbook H-1601-1, Land Use Planning Handbook).

Trespass. Any unauthorized use of public land.

Tribal interests. Native American or Native Alaskan economic rights such as Indian trust assets, resource uses and access guaranteed by treaty rights, and subsistence uses.

Understory. That portion of a plant community growing underneath the taller plants on the site.

Unitization. Operation of multiple leases as a single lease under a single operator.

Utility corridor. Tract of land varying in width forming passageway through which various commodities such as oil, gas, and electricity are transported.

Valid existing rights. Documented, legal rights or interests in the land that allow a person or entity to use said land for a specific purpose and that are still in effect. Such rights include but are not limited to fee title ownership, mineral rights, rights-of-way, easements, permits, and licenses. Such rights may have been reserved, acquired, leased, granted, permitted, or otherwise authorized over time.

Vegetation manipulation. Planned alteration of vegetation communities through use of mechanical, chemical, seeding, and/or prescribed fire or managed fire to achieve desired resource objectives.

Vegetation treatments. Management practices which change the vegetation structure to a different stage of development. Vegetation treatment methods include managed fire, prescribed fire, chemical, mechanical, and seeding.

Vegetation type. A plant community with immediately distinguishable characteristics based upon and named after the apparent dominant plant species.

Visibility (air quality). A measure of the ability to see and identify objects at different distances.

Visitor day. Twelve visitor hours that may be aggregated by one or more persons in single or multiple visits.

Visual resources. The visible physical features on a landscape, (topography, water, vegetation, animals, structures, and other features) that comprise die scenery of the area.

Watershed. Topographical region or area delineated by water draining to a particular watercourse or body of water.

West Nile virus. A virus that is found in temperate and tropical regions of the world and most commonly transmitted by mosquitos. West Nile virus can cause flu-like symptoms in humans and can be lethal to birds, including sage-grouse.

Wildcat well. An exploratory oil well drilled in land not known to be an oil field.

Wilderness. A congressionally designated area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, that is protected and managed to preserve its natural conditions and that (1) generally appears to have been affected mainly by the forces of nature, with human imprints substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least 5,000 acres or is large enough to make practical its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historic value. The definition is contained in Section 2(c) of the Wilderness Act of 1964 (78 Stat. 891).

Wilderness characteristics. Wilderness characteristics attributes include the area's size, its apparent naturalness, and outstanding opportunities for solitude or a primitive and unconfined type of recreation. They may also include supplemental values. Lands with wilderness characteristics are those lands that have been inventoried and determined by the BLM to contain wilderness characteristics as defined in section 2(c) of the Wilderness Act.

Wilderness Study Area (WSA). A designation made through the land use planning process of a roadless area found to have wilderness characteristics, as described in Section 2(c) of the Wilderness Act of 1964.

Wildland fire. Wildland fire is a general term describing any non-structure fire that occurs in the wildland. Wildland fires are categorized into two distinct types:

- Wildfires: Unplanned ignitions or prescribed fires that are declared wildfires.
- Prescribed fires: Planned ignitions.

Wildland fire use. *A term no longer used; the new terminology is "managed fire" (see "managed fire" definition).* A vegetation treatment that involves taking advantage of a naturally-ignited wildland fire in an area where fire would benefit resources. Wildland fire use would be conducted in specific areas needing treatment after a site-specific plan and NEPA analysis are completed and only if predetermined prescriptive parameters (e.g., weather/fire behavior) can be met. Until this planning and NEPA analysis are accomplished, wildland fires would be suppressed using an appropriate management response.

Wildland-urban interface (WUI). The line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

Withdrawal. An action that restricts the use of public land and segregates the land from the operation of some or all of the public land and mineral laws. Withdrawals are also used to transfer jurisdiction of management of public lands to other federal agencies.

Winter concentration areas. Sage-grouse winter habitats which are occupied annually by sage-grouse and provide sufficient sagebrush cover and food to support birds throughout the entire winter (especially periods with above average snow cover). Many of these areas support several

different breeding populations of sage-grouse. Sage-grouse typically show high fidelity for these areas, and loss or fragmentation can result in significant population impacts.

Appendix A. BLM Instruction Memorandum 2012–044, BLM National Greater Sage-Grouse Land Use Planning Strategy

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Appendix B. Figures

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Appendix I. Required Design Features, Preferred Design Features, and Suggested Design Features, Regional Mitigation Strategy

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Appendix J. Greater Sage-Grouse Draft Monitoring Framework

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http://www.blm.gov/co/st/en/BLM_Programs/wildlife/sage-grouse.html