From: Jeff Everett
To: Ronald Baxter
Subject: RE: Oregon ADPP
Date: Thursday, December 04, 2014 1:12:57 PM
Attachments: OR_GRSG_Draft_RMPA_EIS Table of Contents.pdf
OR_GRSG_Draft_RMPA_EIS_Chapter_3.pdf
OR_GRSG_Draft_RMPA_EIS_Chapter_4.pdf

Hey Ron –

So, we don't have a final Oregon plan yet, so the best I can offer at this point is the most-recent working draft that we have from OR BLM. There are significant pieces of this that are still missing, as many as 19 significant parts (adaptive management, buffers, disturbance cap, mitigation, etc) that OR BLM is waiting on from the NOC. These have a ripple-effect through the document and thus what I am sending is incomplete.

I'll start with the table of contents, and chapter 3 – baseline conditions, as well as chapter 4 – consequences; so you can start with these. If you need more, please let me know. I'm in tomorrow morning but in meetings tomorrow afternoon, back next week.

Cheers
J-

From: Baxter, Ronald [mailto:ronald_baxter@fws.gov]
Sent: Tuesday, December 02, 2014 7:21 AM
To: Jeff Everett
Subject: Re: Oregon ADPP

Gracias Amigo...

On Mon, Dec 1, 2014 at 9:14 PM, Jeff Everett <jeff_everett@fws.gov> wrote:

Hey Ron –

I'll send you what I can as soon as I can; probably Wednesday – crazy week here. More soon.

I have Conifers and ExUrban development for the species report. As soon as I get my head on straight after the long holiday week, I'm sure I'll be asking you for stuff too.

Cheers

J-

From: Baxter, Ronald [mailto:ronald_baxter@fws.gov]
Sent: Monday, December 01, 2014 3:38 PM
To: Jeff Everett
Subject: Oregon ADPP

Hi Jeff: I've been volunteered to write-up the the Species Report chapter on mining, and was wondering if you might be able to forward to me the latest version of the Oregon ADPP (assuming it's available) or the latest version of the Oregon plan (if not)?

Thanks,
Ron

--
Ronald J. Baxter
Endangered Species Biologist
U.S. Fish and Wildlife Service
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Reno, NV 89502
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CHAPTER 3
AFFECTED ENVIRONMENT

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**. The affected environment provides the context for assessing potential impacts as described in **Chapter 4**, Environmental Consequences.

For this RMPA/EIS, the planning area is the entire Oregon Sub-region (31,756,507 acres), which is east of the Cascade Mountains, and contains BLM-administered lands and other lands. Within the Oregon Sub-region planning area, there are 12,618,026 acres of BLM-administered surface lands and 2,639,000 acres of BLM-administered mineral split-estate beneath private surface lands. This totals 15,257,026 acres, which comprises the decision area. The planning area encompasses two WAFWA Sage-Grouse Management Zones: Snake River Plain (MZ IV) and Northern Great Basin.

3.1.1 Organization of Chapter 3

Each resource section in this chapter contains a discussion of background information, including guidance and regulations, and current conditions. Existing conditions describe the location, extent, and current condition of the resource in the planning area in general and on BLM-administered lands. Conditions for a resource can vary, depending on the resource. Those resources that have a greater influence on GRSG populations and habitat and that are more likely to be affected by GRSG management actions are described in greater detail than those resources that have little to no influence. Those resources that have a greater influence are GRSG, vegetation, wild horse and burro, wildland fire management, livestock grazing/range management, travel management, lands and realty, and energy and mineral resources.

Depending on the resource, a general description of the existing conditions may be provided for the Oregon Sub-region planning area, regardless of land status. This is done to provide a regional context for the resource. Also, a more detailed description of the existing conditions may be provided for the decision area according to the BLM plans being amended by this RMPA/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.

The following resources and resource programs are not present; do not have specific GRSG conservation goals, objectives, or management actions identified in the alternatives; or are not directly affected by the alternatives presented in this RMPA/EIS:

- Air Quality
- Paleontology
- Visual Resources
- Cave and Karst Resources
- Coal
- Public Health and Safety

Although coal/strip mining is a threat to GRSG and their habitat for the general Great Basin region, these activities do not historically or currently occur in the Oregon sub-region. Within the sub-region, there are no known BLM-administered lands that contain economic deposits of coal, and there are no existing or historic, surface or subsurface coal mines in the sub-region. There are no lands designated as unsuitable for surface mining, in accordance with 43 CFR Part 1610.7-1, relative to implementing the Surface Mining Control and Reclamation Area of 1977. This is because economic deposits of this solid mineral are not known to be present in the sub-region.

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 condition based on the indicators, and the reasons for the change are identified where known. Trends can also be described in quantitative or qualitative terms. Identifying the trends is done to provide an understanding of how BLM 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.

The BLM reviewed the RMPs being amended under this RMPA/EIS and other relevant information sources (such as RMP amendments, maps, and state GRSG conservation assessments) for existing conditions and trends for the resources described in this chapter with respect to GRSG and their habitat. This affected environment information is summarized in the following sections and, where appropriate, noted when the information is incorporated by reference.

Data from GIS have been used in developing acreage calculations and for generating many of the 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 statewide analysis, the compatibility constraints between datasets, and lack of data for some resources, all calculations are approximate and serve for comparison and analytic purposes only. Likewise, the 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 geographic information systems data; therefore, the acreages may be recalculated and revised at a later date.

3.2 GREATER SAGE-GROUSE AND SAGE-GROUSE HABITAT

The GRSG is a federal candidate species for listing under the ESA, an Oregon BLM sensitive species, and an ODFW vulnerable species.

3.2.1 Existing Conditions

Conditions of the Planning Area

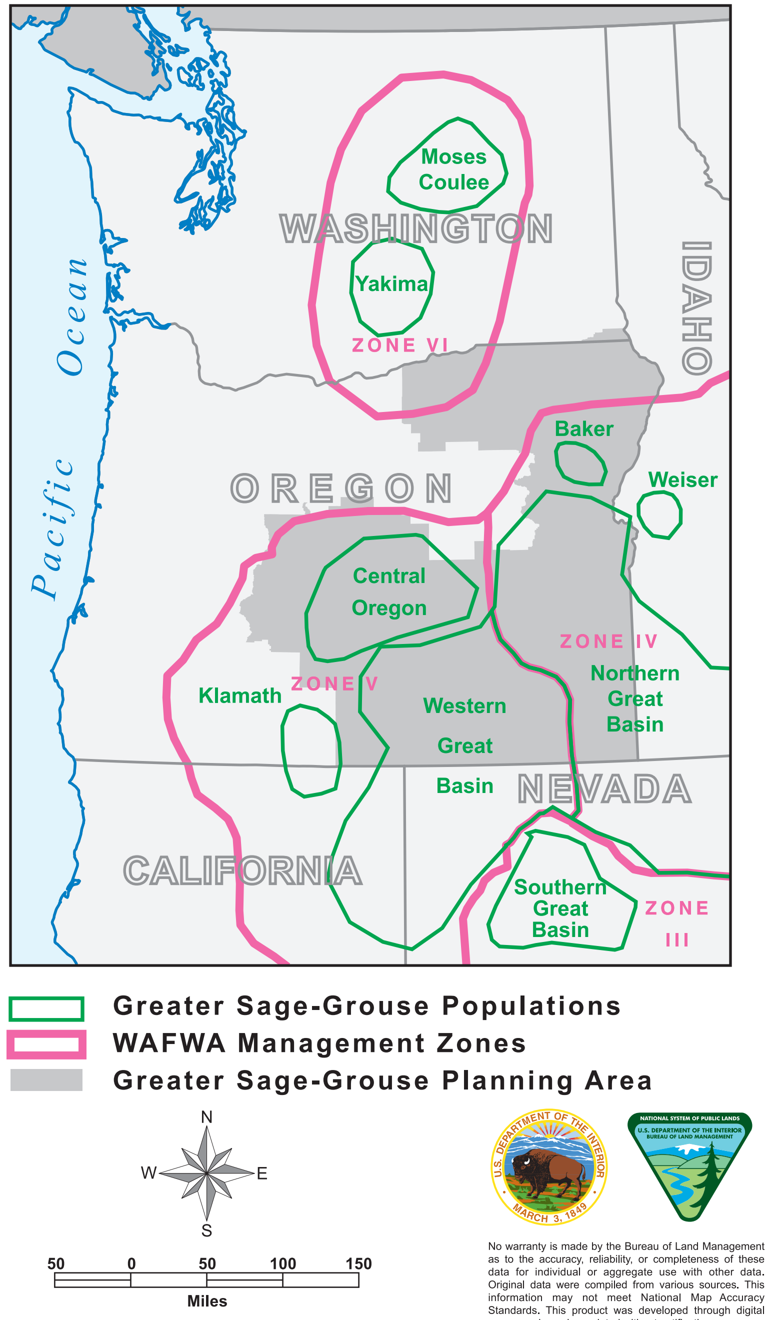
Greater Sage-Grouse

Availability of Sagebrush Habitat

The planning area encompasses two WAFWA Sage-Grouse Management Zones: Snake River Plain (MZ IV) and Northern Great Basin (MZ V; Stiver et al. 2006). There are approximately 13.7 and 5.1 million acres of preliminary priority habitat (PPH) in MZs IV and V, and 4.9 and 4.2 million acres of preliminary general habitat (PGH) in MZs IV and V, respectively.

Garton et al. (2011) identified five GRSG populations in Oregon, and two of these are managed by at least three states (**Figure 3-1**, Geographic Sub-Division of Five Greater Sage-Grouse Populations in Oregon and Shared Populations Among Adjacent States). Oregon's two largest GRSG populations are in southeast Oregon. BLM regions and WAFWA management zones represent broad-scale habitat analyses, while Population Areas represent mid-scale GRSG habitat.

The relatively large Northern Great Basin population (minimum population estimate of 9,114 males in 2007; Garton et al. 2011) occupies portions of Oregon, Nevada, Idaho, and Utah and is separated from adjacent populations by distance (12 to 37 miles) and topography. The Western Great Basin population



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification. M11-11-04

Figure 3-1: Geographic Sub-Division of Five Greater Sage-Grouse Populations in Oregon and Shared Populations Among Adjacent States (minimum population estimate of 5,904 males in 2007; Garton et al. 2011) in southeast Oregon, northwest Nevada, and northeast California is separated from adjacent populations by distance (approximately 16 miles) and unsuitable habitat. The Klamath Falls population in southwest Oregon had few birds at leks into the early 1990s, and no sightings have been confirmed since 1993 despite periodic survey efforts (Hagen 2011). The Baker population in northeast Oregon (minimum estimated spring population of 872 to 1,650 birds in 2010; Hagen 2011) appears to be separated by topography and unsuitable habitat from the nearest population in Weiser, Idaho, by approximately 20 miles. Inter-seasonal movements of a radio-marked female sage-grouse between its spring/summer range east of Keating, Oregon, and winter locations northwest of Weiser, Idaho, (distance approximately 33 miles) indicate some connection of the Baker population with adjacent populations (USFWS 2013a). Additional leks have been found in the Baker area in the last few years as result of surveys for a proposed transmission line project. The Central Oregon population has a minimum population estimate of 835 males in 2007 (Garton et al. 2011) and is separated by topography from adjacent populations (i.e., Western Great Basin and Northern Great Basin) and distance (approximately 19 miles).

The distribution of GRSG is closely aligned with the distribution of sagebrush-dominated landscapes (Schroeder et al. 2004). GRSG require large, intact and connected expanses of sagebrush shrubland to exist (Aldridge et al. 2008; Wisdom et al. 2011). Sagebrush habitat in south-central Oregon and the Owyhee region of southeast Oregon is among the largest and most contiguous found within the current range of GRSG. The overarching habitat goal established by ODFW (Hagen 2011) is to maintain or enhance the current range and distribution of sagebrush habitats in Oregon. To meet this goal, the conservation focus for ODFW is to retain at least 70 percent of sage-grouse range as sagebrush habitat in advanced structural stages, sagebrush Classes 3, 4, or 5, with an emphasis on Classes 4 and 5. The remaining 30 percent could include areas of juniper encroachment, non-sage-brush shrubland, and grassland (either from natural or anthropogenic disturbance) that potentially can be enhanced or restored. The “70/30” goal is used in the affected environment to invoke additional actions if the split is exceeded. The ODFW has endorsed the actions/objectives associated with the 70/30 split. The 70/30 split was based on a multi-scale habitat assessment developed by the BLM in southeastern Oregon (Karl and Sadowski 2005) and has been used in most eastern Oregon RMPs published since 2000 for all habitat. However, other authors (Aldridge et al. 2008; Doherty et al. 2010; Wisdom et al. 2011) report a higher proportion of sagebrush cover (50 to 70 percent) within priority habitat is required for long-term sage-grouse persistence.

In Oregon, the BLM developed its PPH/PGH map (see **Figure 2-1**) based in large part on the ODFW Sage-Grouse Core Areas Map. All Core Area habitat was classified as PPH, and all Low Density habitat area was classified as PGH. ODFW does not include all currently occupied GRSG habitat in its Low Density habitat layer[1] as modeled by Durtsche et al. (2010), though it is included in in its Mitigation Framework. The BLM added these areas (approximately 1.7 million acres of BLM-administered lands) to its PGH layer.

ODFW identified Core Areas (Doherty et al. 2011b) for GRSG that conserve most of Oregon's population with emphasis on areas with the highest density and most important for breeding and wintering and may serve as connectivity corridors (Hagen 2011). While the radius of Core Areas may differ around leks, numerous studies have shown that on average, 80 percent of nests are within 4 miles of a lek adding to the importance of the Core Areas for breeding and early brood-rearing purposes (Doherty et al. 2011b). Due to the nature of the available data, no correlation of distance or condition assessment was undertaken for the proximity to leks. Core Areas in Oregon encompass approximately 90 percent of the breeding populations of GRSG on 38 percent of the species' range. However, not all lek locations are known and some occur outside of the Core Areas.

Average maximum counts of lekking male GRSG were used to identify four lek density strata (percent of breeding population): very high (25 percent), high (50 percent), moderate (75 percent), and low (100 percent). Lek density strata, winter habitat use areas, and connectivity corridors were integrated to classify GRSG habitat into one of two categories: Core Area and Low Density. Core Area habitat consists of all sagebrush types or other habitats that support GRSG that are encompassed by areas of very high, high, and moderate lek density strata; where low lek density strata overlap local connectivity corridors; or where known winter habitat-use polygons overlap with either low lek density strata, connectivity corridors, or occupied habitat. Low Density area encompasses the remainder. Of the 3,397 breeding season locations of radio-telemetry birds, 95 percent occur in Core Area habitat and the remaining 5 percent occur in Low Density habitat (Hagen 2011). Of the 663 summer locations, 89 percent occur in Core Area habitat and the remaining 5 percent occur in Low Density habitat. Of the 1,695 winter locations, 99 percent occur in Core Area habitat, and the remaining 1 percent occurs in Low Density habitat.[2] Core Area and Low Density habitat comprise approximately 7.1 and 6.2 million acres, respectively (Hagen 2011). After local implementation team refinement of the Core and Low Density maps, 6.5 and 5.2 million acres remain in Core and Low Density habitat, respectively (Budeau 2012). Approximately 67 percent of Core Area habitat and 68 percent of Low Density habitat occur on BLM-administered lands (**Figure 2-1**).

[1] One percent of breeding and 6 percent of summer radio-telemetry locations of sage-grouse in Oregon are outside of Core Area and Low Density habitat, respectively (Hagen 2011). Not all leks have been found.

[2] Some sage-grouse nests recently have been found in Low Density habitat suggesting these percent occupancy rates may be elevated. Forty-eight percent of the radio telemetry outfitted birds in one study area in the Warner Range in 2012 nested in Low Density habitat, because a lek discovered in Spring 2010 was not included in the ODFW Core Area analysis.

IM 2012-044 directs the BLM to collaborate with state wildlife agencies to identify and map two categories of GRSG habitat:

- Preliminary Priority Habitat (PPH): Areas that have been identified as having the highest conservation value to maintaining sustainable GRSG populations. These areas would include breeding, late brood-rearing, and winter concentration areas, and
- Preliminary General Habitat (PGH): Areas of occupied seasonal or year-round habitat outside of priority habitat.

There are approximately 14.8 million acres of GRSG habitat in Oregon, including 6.5 million acres classified as PPH and 8.2 million acres classified as PGH (**Table 3-1**, Acres of PPH and PGH on BLM-Administered and Non-BLM Lands in Oregon). Non-BLM-administered land includes tribal, state, other federal, county, and private lands. The BLM administers 10.2 million acres or 69 percent of this habitat area. Burns, Lakeview, and Vale BLM Districts each support 70 percent or more of the available GRSG habitat in these areas (see **Figure 3-2**, Bureau of Land Management Districts in the Planning Area). On the Prineville District, the BLM administers approximately 48 percent of available GRSG habitat.

Table 3-1
Acres of PPH and PGH on BLM-Administered and Non-BLM Lands in Oregon

BLM District	PPH Acres		PGH Acres		Total Acres
	BLM	Other	BLM	Other	
Burns	976,100	333,200	1,992,100	957,200	4,258,600
Lakeview	975,200	408,800	1,359,600	401,700	3,145,200
Prineville	329,600	391,900	300,300	271,300	1,293,200
Vale	2,266,100	886,100	2,010,700	960,500	6,123,400
Total	4,547,000	2,020,000	5,662,700	2,590,700	14,820,400

Source: Oregon/Washington BLM 2013

Table 3-2, Acres of GRSG Population Areas on BLM-Administered Lands in Oregon, shows the acreage of PPMA and PGMA on BLM-administered land in each GRSG population area in Oregon, along with the percentage of the GRSG population area found in each area.

Connectivity of Habitat Patches

While the amount of habitat available to GRSG is very important, habitat pattern and quality is just as critical to long-term survival of the species. Fragmentation of habitat into smaller patches can result in extirpation of local GRSG populations when functional connectivity among patches is lost. Leks separated by distances greater than 11 miles could be isolated due to decreased

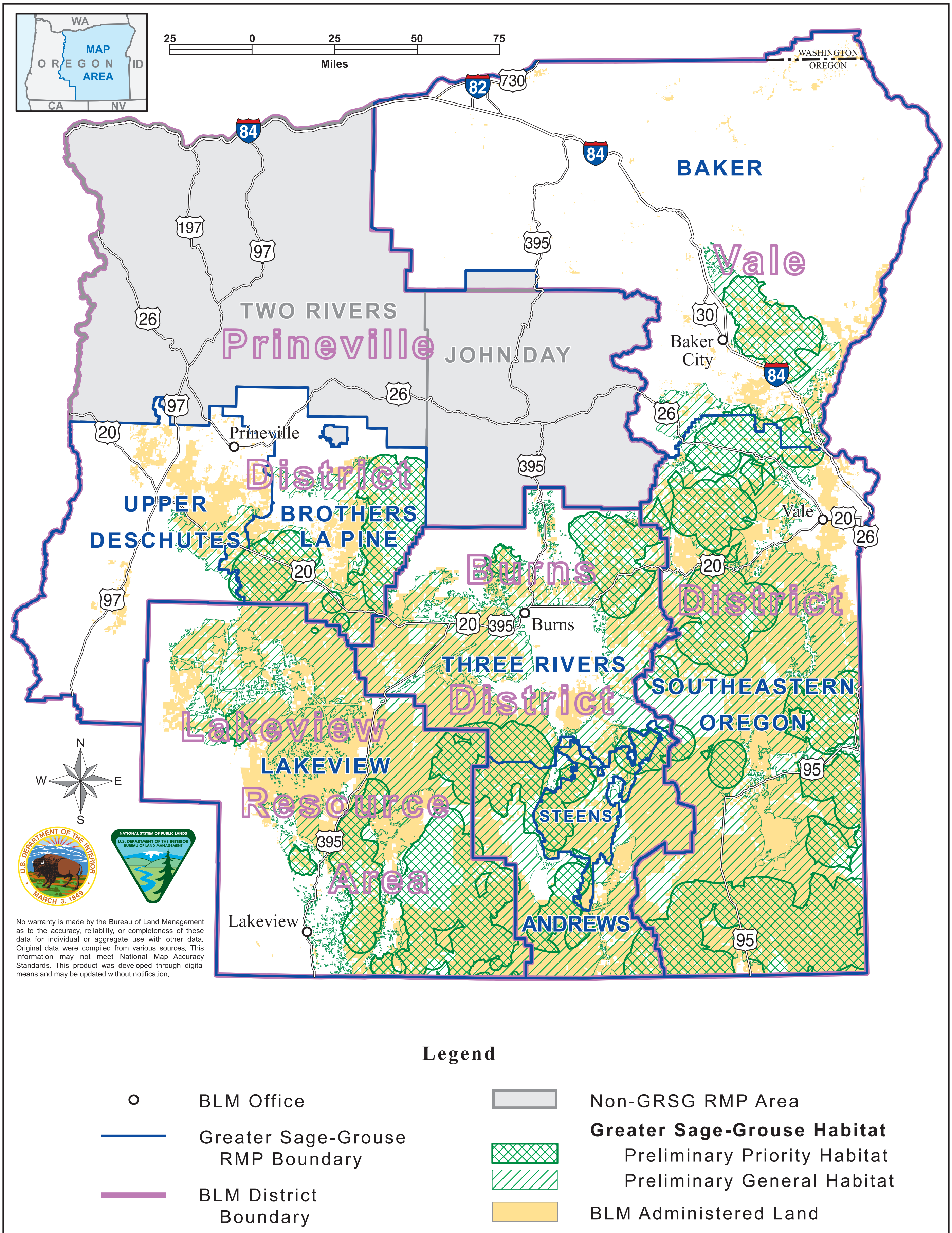


Figure 3-2: Bureau of Land Management Districts in the Planning Area

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Table 3-2
Acres of GRSG Population Areas on BLM-Administered Lands in Oregon

WAFWA Management Zone	Population	PPMA on BLM lands	PGMA on BLM lands	Non-Habitat on BLM lands	Total Occupied (PPMA & PGMA)
MZ IV	Area outside GRSG population	12,163 (<1%)	31,542 (<1%)	147,155	43,705 (<1%)
MZ V	Area outside GRSG population	26,031 (1%)	312,772 (1%)	510,333	338,803 (3%)
MZ IV	**Baker OR**	100,532 (2%)	3,406 (<1%)	2,715	103,938 (1%)
MZ V	**Central OR**	372,093 (8%)	1,253,780 (22%)	435,829	1,625,873 (16%)
MZ IV	**Northern Great Basin**	2,138,699 (47%)	1,909,731 (34%)	615,688	4,048,430 (40%)
MZ V	**Western Great Basin**	1,897,503 (42%)	2,151,398 (38%)	683,651	4,048,901 (40%)

Source: Oregon/Washington BLM 2013

probability of dispersals from neighboring leks (Connelly et al. 2000a). Isolation and reduced connectivity increases the probability of loss of genetic diversity and extirpation from stochastic events (Knick and Hanser 2011).

There is little information available regarding minimum sagebrush patch sizes required to support populations of GRSG. This is due in part to the migratory nature of some but not all GRSG populations, the lack of connectivity between seasonal habitats, and differences in local, regional, and range-wide ecological conditions that influence the distribution of sagebrush and associated understories. Where home ranges have been reported, they are extremely variable (1.5 to 238 square miles; Connelly et al. 2011a). Investigations from Idaho and Wyoming suggest that relatively large blocks of sagebrush habitat (more than 9,900 acres) are critical to successful reproduction and over-winter survival (Leonard et al. 2000; Walker et al. 2007). Occupancy of a home range is also based on multiple variables associated with both local vegetation characteristics and landscape characteristics (Knick et al. 2003). Pyke (2011) estimated that greater than 9,884 acres (4,000 hectares) was necessary for population sustainability; however, Pyke did not indicate whether this value was for migratory or non-migratory populations, or if this included juxtaposition of all seasonal habitats. Large seasonal and annual movements emphasize the large landscapes required by the GRSG (Knick et al. 2003; Connelly et al. 2011a).

GRSG populations may be nonmigratory or migratory, moving between or among seasonal use areas (Connelly et al. 2011a). GRSG in Oregon generally exhibit one-stage migratory behavior with the largest movements (10 miles) occurring between breeding and summer habitats, which corresponds with elevational movements in mountains (Hagen 2011). Movements between summer and winter habitats (3 to 9 miles) were generally directed toward breeding areas, although GRSG may travel considerable distances (over 19 miles) in severe winters to find food and cover (USFWS 2013a).

The ODFW used a GIS-based connectivity model (Hagen 2011) to evaluate the fragmentation of existing GRSG habitat patches in Oregon. The average maximum extent of connectivity between breeding and surrounding seasonal-use areas was 10 miles, which is similar to the range-wide average (Knick and Connelly 2011). Habitat capability was defined and ranked from most to least capable of supporting GRSG on a scale of 1 to 4, respectively, based on 160-acre units. Within each 160-acre unit, the dominant overstory cover type (over 50 percent) determined the overall viability. Areas of intact sagebrush cover had high viability; habitats that are potentially useful to GRSG but the extent of which is unknown had moderate viability; and habitats that have potential to transition from a disturbance (natural or human-caused) to sagebrush had low viability. Habitats that had been converted to agriculture or urban land uses, and natural features, such as bare ground or rock cliffs, had negligible viability. Roads, power lines, and urban or rural industrial developments downgrade otherwise viable habitat for GRSG (i.e., from viable to negligible viability). Model output resulted in maps (Hagen 2011) that depict areas of vulnerable and intact habitats across the state (broad-scale) and for each BLM district boundary (mid-scale). The connectivity model classified 9.2 million acres in Oregon as largely connected high viability blocks of habitat, although the suitability of understory vegetation for GRSG of most of these acres is unknown. It is important to understand that connectivity maps do not describe the habitat condition with respect to understory structure and composition of habitat blocks. Identifying these factors (through monitoring) will be important to management.

An assessment of habitat connectivity using only those high viability habitat blocks that were greater than 2,500 acres identified several areas of contiguous habitat. However, within the 2 largest areas, encompassing over 6 million acres, several locations have small corridors and, thus, limited connectivity (Hagen 2011). Both human-caused and natural barriers in Burns District BLM separate these two contiguous areas. From the statewide scale, it is evident that connectivity is limited between GRSG in the Baker Resource Area and northern Malheur County.

<u>Landscape Matrix and Edge Effect</u>

GRSG typically occupy sagebrush vegetation but may also use a variety of other habitats (e.g., riparian meadows, agricultural lands) intermixed in a sagebrush-dominated landscape. In Idaho, sagebrush patches adjacent to large, abrupt patches of grass or forb-dominated habitat (usually burned areas or crested wheatgrass seedings) received much less use on their periphery than more interspersed sagebrush patches (Shepard 2006). Aldridge and Boyce (2007) found GRSG selected large expanses of sagebrush and avoided anthropogenic edge during the breeding season. Thus, the viability of fragmented habitat for GRSG is dependent upon the juxtaposition of these habitats in relation to sagebrush and the hazards to birds using these areas (Connelly et al. 2011b).

Wildfire and prescribed fire can cause loss of habitat and, as a result, fire has been identified as a primary factor associated with GRSG population declines (USFWS 2010). GRSG typically select nest sites in herbaceous understory, resulting in loss of nesting habitat following wildfire or prescribed fire. However, it is important to distinguish between sagebrush communities in xeric versus higher-elevation mesic sites (Miller et al. 2011). Restoration and maintenance of sagebrush-steppe communities in higher elevation mesic sites using prescribed fire may be necessary to maintain sage-grouse habitat by reducing juniper encroachment. Habitat restoration and maintenance treatments should be designed for site-specific benefits, and, when properly implemented, can help protect GRSG habitat from large, high severity wildfires.

Juniper encroachment affects over 12 million acres in the Great Basin alone (Miller et al. 2008). A decline of shrubs is the most documented shift in understory vegetation following western juniper encroachment. Conifer encroachment fragments sagebrush habitat for sage-grouse both by removing suitable cover and by providing tall structures that attract predators of sage-grouse such as corvids (Doherty et al. 2008, 2010). Mountain big sagebrush sites show 20 to 25 percent declines in shrub cover in response to trees reaching 50 percent of the maximum site potential (Miller et al. 2000). Corvid abundances have been positively correlated with higher nest predation rates of many birds, including GRSG (Hagen 2011).

<u>Anthropogenic Disturbances</u>

Comparing environmental conditions and levels of human disturbance on areas of former range (extirpated range) with areas still occupied by GRSG (occupied range), Wisdom et al. (2011) identified five key factors most likely to lead to extirpation of local populations: sagebrush area, elevation, distance to transmission lines, distance to cellular towers, and land ownership (See *Availability of Sagebrush Habitat* for more information about sagebrush). Land ownership was a surrogate for conversion of private lands to non-sagebrush land uses that have reduced habitat availability and fragmented remaining sagebrush habitat nearby. Lek abandonment was most likely to occur in areas with over 25 percent cultivated cropland within 18 miles of the lek (Aldridge et al. 2008). Transmission lines, in addition to reducing habitat suitability and increasing fragmentation, can cause GRSG mortality through bird collisions with lines and facilitate raptor predation of GRSG. Transmission structures and communication towers may also provide nesting sites for corvids and raptors in habitats with low vegetation and relatively flat terrain (Ellis 1984; Steenhof et al. 1993; Johnson et al. 2011). Lek count trends tend to be lower on leks within three miles of interstate highways (Johnson et al. 2011) but no apparent relationship has been found between lek count trends and the presence of secondary roads (Aldridge et al. 2008). Generally, road-effect distances (the distance from a road at which a population density decrease is detected) are positively correlated with increased traffic density and speed (Foreman and Alexander 1998). Rates of decline in sage-grouse male lek attendance increased as traffic volumes on roads near leks increased, and vehicle activity on roads during the daily strutting period (that is, early morning) had a greater influence on male lek attendance compared with roads with no vehicle activity during early morning in southwestern Wyoming (Holloran 2005). Generally, oil and gas developments within two to four miles of leks or nesting areas had deleterious effect on populations, with the impacts increasing with increasing well density (Lyon and Anderson 2003; Walker et al. 2007; Johnson et al. 2011). Knick and Connelly (2011) found that fire and human disturbance were the primary factors influencing fate of leks. Knick et al. (2003) reported 95 percent of active leks (3,184 leks) in their western states study area were in landscapes with less than 3 percent development; all lands surrounding leks were less than 14 percent developed.

Conditions on BLM-Administered Lands

Greater Sage-Grouse

Burns District. The GRSG population in the Burns District, based on counts at 126 lek complexes over the last 30 years has experienced two large increases and two subsequent declines, and a fluctuating but slightly increasing trend from 1980 to 2010 (Hagen 2011). Since 1981, population size has fluctuated around 4,300 birds, which is the population goal (based on the Spring 2003 breeding population) that ODFW has set for the region. Most of the sagebrush habitat is within the Northern Great Basin MZ. Maintenance of currently available habitat amounts and quality should sustain this population level (Hagen 2011). However, there is potential for the Burns District population to be influenced by management south and east of Oregon in the Western Great Basin and Northern Great Basin MZs.

While there is a large amount of GRSG habitat in the Burns District (4.2 million acres; **Table 3-1**) including significant amounts of PPH (1.3 million acres), both human-caused and natural barriers separate the 2 largest contiguous areas of habitat and may impact the ability of GRSG to disperse between populations. Areas of PGH between large areas of PPH form habitat corridors that link priority habitat areas on the Burns District with GRSG habitat on the Lakeview, Prineville, and Vale Districts (**Figure 2-1**). In the ODFW habitat viability analysis (Hagen 2011), sagebrush habitat was found to comprise 68 percent of the district, most of which (80 percent) was ranked as high viability. According to Hagen (2011), "reasonable habitat connectivity exists in this district as evidenced by the inclusion of over half of the two largest contiguous areas of sagebrush in the state." However, GRSG habitat north of Highway 20 between Hines and Hampton is heavily impacted by juniper encroachment. Higher elevation areas in the Steens Mountain region are also being encroached by juniper. Fire has affected approximately 373,000 acres (240,000 acres in 2012) of most highly viable habitat (i.e., PPH) in the Burns District. Emergency stabilization and rehabilitation plans outline reestablishment of sagebrush in these important habitats.

<u>Prineville District.</u> The Central Oregon population is encompassed within the eastern portion of the Prineville District. The Prineville GRSG population, based on counts at 58 lek complexes over the last 30 years, is estimated at approximately 2,000 birds and has declined steadily; the trend is the most sustained of all BLM districts (Hagen 2011). The causes for population declines are unknown but could be related to lack of genetic diversity, population isolation, land-use practices, recreation activities, and urban development. Because the Prineville District is at the northern edge of GRSG range, connectivity in this region is especially important. The ODFW plan for GRSG (Hagen 2011) seeks to restore populations and distributions near the 1980 spring breeding population level (approximately 3,000 birds) through maintaining or increasing the amount of currently available habitat and increase habitat quality (enhancement and restoration). The ODFW habitat viability analysis reported 67 percent of the Prineville District was in sagebrush cover, and 74 percent of that was high viability habitat (Hagen 2011). The Prineville District has the smallest amount of GRSG habitat (1.3 million acres) of any BLM district in eastern Oregon (**Table 3-1**). The BLM manages approximately 49 percent (629,938 acres) of PPH/PGH in the district. The primary habitat block where GRSG occur is contiguous with the area shared by the Lakeview and Burns Districts. The habitat is concentrated in the southeastern edge of the district forming 2 relatively large patches of PPH. Juniper encroachment (320,000 acres) is a significant concern for approximately 30 percent of this habitat area. Human impacts from anthropogenic structures (e.g., power lines, OHV trails, and residential developments) and recreational activities (e.g., mountain biking, bird watching, horseback riding) are also a concern. Hagen (2011) postulated that the cumulative effects of these disturbances are among the main factors limiting this population. Slightly more than 1,000 acres of high viability habitat in the Prineville District area have been impacted by wildfire since 2004.

<u>Lakeview District.</u> Almost all of the Lakeview District falls into the Western Great Basin GRSG population. GRSG population trends on the Lakeview District have fluctuated widely with peaks in 1989 and 2006 and lows in 1996 and 2007. As of 2010, the average number of males observed per lek (15.8) has returned to near the 1996 low (14). Since 1981, population size has fluctuated around 9,400 birds, which is the population goal (based on the Spring 2003 breeding population) that ODFW has set for the region. Maintenance of currently available habitat amounts and quality is assumed to be sufficient to sustain this population level (Hagen 2011). However, there is potential for population trends to be influenced by management outside of Oregon.

Approximately 598,000 acres of GRSG habitat has been lost on the Lakeview District since the late 1800s, representing a 17 percent decline in habitat availability. The ODFW habitat viability analysis reported 67 percent of the Lakeview District was comprised of sagebrush cover, and 92 percent of that was high viability habitat (Hagen 2011). The BLM manages 2.3 million acres (74 percent) of the 3.1 million acres of PPH/PGH mapped in this region. Connectivity is high with the most contiguous patch of sagebrush in the state extending from the Nevada border to north of Highway 20. According to Hagen (2011), "Christmas Valley and the area north of Summer Lake are highly susceptible to future isolation given the relatively narrow corridor of habitat connecting them with the larger habitat areas." Much of this corridor is mapped as PGH.

Vale District. The BLM administers 4.2 million acres (70 percent) of the 6.1 million acres of PPH/PGH mapped in this region. There are large contiguous habitat patches in this region, although there also are large disturbed areas resulting from crested wheatgrass seeding projects done in the 1960s. Sagebrush areas lost to wildfire (337,750 acres) and seedings (148,243 acres) are the largest in Oregon. Sagebrush habitat east of Baker City is relatively isolated from other habitat blocks. The area near Interstate 84 may serve as a migratory or dispersal corridor.

The number of counted males per active lek in Baker County has remained relatively stable since systematic lek surveys began in 1989 and is estimated at approximately 1,500 birds. Maintenance of currently available habitat amounts and quality is assumed to be sufficient to sustain a 2003 population size (approximately 2,000 birds) and distribution into the future (Hagen 2011). However, it is unknown if there is movement (dispersal) of birds from habitat east of Interstate 84 to habitats in the southwest portion of Baker County. The ODFW assumes that populations east of Interstate 84 are closed to immigration or emigration (i.e., "closed populations"), and those near Malheur County are open populations (i.e., population size is regulated in part by immigration from populations North of Harper). A telemetry study involving 63 sage-grouse in Baker County during 2009-2012 found no evidence of dispersal into Malheur County. Most birds occupied relatively small ranges during spring and summer months, but showed large movements to winter habitat. Several birds moved approximately 16 kilometers southwest to the Virtue Flat area for winter. One female moved out of the study area to winter in southwest Idaho (distance of 33 miles) and returned to Oregon in spring (USFWS 2013a). However, recent evidence of birds moving from Keating Valley and Virtue Flat regions indicates seasonal migrations into Idaho.

Population trends for the remainder of Vale District (excluding Baker) have fluctuated around the 2003 estimate for the region (approximately 11,000 birds; Hagen 2011). It is likely that populations were significantly larger prior to the extensive sagebrush removal program of the 1960s. As the treatment areas are recolonized by sagebrush, they will assist in maintaining local populations. Fire has altered over 800,000 acres of sagebrush in Vale District since 2004 (Hagen 2011; BLM 2012e). During the record-setting 2012 fire season, the Long Draw fire burned over 557,000 acres in the Vale District, and the Holloway fire burned an estimated 225,000 acres in the Burns and Vale Districts. The extent to which management practices designed to maintain and restore sagebrush habitat would influence shared populations with Idaho and Nevada is unknown.

The BLM's objective is to maintain or increase current populations and manage or restore priority areas so that at least 70 percent of the land cover provides adequate sagebrush habitat to meet sage-grouse needs (70/30 objective).

In Oregon, the amount of sagebrush cover is close to the 70/30 objective when considering shrub cover. The ODFW's model estimates that the statewide sagebrush disturbance proportion is currently near the objective of 70/30. The ODFW approach used GIS and satellite imagery as well as the Southwest, Northwest GAP models and LANDFIRE. The ODFW approach accounts for sagebrush cover, but not the understory. The amount of sagebrush cover can be measured to some degree through remote sensing but the composition of the understory cannot. On the 10.2 million acres of GRSG habitat that the BLM administers in Oregon (of the 14.8 million total acres in Oregon), the BLM is currently near the 70/30 objective, although the percentage of sagebrush and disturbed habitats varies within each district. **Table 3-3**, ODFW Estimated Percent Sagebrush Cover by District, shows the current estimated percent sagebrush cover by district.

Table 3-3
ODFW Estimated Percent Sagebrush Cover by District[1]

BLM District	Sagebrush Cover	Disturbed Cover
Baker Resource Area	82% sagebrush	18% disturbed habitats
Vale District (excluding Baker Resource Area)	70% sagebrush	30% disturbed habitats
Burns District	68% sagebrush	32% disturbed habitats
Lakeview District	72% sagebrush	28% disturbed habitats
Prineville District	47% sagebrush	53% disturbed habitats

Source: Oregon/Washington BLM 2013
[1]Since the ODFW calculations, wildfire affected approximately 373,000 acres in the Burns District and 337,750 acres in the Vale District in 2012.
http://www.dfw.state.or.us/wildlife/sagegrouse/docs/20110422_GRSG_April_Final%2052511.pdf

In Oregon, the quality of the sagebrush cover is below the 70/30 objective when considering the presence of invasive plant species in the understory vegetation. The Vegetation Dynamics Development Tool (VDDT) captures acres of sagebrush over story with an invasive plant species understory using Integrated Landscape Assessment Project (ILAP) data. Where invasive plant species understory occurs in the first or second stages, the vegetation cover is not considered quality sagebrush due to the functionality of the sagebrush and the likelihood of conversion during the next wildfire.

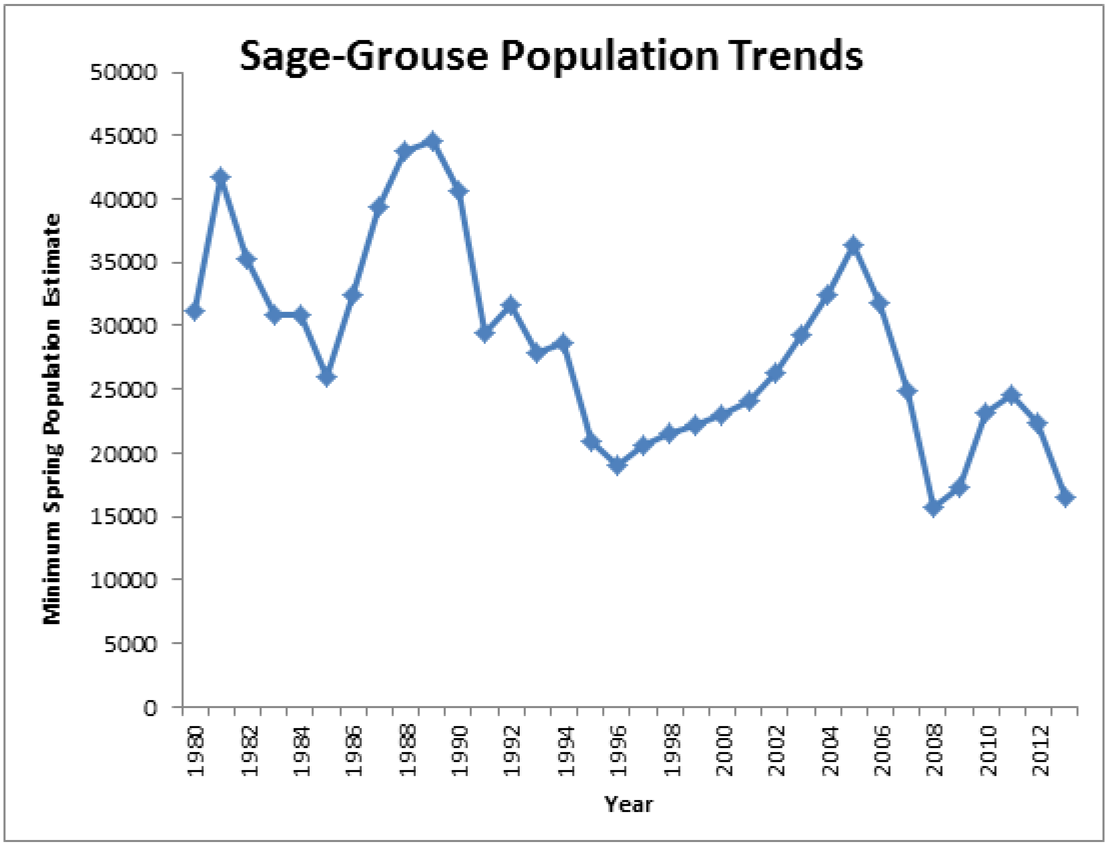
The Great Basin vegetation dynamics modeling effort was used to determine general habitat trends considering a variety of primary habitat influences (e.g., wildfire, risk of overgrazing, insects and disease, conifer encroachment, vegetation treatments). Based on these inputs and the natural rates sagebrush systems transition between stable conditions, modeling was conducted to quantify the direction and magnitude of non-geospatial acreage trends in relation to sagebrush conditions most likely to provide GRSG habitat. It is important to note that the modeling effort did not include changes in habitat conditions associated with permitted activities, which are considered discrete disturbances analyzed in the infrastructure development (ROWs and roads), travel management, and energy/mineral development sections.

3.2.2 Trends

Greater Sage-Grouse

Within the extant range of GRSG in Oregon, spring population indices have demonstrated an overall decline since the 1940s (Hagen 2005). GRSG populations declined at an overall rate of 3.50 percent per year from 1965 to 2003 (Connelly et al. 2004). However, statewide spring trends over the past 30 years (1980 to 2010) were relatively stable with population increases in most areas from the mid-1990s through 2006 (Hagen 2011) (**Figure 3-3**, Sage-grouse population trends, 1980-2012, Oregon). Based on the best available information, there was a minimum (conservative) spring population estimate of 24,000 (range 21,064 to 27,115) GRSG in Oregon in Spring 2010 (Hagen 2011). The minimum estimated spring population size, based on lek data summarized over a 10-year period (2003-2013), suggest population sizes have fluctuated markedly over this time period. However, annual rates of change in lek attendance data obtained from trend leks, (i.e., breeding sites that have been counted consistently over a number of years and are considered a sub-sample of all leks in a region) indicate a recent decline in sage-grouse numbers. Compared to 2012, male lek attendance in 2013 was down approximately 24 percent across the region. In 2012, GRSG experienced below average production, likely resulting in decreased lek attendance rates. The number of chicks per hen was 0.8 in 2012 and is below the 20-year average of 1.5. Additionally, the percent chicks in the 2012 harvest were 29 percent representing the second lowest report on record since 1992. Consequently, GRSG population size was expected to decrease in Oregon in 2013. In addition, several large wildfires burned through GRSG habitats in the summer of 2012, and significant GRSG habitat losses were sustained in Oregon, which may have contributed to population declines. The full effects of these large-scale wildfires remain unknown at this time.

Figure 3-3 Sage-grouse population trends, 1980-2012, Oregon



Source: ODFW 2013

The ODFW population objective is to "manage greater sage-grouse statewide to maintain or enhance their abundance and distribution at the 2003 spring breeding population level, approximately 30,000 birds over the next 50 years" (Hagen 2011). Currently, GRSG numbers in Oregon are below this benchmark but have not reached levels that are outside the range of natural variation (the 10-year average is 24,516 ± 5,097 GRSG, and the range is 15,803 to 36,405; Hagen 2011). Because of natural fluctuations in populations, the ODFW anticipates the population will drop below the 2003 benchmark, possibly by as much as 50 percent during some years. In Oregon, GRSG habitat (defined as any vegetation type that includes sagebrush) declined from approximately 17.8 million acres prior to EuroAmerican contact to 14 million acres today, a 21 percent decline. Most of this loss occurred in the north-central region of the potential historic range (Hagen 2011). The Central Oregon population, which inhabits the Prineville District, is estimated to have only 53 percent of historic sagebrush habitat, having lost more historic habitat than any other BLM district in Oregon. A large proportion was lost to agriculture. In the Burns District, sagebrush habitat has decreased by 8.8 percent much of which was conversion of private land to agriculture. Conversion of sagebrush habitat to agriculture reached a threshold in the mid-1950s and has remained relatively unchanged since. However, the number of irrigated acres has increased slightly in some areas since the 1950s.

Compared with other portions of GRSG range in the western US, Oregon has large expanses of contiguous habitat with minimal threats of fossil fuel exploration or development. In the Oregon portion of the Western Great Basin population area, encompassing nearly all of the Lakeview District and large portions of the Burns and Vale Districts, over 80 percent of the historic GRSG habitat remains intact, and most of the habitat is in public ownership, this area alone supported over 10,000 birds in 2010 (USFWS 2013a). Despite the continued existence of large occupied areas, GRSG populations occupying small, disjunct areas at the edge of the current range are at risk of extirpation (Schroeder et al. 1999; Schroeder et al. 2004; Wisdom et al. 2011). Several areas within the planning area remain contiguous only because of small and tenuous corridors (Hagen 2011). GRSG have disappeared from certain peripheral habitats in the planning area within the past 40 years.

Prior to 2012, there had been a total decrease of nearly 3 percent in sagebrush due primarily to wildfire. From 1980 to 2003, over 600,000 acres of sagebrush were affected by wildfire. Wildfires have burned approximately 295,000 acres of high priority GRSG habitat in Oregon from 2004 to 2009 (Hagen 2011). Acres of sage-grouse habitat burned in 2012 surpassed all historic records for eastern Oregon. More sagebrush habitat was burned in 2012 than in the previous 23 years. Approximately 312,321 acres of PGH and 632,842 acres of PPH burned. Thus, approximately 6.4 percent of GRSG habitat in Oregon burned in Oregon in 2012. Most of this was in prime GRSG habitat (e.g., Trout Creek Mountains), representing nearly 10 percent of the available PPH in the state.

Juniper encroachment in GRSG habitat has impacted an additional 2.8 million acres. Juniper expansion has doubled in GRSG range (from 1.6 to 3.3 million acres) since European settlement, much of which has occurred in the Prineville District. Tree removal is widely assumed to benefit GRSG populations, although studies have yet to document a relationship between juniper removal and increased GRSG productivity. In Oregon, the BLM and Natural Resources Conservation Service (NRCS) through its Sage-Grouse Initiative are reducing the fragmentation threat of juniper encroachment in high priority sage-grouse habitats. Habitats with over 10 percent conifer canopy cover (i.e., Phase I and II encroachment) are targeted for conifer removal.

Currently, wildfire, invasive plant species, and juniper encroachment, are the three most significant factors causing habitat loss in Oregon (Hagen 2011). Net loss of sagebrush habitat has only slightly been offset by the acres of juniper removal.

3.3 Vegetation

Vegetation serves multiple purposes on the landscape and provides many ecosystem services, including stabilizing soils, preventing erosion, using carbon dioxide, releasing oxygen, increasing species diversity, and providing habitat and food for animals and products for human use. Many of the BLM's land management policies are directed toward maintenance of healthy vegetation communities. Vegetation can be characterized generally by ecological provinces and more specifically by plant communities. The ecological provinces and plant communities discussed below are those that provide the most important land cover across the planning area.

USFWS identified invasive plants and conifer encroachment as vegetation issues of concern in GRSG habitat (USFWS 2010a). Of all the invasive plant species, annual grasses in particular were identified as especially problematic (see Noxious Weeds and Invasive Species, below, section for more detail). Western juniper (*Juniperus occidentalis* var. *occidentalis*) is the encroaching conifer of concern in Oregon. Both invasive plants and juniper can reduce or eliminate GRSG food and cover, and alter disturbance regimes in a manner detrimental to GRSG habitat quality and quantity. Juniper also provides perch sites for avian predators.

Although not specifically addressed in the 2010 listing decision, the use of non-native grasses, especially crested wheatgrass (*Agropyron cristata* and *A. desertorum*), in post-fire restoration efforts and in past range improvement projects is not preferred when native grass species provide a viable alternative, and its use under these circumstances is of concern to both USFWS and ODFW.

Public lands are undergoing complex environmental challenges that go beyond traditional management boundaries. In response, the BLM is instituting a landscape-scale management approach which evaluates large areas to better understand the ecological values, human influences, and opportunities for resource conservation. The BLM's landscape approach includes REAs which provide a framework for integrating science and management. REAs evaluate landscape scale ecoregions, which are large areas with similar environmental characteristics. In the Oregon Sub-region, the Northern Great Basin ecoregion REA is underway. Additional information is provided on the BLM Northern Great Basin REA website at http://www.blm.gov/wo/st/en/prog/more/Landscape_Approach/reas/nbasinrange.html.

3.3.1 Existing Conditions

Conditions of the Planning Area

General Vegetation

Southeast Oregon falls within multiple ecoregions (Wiken et al. 2011) (**Figure 3-4**, Ecoregions in the Planning Area). Of these ecoregions, most of the GRSG habitat falls within the Northern Basin and Range Ecoregion. The topography

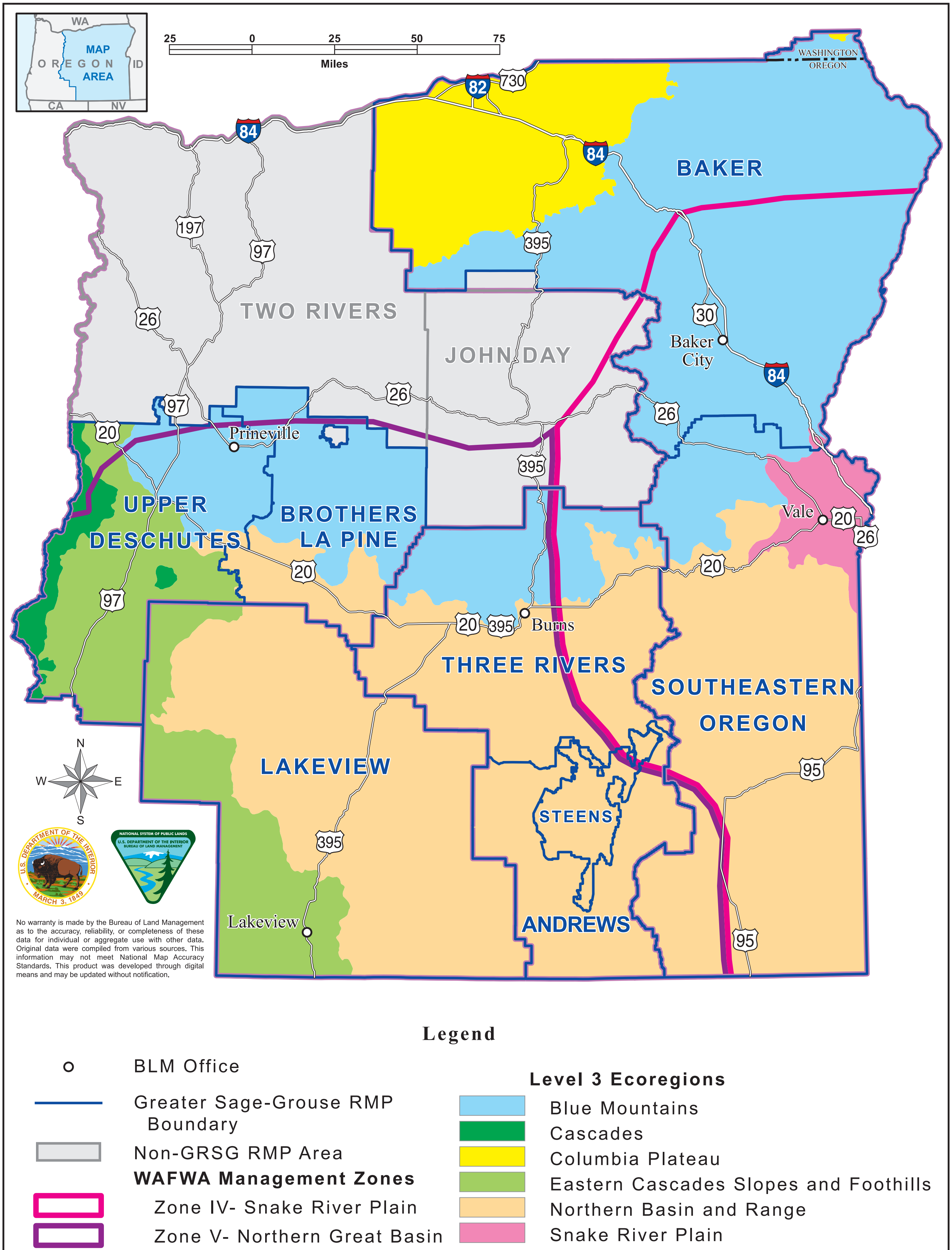


Figure 3-4: Ecoregions in the Planning Area

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within these ecoregions is quite diverse, consisting of dissected lava plains, rolling hills, alluvial fans, valleys and scattered long linear north-south trending mountain ranges. There are innumerable large and small closed basins surrounded by extensive terraces formed in ancient lakes.

Vegetation conditions within the planning area generally, and on BLM-administered lands specifically, are relatively similar. One key difference is that privately owned lands have fewer restrictions on vegetation management activities, so landowners can \have more restoration options available and can treat more acres if adequate resources are available. For example, until October 2010, herbicide use on BLM-administered lands was severely restricted such that herbicides were rarely used as part of invasive plant or juniper management. On privately owned lands, these restrictions were not present. In many cases, the current extent of different types of vegetation or its condition is not known on lands other than BLM-administered lands. What information does exist on private, state, and other federal lands is generally incomplete.

Although this section includes estimates of the number of acres in each vegetation type analyzed, confidence in the accuracy of these estimates is low to moderate. Planning area-wide vegetation mapping has occurred as part of several different projects, such as SageMap, ReGAP, LANDFIRE and the Integrated Landscape Assessment Project. However, each effort used different imagery or the same imagery processed in different ways such that agreement between maps is relatively low. Accuracy of vegetation data based on remote sensing models is good at the regional or WAFWA management zone scale; however, data accuracy decreases with scale. When using remotely sensed data at finer scales, site-specific data are important to supplement the model. In addition, certain vegetation types are very difficult to map in semi-arid environments due to limited extent (riparian), high interannual variability (annual grassland, sagebrush-steppe), difficulty in distinguishing key species (crested wheatgrass seedings, sagebrush-steppe), and the inability to detect the early stages of juniper encroachment (juniper woodland), especially with data at coarse scales, such as in LANDSAT imagery (**Figure 3-5**, Vegetation in the Planning Area).

Noxious Weeds and Invasive Species

Noxious weeds and exotic invasive plant species compete with native vegetation for water, space, and nutrients. Invasive plants, defined in BLM Departmental Manual 9015 as "a species that is non-native to the ecosystem under consideration and whose introduction does or is likely to cause economic or environmental harm or harm to human health." The BLM considers plants invasive if they have been introduced into an environment where they did not evolve. As a result, they usually have no natural enemies to limit their reproduction and spread (Westbrooks 1998). Invasive plants can produce significant changes to vegetation, composition, structure, or ecosystem function

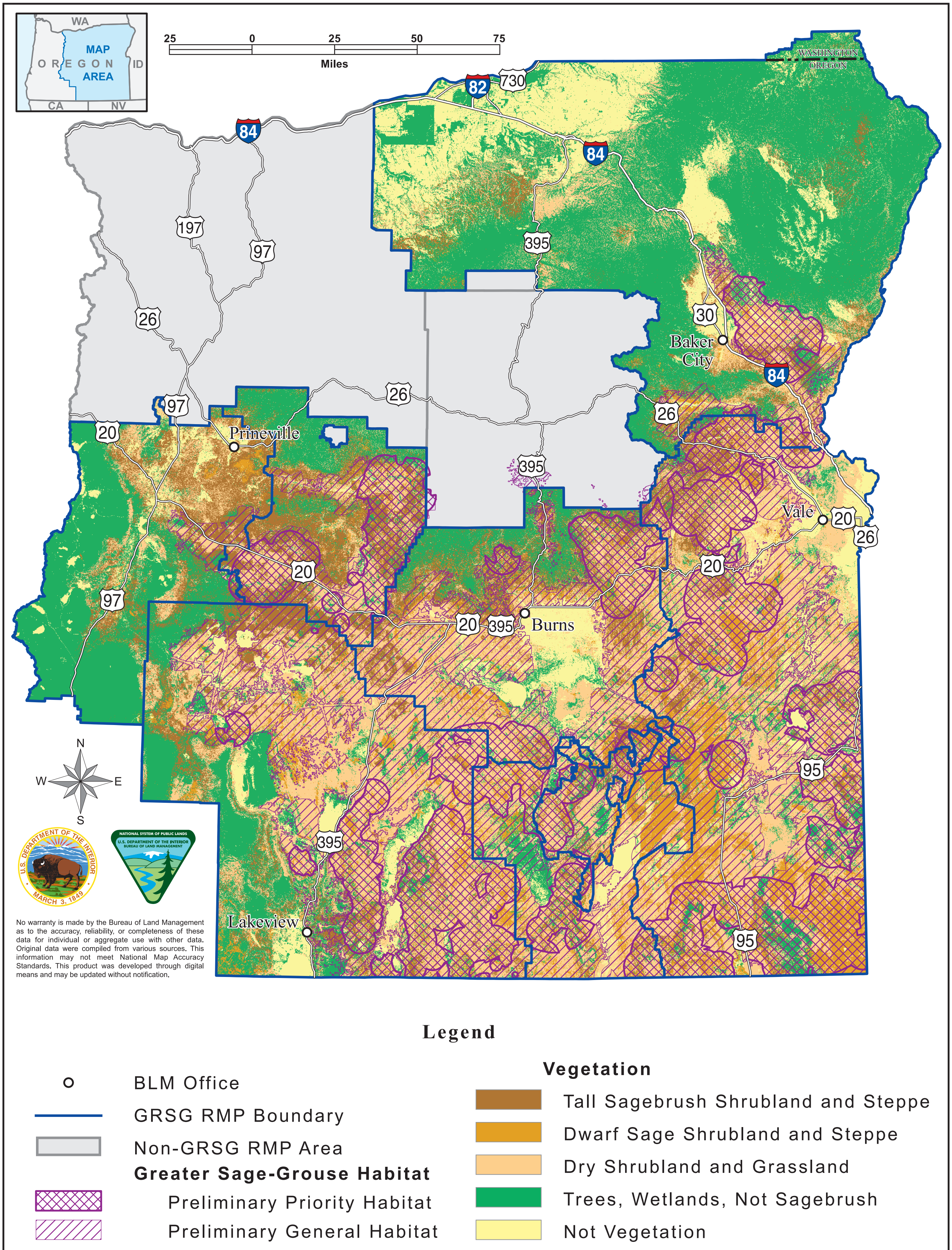

Figure 3-5: Vegetation in the Planning Area

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(Cronk and Fuller 1995). Invasive plant species tend to displace native species used by GRSG for food and cover (Miller et al. 2011).

Noxious weeds are a subset of invasive plants that are state or federally listed as harmful to public health, agriculture, recreation, wildlife and any private or public property. These weeds are regulated by the Federal Noxious Weed Act of 1974 and the Oregon noxious weed policy (Oregon Department of Agriculture 2013).

Riparian and Wetland

Riparian areas include both lotic (running water) and lentic (standing water) systems. Many riparian areas are associated with wetlands, which occur wherever the water table is usually at or near the surface or where the land is at least seasonally covered by shallow water. In the planning area, wetlands include marshes, shallow swamps, lake shores, sloughs, bogs, and wet meadows.

Wetlands and riparian systems typically provide wildlife with green forage, insects, and drinking water. Green forage is especially important for many wildlife species during the summer and fall when upland vegetation dries out. Although riparian areas and wetlands cover less than 1 percent of the planning area, their ecological significance far exceeds their limited physical area. Riparian and wetland areas are major contributors to ecosystem productivity and structural and biological diversity, particularly in drier climates (Elmore and Beschta 1987).

Treeless riparian areas and the edges of wetlands can be important late brood-rearing areas for GRSG as the longer presence of water maintains forb succulence later into the summer (Hagen 2011). Since riparian areas are typically very narrow, they generally are not mapped directly but are assumed to be present along perennial streams. Wetlands may consist of ephemerally wet areas, such as old lakebeds and playas or more permanent wet areas, and can be mapped. Probably the most significant and valuable riparian areas and wetlands for GRSG are those associated with isolated springs and streams scattered over the arid landscape. The variety of shrubs, grasses, and forbs present depends on the degree and duration of wetness and shade at each location (Gregory et al. 1991).

Prior to the 1970s, many riparian/wetland areas were degraded by uncontrolled uses. Any management activity that disturbs water, soil, or vegetation can potentially degrade riparian areas. Such activities include livestock grazing, road construction, timber harvest, mining, irrigation, and recreation. In addition, off-site activities can affect riparian areas by influencing the timing and amount of overland and subsurface flow of water and movement of soils. Some past land use practices have resulted in riparian areas that have inadequate vegetation to protect streambanks from erosion; lack appropriate diverse vegetation that provides habitat for riparian-dependent wildlife species; contain incised channels that do not allow streams to dissipate flood energy and provide water storage; and provide inadequate pools and shade for aquatic species.

Conditions on BLM-Administered Lands

Acres of vegetation communities within PPH and PGH on BLM-administered lands within the planning area are presented in **Table 3-4**, Acres of Vegetation Communities within PPH and PGH on BLM-Administered Lands within the Planning Area.

Table 3-4
Acres of Vegetation Communities within PPH and PGH on BLM-Administered Lands within the Planning Area

Vegetation Community	Designated PGH (acres)	Designated PPH (acres)	Non-Designated (acres)	Total (acres)
Cool-Moist Sagebrush Steppe	181,719	324,338	71,633	**577,690**
Warm-Dry Sagebrush Steppe	3,195,814	2,218,285	654,696	**6,068,795**
Shallow-Dry Sagebrush Steppe	662,138	1,306,521	43,568	**2,012,227**
Other Sagebrush-Steppe	180,366	73,731	67,675	**321,772**
Dominated by Invasive Plant Species	538,920	284,658	168,606	**992,184**
Federally listed and State-listed Noxious Weeds	31,572	19,026	34,023	**84,621**
Other non-listed weeds	4	15	128	**147**
Juniper Woodland	488,591	204,785	519,140	**1,212,516**
Crested Wheatgrass Seedings	67,558	25,518	95,947	**189,023**
Wetlands	14,608	27,900	34,442	**76,950**
Perennial Streams	327 miles	160 miles	527 miles	**1,014 miles**
Non-habitat	886,701	394,805	1,721,893	**3,003,399**

Sources: SageMap, data downloaded 18 May 2012, Integrated Landscape Assessment Project, BLM Corporate Weeds Database and Noxious Invasive Species Information Management System (NISIMS), 2013.

Sagebrush-Steppe

Sagebrush-steppe is the primary habitat for GRSG. In Oregon, sagebrush-steppe is divided into three main types based on site productivity as identified in ecological site descriptions. Most of the planning area is dominated by sagebrush, despite the widespread prevalence of invasive plants, juniper encroachment, and crested wheatgrass seedings (**Table 3-4**). There is some degree of overlap between the acres identified as sagebrush steppe, dominated by invasive plant species, juniper woodland, and crested wheatgrass seedings due to the difficulty in clearly separating these types. For example, an area may be mapped as sagebrush steppe in one mapping effort but identified as having a high component of invasive plant species in another. The degree of overlap is not known.

<u>Cool-Moist Sagebrush Steppe (M169 Intermountain and Great Basin Tall Sagebrush Shrubland and Steppe)</u>

The Cool-Moist Sagebrush Steppe is typically found in moderately deep to deep soils with a frigid temperature regime and xeric moisture regime (Anderson 1998; Kagan and Caicco 1996). As such, it is typically found at the higher elevations where the average annual precipitation exceeds 12 inches annually, and on cooler, moister aspects at mid-elevations. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) is the most common big sagebrush subspecies present, often with antelope bitterbrush (*Purshia tridentata*) as a co-dominant. Wyoming big sagebrush (*A. t.* ssp. *wyomingensis*) and basin big sagebrush (*A. t.* ssp. *tridentata*) can also be present, primarily in the ecotone between the Cool-Moist and Warm-Dry Sagebrush Steppe. Low sagebrush (*A. arbuscula*) is dominant where soils are shallower and saturate at least once every 10 years, precluding big sagebrush.

Idaho fescue (*Festuca idahoensis*) is one of the more common native grasses in the Cool-Moist Sagebrush Steppe with bluebunch wheatgrass (*Pseudoroegneria spicata*) a common co-dominant. These sites are also forb-rich, particularly when sagebrush cover is relatively low. Because grasses and forbs cure later in the summer, the Cool-Moist Sagebrush Steppe provides important late brood-rearing habitat and can provide nesting and wintering habitat at the ecotone and in winters with less snow.

<u>Warm-Dry Sagebrush Steppe (M171 Intermountain and Great Basin Dry Shrubland and Steppe)</u>

The Warm-Dry Sagebrush Steppe is typically found in shallow to moderately deep soils with a mesic soil temperature regime and aridic moisture regime (Anderson 1998; Kagan and Caicco 1996). This sagebrush type is typically located in the low elevations where the average annual precipitation is less than 12 inches annually and on warmer, drier aspects at mid-elevations. Wyoming big sagebrush is the most common big sagebrush subspecies with low sagebrush dominant on shallower soils that saturate at least once every 10 years, and mountain big sagebrush present at the ecotone with the Cool-Moist Sagebrush Steppe. Deeper soils may support basin big sagebrush. Soils with a higher salt content typically include spiny hopsage (*Grayia spinosa*), black greasewood (*Sarcobatus vermiculatus*), or shadscale (*Atriplex confertifolia*). The Warm-Dry Sagebrush Steppe is often intermingled with the Shallow-Dry Sagebrush Steppe.

Bluebunch wheatgrass and Thurber's needlegrass (*Achnatherum thurberianum*) are the most common native grasses. The Warm-Dry Sagebrush Steppe supports the greatest number of invasive plant species, including the exotic annual grasses, and the highest proportion of crested wheatgrass seedings. Most of the area impacted within this type is associated with the increased frequency of wild fire and slow recovery time following wild fire. However, this sagebrush type also provides the most wintering, nesting, and early brood-rearing habitat for GRSG.

Shallow-Dry Sagebrush Steppe (M170 Intermountain and Great Basin Dwarf Sagebrush Shrubland and Steppe)

The Shallow-Dry Sagebrush Steppe is found on shallow to very shallow soils with an frigid soil temperature regime and a aridic to mesic moisture regime (Anderson 1998; Kagan and Caicco 1996). The Shallow-Dry Sagebrush Steppe can occur at any elevation, but is most common at lower elevations intermingled with the Warm-Dry Sagebrush Steppe. Low sagebrush is the most common sagebrush species, but black sagebrush (*Artemisia nova*) or stiff sagebrush (*A. rigida*) communities are also included. This type includes some very unproductive big sagebrush communities such as basin big sagebrush communities in lava fields and on deep pumice, Wyoming big sagebrush communities on slightly deeper soils and mountain big sagebrush communities on slightly deeper and cold soils. Saltier soils may include spiny hopsage, black greasewood, shadscale and winterfat (*Krascheninnikovia lanata*).

The Shallow-Dry Sagebrush Steppe is grass-poor but forb-rich. Sandberg's bluegrass is the most common native grass species and bare ground can be extensive. Invasive plant species may also be present and can become dominant following fire. The Shallow-Dry Sagebrush Steppe provides important habitat for pre-laying hens and for brood-rearing, particularly near the edges adjacent to the Warm-Dry or Cool-Moist Sagebrush Steppe. It provides some wintering habitat in years with less snow and where the sagebrush are a bit taller. GRSG leks may also be located in this type.

Other Sagebrush Steppe

Two other types of sagebrush steppe occur within the planning area, but are limited in size and widely scattered. Remnants of what would have been Warm-Moist Sagebrush Steppe may still be found in lower elevations as small patches along streams and road edges in deep to very deep soils that are subirrigated. Much of this type was converted to agriculture during the Euro-American settlement period and now supports irrigated hay, grain, and vegetable crops. Basin big sagebrush and basin wildrye are the two species most commonly associated with this type. The silver sagebrush steppe is another minor type usually found in semi-wet meadows, flood plains of rivers, moist semi-alkaline flats, and playas. Silver sage is the dominant and characteristic shrub of this community. It grows in areas that have been deflated (eroded by wind) and subsequently partially filled with ingrained sediments. Although species such as creeping wildrye occasionally occur, the understory can be dominated by widely spaced, often robust bunchgrasses such as Nevada bluegrass. GRSG use of these two minor sagebrush steppe types in southeastern Oregon is not well known, but some nesting may occur.

Invasive Plants

The invasive plant species of concern for GRSG are well adapted to the semi-arid environments of eastern Oregon. Available data show there are 69 invasive weed species occurring in the planning area on BLM-administered lands, with 52 that are federally listed (USDA 2010) or state-listed (Oregon Department of Agriculture 2013) noxious weed species. There are 35 noxious weed species occurring within PGH or PPH (**Table 3-5**, Greater Sage-Grouse Habitat Acres of Occurrences for Federally Listed and State-Listed Noxious Weeds (sorted by PGH/PPH acres)), and **Table 3-6**, Greater Sage-Grouse Habitat Acres of Occurrences for Other Invasive Plant Species). Many of these species occur within sagebrush communities utilized by GRSG, including active and unoccupied leks (BLM 2013b). Analysis of invasive weeds found 34 species occurring on 37,212 acres within 3 miles of active and inactive leks (**Table 3-7**, Acres of Occurrences of Invasive Plant Species within 3 Miles of Occupied and Unoccupied Leks by BLM District). Some of the acres of weed species documented are quite small, and many occur on less than one hundredth of an acre, but the total occupied acres of other groups is quite large, with the thistles occupying tens of thousands of acres.

Table 3-5
Greater Sage-Grouse Habitat Acres of Occurrences for Federally Listed and State-Listed Noxious Weeds (sorted by PGH/PPH acres)

Scientific Name	Common Name	Non-Habitat	PGH	PPH
Taeniatherum caput-medusae	Medusahead rye	10,151	10,539	12561
Cirsium arvense	Canada Thistle	2,030	7,478	620
Cirsium vulgare	Bull Thistle	2,653	7,133	795
Onopordum acanthium	Scotch Thistle	2,604	1,386	1993
Cardaria draba	Whitetop (hoary cress)	2,243	1,316	1408
Lepidium latifolium	Perennial pepperweed	1,285	1,546	263
Acroptilon repens	Russian Knapweed,	1,571	356	380
Salvia aethiopis	Mediterranean sage	502	375	249
Linaria dalmatica	Dalmation Toadflax	2,136	572	21
Halogeton glomeratus	Halogeton	56	82	459
Centaurea stoebe	Knapweed, Spotted	1,691	302	35
Centaurea diffusa	Knapweed, Diffuse	2,455	258	48
Centaurea solstitialis	Starthistle, Yellow	675	46	90
Euphorbia esula	Spurge, Leafy	200	51	35
Chondrilla juncea	Rush skeletonweed	1,666	47	8
Tamarix ramosissima	Saltcedar	12	36	0.3
Cynoglossum officinale	Houndstongue	858	11	17
Xanthium spinosum	Spiny cocklebur	4	2	24
Tribulus terrestris	Puncturevine	149	24	0.9
Salsola tragus	Russian thistle	64	2	12

Table 3-5
Greater Sage-Grouse Habitat Acres of Occurrences for Federally Listed and State-Listed Noxious Weeds (sorted by PGH/PPH acres)

Scientific Name	Common Name	Non-Habitat	PGH	PPH
Carduus nutans	Thistle, Musk	10	7	0.0007
Convolvulus arvensis	Field bindweed	9	2	2
Hypericum perforatum	St. Johnswort	12	0.02	2
Aegilops cylindrical	Jointed Goatgrass	6	1	0.7
Orobanche minor	Small broomrape	0	0	1
Potentilla recta	Sulfur cinquefoil	18	0.2	0.05
Lythrum salicaria	Purple loosestrife	0.5	0	0.2
Centaurea virgata	Knapweed, Squarrose	35	0.1	0.006
Isatis tinctoria	Dyers woad	0	0.1	0.002
Polygonum cuspidatum	Japanese Knotweed (fleece flower)	2	0	0.1
Linaria vulgaris	Yellow Toadflax	32	0.1	0
Senecio jacobaea	Tansy ragwort	0	0.01	0.006
Conium maculatum	Poison hemlock	22	0	0.003
Cytisus scoparius	Scotch broom	0.4	0	0.002
Solanum elaeagnifolium	Silverleaf nightshade	0	0	0.0003
Anchusa officinalis	Common bugloss	14	0	0
Cardaria pubescens	Whitetop, Hairy	3	0	0
Carduus acanthoides	Thistle, Plumeless	26	0	0
Centaurea calcitrapa	Purple Starthistle	0.0006	0	0
Centaurea iberica	Iberian Starthistle	13	0	0
Clematis vitalba	Old man's beard	14	0	0
Dipsacus laciniatus	Cutleaf teasel	576	0	0
Euphorbia myrsinites	Myrtle Spurge	1	0	0
Hemizonia pungens	Spikeweed	21	0	0
Hieracium aurantiacum	Orange hawkweed	2	0	0
Hieracium pratense	Hawkweed, Meadow	32	0	0
Iris pseudacorus	Yellow flag iris	10	0	0
Kochia scoparia	Kochia	155	0	0
Opuntia aurantiaca	Jointed Prickly Pear	0.01	0	0
Peganum harmala	African rue	0.4	0	0
Rubus aremeniacus	Himalayan Blackberry	1	0	0
Solanum rostratum	Buffalobur	0.2	0	0
Total Noxious Weed Acres		**34,023**	**31,572**	**19,027**

Source: Oregon/Washington BLM 2013

Table 3-6
Greater Sage-Grouse Habitat Acres of Occurrences for Other Invasive Plant Species[1]

Scientific Name	Common Name	Non-Habitat	PGH	PPH
Centaurea melitensis	Maltese Starthistle	0	0	0.0008
Cichorium intybus	Chicory	0	0	1
Cirsium undulatum	Wavyleaf Thistle	0.1	0	0
Digitalis purpurea	Purple Foxglove	10	0	0
Dipsacus fullonum	Fullers' Teasel	26	0.0007	0.5
Elaeagnus angustifolia	Russian Olive	11	1	0.0003
Hyoscyamus niger	Black henbane	0	1	1
Leucanthemum vulgare	Oxeye Daisy	0.1	0	0.3
Melilotus officinalis	Yellow Sweet Clover	0	2	12
Phalaris arundinacea	Reed Canarygrass	0.03	0	0
Sisymbrium altissimum	Tumble Mustard	0.003	0	0
Solanum dulcamara	Bitter/climbing nighshade	0	0	0.0002
Verbascum thapsus	Common mullein	79	0	0
Vinca major	Bigleaf periwinkle	2	0	0
Xanthium strumarium	Rough Cocklebur	0	0	0.05
Total Acres		**129**	**4**	**15**

Source: Oregon/Washington BLM 2013
[1]Does not include annual grasses, which as estimated to occur on approximately 1 million acres

Table 3-7
Acres of Occurrences of Invasive Plant Species within 3 Miles of Occupied and Unoccupied Leks by BLM District

Scientific Name	Common Name	Burns District	Lakeview District	Prineville District	Vale District
Acroptilon repens	Russian Knapweed	16	34	264	18
Aegilops cylindrical	Jointed Goatgrass				1
Cardaria draba	Whitetop (hoary cress)	2,407	73	360	1,224
Carduus nutans	Musk Thistle	0.02	0.09		
Centaurea diffusa	Diffuse Knapweed	118	0.001	7	60
Centaurea iberica	Starthistle, Iberian				0.007
Centaurea solstitialis	Starthistle, Yellow	7	0.001		79
Centaurea stoebe	Knapweed, Spotted	171	0.003	3	29
Chondrilla juncea	Rush skeletonweed				12
Cirsium arvense	Canada Thistle	5,633	145	218	10
Cirsium vulgare	Bull Thistle	5,542	56	114	0.8
Conium maculatum	Poison hemlock	0.003	0.0007		
Convolvulus arvensis	Field bindweed	9	0.0007		0.0002
Cynoglossum officinale	Houndstongue				22
Dipsacus fullonum	Fullers' Teasel		1		0.1
Elaeagnus angustifolia	Russian olive	0.007			0.0003

Table 3-7
Acres of Occurrences of Invasive Plant Species within 3 Miles of Occupied and Unoccupied Leks by BLM District

Scientific Name	Common Name	Burns District	Lakeview District	Prineville District	Vale District
Euphorbia esula	Spurge, Leafy				40
Hyoscyamus niger	Black henbane	1			0.4
Hypericum perforatum	St. Johnswort	2	0.2		
Isatis tinctoria	Dyers woad	0.1			
Lepidium latifolium	Perennial pepperweed	1,126	702	9	152
Leucanthemum vulgare	Oxeye Daisy				0.3
Linaria dalmatica	Dalmation Toadflax	342	0.0007		0.1
Lythrum salicaria	Purple loosestrife	0.1			0.2
Onopordum acanthium	Scotch Thistle	1,190	5	0.1	339.
Polygonum cuspidatum	Knotweed, Japanese (fleece flower)				0.1
Potentilla recta	Sulfur cinquefoil				0.05
Salvia aethiopis	Mediterranean sage	201	530		5
Senecio jacobaea	Tansy ragwort	0.008			
Solanum elaeagnifolium	Silverleaf nightshade				0.0003
*Taeniatherum caput-medusae**	Medusahead rye	11,730	3,033	4	1,158
Tamarix ramosissima	Saltcedar				2
Tribulus terrestris	Puncturevine	0.02			1
Xanthium spinosum	Spiny cocklebur				0.1
Total invasive plant Lek acres		**28,495**	**4,582**	**980**	**3,155**

Source: Oregon/Washington BLM 2013
*Acres for medusahead rye is likely incomplete and an under-estimation

As shown in **Table 3-4**, nearly 285,000 acres of PPH are dominated by invasive plant species, but only 19,000 of these acres are dominated by listed noxious weeds. There are 17 invasive plants of concern that are not officially on the federal or Oregon Department of Agriculture noxious weed lists. These invasive plant species are not tracked as official noxious weeds, even though a few of them are having a tremendous effect on the ecosystem. Most notable is an annual grass complex made up of the state-listed noxious weed medusahead (*Taeniatherum caput-medusae*), the invasive species of concern cheatgrass (*Bromus tectorum*), and North Africa grass (*Ventenata dubia*), which are estimated to occur on a million acres of BLM-administered lands in eastern Oregon (BLM 2010a). BLM data on cheatgrass are incomplete and the species is widely underreported in the noxious weed databases. Disturbances such as wildfire can promote the large-scale conversion of native vegetation to cheatgrass, medusahead, and *Ventenata*. Once converted to invasive plant species, restoration of native vegetation is extremely time-consuming and resource-intensive. The best option for control of weed spread is prevention of wildfire and weed control efforts to prevent spread in the first place.

The other major groups of noxious weeds in PPH and in close proximity to leks in the planning area are a number of thistles; Canada thistle (*Cirsium arvense*), bull thistle (*C. vulgaris*), Scotch thistle (*Onopordum acanthium*), Russian thistle (*Salsola kali*), and musk thistle (*Carduus nutans*), a number of weedy mustards; white top (*Cardaria draba*), perennial pepperweed (*Lepidium latifolium*), and dyers woad (*Isatis tinctoria*); and a number of knapweeds, Russian knapweed (*Acroptilon repens*), diffuse knapweed (*Centaurea diffusa*), yellow starthistle (*C. solstitialis*), spotted knapweed (*C. stoebe*), and squarrose knapweed (*C. virgata*). Other listed noxious weeds with substantial acreage within GRSG habitat include: Dalmatian toadflax (*Linaria dalmatica*), leafy spurge (*Euphorbia esula*), Mediterranean sage (*Salvia aethiopis*), saltlover (*Halogeton glomeratus*) puncturevine (*Tribulus terrestris*), rush skeletonweed (*Chondrilla juncea*), houndstongue (*Cynoglossum officinale*), common St. Johnswort (*Hypericum perforatum*), spiny cocklebur (*Xanthium spinosum*), tansy ragwort (*Senecio jacobaea*), and jointed goatgrass (*Aegilops cylindrica*).

In all, federal and state listed noxious weeds tracked by the BLM in the corporate databases occur on 84,623 acres within the planning area; there are 31,572 acres of noxious weeds in PGH, and another 19,026 acres within PPH. There are an additional 15 species in the database (not counting the invasive plant species) on 148 acres, of which only 19 acres are in PPH or PGH. This is likely an underestimate as non-federal or non-state listed weeds are often not well-documented.

Cheatgrass, medusahead, and other invasive annual grasses have widespread invasion potential (**Table 3-8**, Acres of Moderate to High Cheatgrass Potential within Greater Sage-Grouse Habitat in the Planning Area), and are considered most problematic due to the difficulties, expense, and low success rate in restoration; the lack of EPA-approved biological control agents or biopesticides; and the dramatic shortening of fire frequencies where invasive plant species dominate (Brooks et al. 2004; Sheley et al. 2011). Spatial data on the extent of the weedy annual grass complex (including medusahead, cheatgrass, and North African grass) are incomplete and estimated to be nearly (or likely over) a million acres within the planning area. Acres of moderate to high potential for cheatgrass occurrence are presented in **Table 3-8**.

All districts attempt to treat invasive plant infestations using a variety of methods under the umbrella of integrated pest management or ecologically-based invasive plant management, but emphasize prevention and early detection of new infestations. Specific prevention measures have been required during larger wildfires, but not for other land management activities, and are voluntary for recreation users. Treatment method categories include manual methods,

Table 3-8
Acres of Moderate to High Cheatgrass Potential within Greater Sage-Grouse Habitat in the Planning Area

Surface Management Agency	WAFWA Management Zone[1]	Total Acres[2]	Acres within PGH	Acres within PPH
BLM	IV	4,414,000	2,361,300	2,052,700
	V	5,412,200	3,663,900	1,748,300
Forest Service	IV	28,400	5,300	23,100
	V	137,600	101,200	36,400
Tribal and Other Federal	IV	75,100	49,500	25,600
	VI	237,900	66,500	171,400
Private	IV	1,679,700	798,900	880,800
	V	1,937,300	1,335,000	602,300
State	IV	331,000	244,800	86,200
	V	149,500	99,900	49,600
Other	IV	5,400	5,400	0
	V	0	0	0

Source: Manier et al. 2013
[2]Acreage comprised of areas with a moderate to high potential for cheatgrass occurrence

mechanical methods, biocontrol methods, prescribed fire, and herbicides. Until 2010, use of herbicides on BLM-administered lands was restricted through a court order. The result was that herbicides were used sparingly and with minimal effectiveness at the landscape scale. All four districts are preparing environmental assessments to expand the use of herbicides and other treatment methods to help control invasive plants. Those documents describe in more detail which herbicides are proposed for use, best management practices, and how herbicides will be incorporated into existing management programs. Use of pre-emergent herbicides targeted at the invasive plant species is increasing as part of post-fire rehabilitation efforts.

Observations and the scientific literature on cheatgrass indicate that, while it may be present on every acre, not every site is at equal risk of cheatgrass dominance. Cheatgrass is most likely to take site dominance where the soil moisture regime is xeric and the soil temperature regime is mesic, although its success at invasion where the soil moisture regime is aridic is increasing. However, even in that optimal soil temperature-moisture combination, cheatgrass can take site dominance following a stand-replacing disturbance such as fire only where native perennials have been depleted or killed by the disturbance (Miller et al. 2011b; Sheley et al. 2011). Thus, healthy rangelands can resist cheatgrass and potentially other invasive plant species (Sheley et al. 2011).

At present, treatment methods are most effective on small, isolated populations, or on newly established infestations (BLM 2010a; Sheley et al. 2011). Manual methods, such as hand pulling, are the least effective except for very few species under limited conditions and rarely used. Mechanical methods, such as mowing, also are of limited effectiveness and tend to be restricted to road edges and rights-of-way (ROWs) on BLM-administered lands in an effort to contain invasive species (BLM 2010a). Bio-control releases for a few invasive forbs have occurred on or near BLM-administered lands, with some success. Prescribed grazing has occurred to a limited extent on Burns District although the success rate of this measure is not yet established. Prescribed burning for invasive species control can be very difficult to conduct successfully and may require burning at such frequencies that GRSG habitat also is adversely affected (Sheley et al. 2011), so this method is rarely, if ever, used on BLM-administered lands. Weed treatments are most effective when methods are combined under the integrated weed management approach, practiced in every BLM district.

All control methods usually require follow-up seeding or planting with non-invasive species that can compete with the invader (BLM 2010a; Sheley et al. 2011). Protocols and practices for post-treatment monitoring and adaptive management are covered in the Oregon Vegetation Treatment EIS (BLM 2010a). Seed zones for all of the native species intended for restoration have not been established; a seed zone is an area within which plant materials can be transferred with little risk of being poorly adapted to their new location. Using the EPA Level III eco-regions (Thorson et al. 2003) as seed transfer zones is a good surrogate when specific genetic or common garden studies are lacking, to ensure that material being used is adapted to the environment (Miller et al. 2011a; Johnson et al. 2010). Further refining seed zones within eco-regions by over-laying local climatic variables, such as maximum temperature, precipitation patterns, or elevation (e.g., less than or more than 4,500 feet), can also further refine adaption zones for plant transfer (Bower 2011; Vogel et al. 2005).

Juniper Encroachment

Western juniper is scattered throughout eastern Oregon, occurring in extensive stands and scattered patches and stringers. Western juniper is classified as M026 Intermountain Singleleaf Pinyon – Western Juniper Woodland. It has historically occupied the most xeric of the tree-dominated zones across eastern Oregon between 2,000 and 8,000 feet in elevation, primarily where average annual precipitation ranges from 10 to 15 inches (Gedney et al. 1999). Above 7,000 feet, extremes in temperatures and severe winter conditions limit juniper growth (Miller and Rose 1995). Most junipers grow on terraces, floodplains, grass-shrub uplands and plateaus-uplands. The distribution of juniper may also be affected by variables other than precipitation, elevation or soils. Because of the xeric environment where juniper grows, the species effectively out-competes other vegetation for available moisture which reduces understory vegetation, plant establishment and vigor (Jeppesen 1978).

The expansion of juniper woodlands over the last 120 years is well documented (**Table 3-9**, Acres of Sagebrush and Juniper Interface within Greater Sage-Grouse Habitat in the Planning Area; Eddleman 1986; Gedney et al. 1999; Miller et al. 2000). Miller and Tausch (2001) estimated the increase was ten-fold. Between 1936 and 1988, inventoried juniper woodlands and savannas across eastern Oregon increased by 433 percent, averaging 8.3 percent per year (Gedney et al. 1999). Between 1988 and 1999, inventoried juniper woodland and savanna increased by 50 percent, averaging 4.5 percent per year (Azuma et al. 2005). Historically, fire restricted western juniper to rockier areas that rarely burned (Miller et al. 2005). However, the highly intensive grazing from the late 1800s through mid-1900s is believed to have reduced fire frequency, allowing juniper to expand relatively rapidly into sagebrush steppe (Burkhart and Tisdale 1976; Miller and Rose 1995, Miller et al. 2005; Romme et al. 2009). The most wide-spread encroachment has been into the Cool-Moist Sagebrush Steppe with some encroachment into the Warm-Dry and Shallow-Dry Sagebrush Steppe. Eddleman (1987) reported that as much as 80 percent of juniper establishment occurs under the crown of sagebrush.

Table 3-9
Acres of Sagebrush and Juniper Interface within Greater Sage-Grouse Habitat in the Planning Area

Surface Management Agency	WAFWA Management Zone	Total Acres of Interface[1]	Acres within PGH	Acres within PPH
BLM	IV	201,800	78,400	123,400
	V	443,900	295,200	148,700
Forest Service	IV	7,800	2,400	5,400
	V	36,700	28,300	8,400
Tribal and Other Federal	IV	2,700	600	2,100
	V	14,600	4,000	10,600
Private	IV	101,400	45,500	55,900
	V	198,900	120,500	78,400
State	IV	29,300	25,200	4,100
	V	8,500	6,700	1,800
Other	IV	0	0	0
	V	0	0	0

Source: Manier et al. 2013
[1]Includes the number of acres where sagebrush land cover occurs within 120 meters of juniper land cover

Acres of interface between juniper and sagebrush ecosystems are shown in **Table 3-9**. Miller et al. (2005) categorized juniper encroachment into three phases. In Phase I, the shrub-steppe species still exert ecological dominance. Juniper is present primarily as seedlings and saplings with an occasional mature, seed-producing tree present. In Phase II, juniper has begun to exert ecological dominance as trees increase in size and density. Sagebrush begins to decrease and herbaceous vegetation begins to decline. Phase III represents a developed juniper woodland, where trees dominate ecological processes and sagebrush is largely or completely gone from the site. As juniper saplings develop in Phase I, GRSG use declines rapidly due to increased tree height for perches improving predator habitat specifically avian predation.

Detecting Phase I juniper is very difficult using remote sensing methods and young juniper trees still within the crowns of sagebrush are easily missed during walk-through assessments and cursory surveys. Most vegetation treatments on BLM-administered lands target later Phase I through early Phase III juniper encroachment (see **Section 3.6**, Wildland Fire Management, for more details).

Crested Wheatgrass Seedings

In the 1960s and 1970s, extensive areas of degraded rangelands were treated to reduce sagebrush and then planted with crested wheatgrass (Heady 1988; Hagen 2011). Crested wheatgrass and other non-native grasses have also been widely used in post-fire restoration as these species often compete well with invasive plant species, unlike most native perennial grasses. Crested wheatgrass may be used as a fuelbreak between invasive plant species-dominated areas and relatively intact sagebrush-steppe. Crested wheatgrass remains the most prevalent and successful species in most seedings; sagebrush is present to some degree (Heady 1988; Karl and Sadowski 2005), but forbs and native perennial grasses are often uncommon to rare. The reasons for this are poorly understood and likely site-specific. In some locations, wind-derived soil crusts may limit the ability of other species to germinate or establish. In other locations, competition for water and nutrients by the established crested wheatgrass may restrict establishment of other species. The ecological integrity sites seeded in the 1960s and 1970s with primarily crested wheatgrass is low, especially over large areas, where there are few mosaics of other plant communities, little diversity of wildlife species that use these communities, and disruption of corridors for animal movement. GRSG use of these crested wheatgrass monoculture seedings is believed to be very limited.

Riparian Areas and Wetlands

Conditions on BLM-administered land are similar to conditions in the planning area as a whole, described in the previous section.

Other

The Other category includes a variety of vegetation types that do not serve as GRSG habitat. These include salt desert shrub, mountain shrubland, lava fields and sand dunes, alpine grasslands, quaking aspen woodlands, and tree- or shrub-dominated riparian and wetland areas. Of these vegetation types, the most extensive type is salt desert shrub. GRSG use of these areas is generally low or believed to be low.

Special Status Plants

The BLM's policy for special status plant species is to conserve and recover threatened and endangered species and the ecosystems on which they depend so that ESA protections are no longer needed, and to initiate proactive conservation measures that reduce or eliminate threats to BLM sensitive species to minimize the likelihood of and need for listing of these species under the ESA. The BLM 6840 Manual, Special Status Species Management (BLM 2008c), sets policy for the management of candidate species and habitat. BLM sensitive species include candidate species for ESA listing, including GRSG. The 6840 manual directs the BLM to conserve special status species and the ecosystems on which they depend on BLM-administered land and reduce the likelihood and need for future listing under the ESA. It also directs the BLM to undertake conservation actions for such species before listing is warranted and to "work cooperatively with other agencies, organizations, governments, and interested parties for the conservation of sensitive species and their habitats to meet agreed on species and habitat management goals."

The BLM 6840 manual requires the BLM to identify strategies, restrictions and management actions necessary to conserve and recover listed species and provide provisions to conserve BLM sensitive species when the engaging in the planning process and developing LUPs and implementation plans. It also requires managers to determine, to the extent practicable, the distribution, abundance, population condition, current threats, and habitat needs for sensitive species, and to evaluate the significance of actions in conserving those species.

In Oregon, besides threatened, endangered, and sensitive species, the State Director has also designated strategic species (BLM 2012e). While these species are not special status species for management purposes per BLM Manual 6840, they are uncommon and sensitive species tracked by the Oregon Heritage program (ORBIC 2012) that do not meet the BLM criteria to be classified as sensitive.

There are 115 known species of special status mosses, lichens and vascular plants occurring on BLM-administered lands, and another 70 species suspected to occur based on proximity to known populations on adjacent available habitat (BLM 2012e; Oregon Plant Atlas 2012; ORBIC 2012). There are 13 known occurrences of BLM strategic species (**Appendix K**).

The Burns District has one federally endangered plant, Malheur wirelettuce (*Stephanomeria malheurensis*) and the Baker Resource area on the Vale District has populations of the federally threatened Spalding's catchfly (*Silene spaldingii*). Within the Vale District on adjacent private land, populations of the listed threatened Howell's spectacular thelypody (*Thelypodium howellii* ssp. *spectablis*) occur, however no extant populations have been found on federal lands to date.

Botanical inventories across the range of the GRSG in Oregon are incomplete, and what is presented in **Appendix K** represents the best available information for known occurrences of BLM special status plants. Vast areas of habitat have not had botanical inventories within the over 13 million acres of the 4 districts.

Most species on the BLM sensitive plant lists that are documented within the planning area are known from a small number of occurrences, usually with small population sizes, occupying small acreage in suitable habitat (BLM 2012e). Many of these species are poorly understood, with few (if any) studies documenting the species' biology, ecology, and population characteristics. These sensitive plants are not evenly or predictably distributed across the landscape, and tend occur in patchy, clumped distributions associated with suitable habitat. Within eastern Oregon, a majority of the BLM sensitive plants are endemics confined to a very limited range or to specific plant communities or unique soil types. Even sensitive plants that have known specialized habitat needs are often not present within specialized habitats; unoccupied suitable habitat is common.

To date, BLM special status plants have been documented on about 39,805 acres within the planning area, of which 14,755 acres (37 percent) are within PPH and 9,210 acres (23 percent) within PGH (BLM 2012e). Overall, BLM special status plant species are documented to occur on a very small percentage of the landscape, less than 0.3 percent of PPH and PGH combined. However, a large percentage of the landscape has not had botanical surveys targeting sensitive plants; it is likely that future pre-disturbance surveys for BLM projects will document more populations. Many of these sensitive plant species are associated with sagebrush habitats that also support GRSG.

3.3.2 Trends

Sagebrush Steppe

Statewide, acres of habitat for GRSG in Oregon have declined by 21 percent from estimated acres of habitat prior to 1850, with most of the decline in the Columbia Basin (Hagen 2011). Juniper encroachment is expected to continue at a faster rate than treatment. The spread of exotic invasive plant species is mainly facilitated by wild fires with lesser causal factors being drought and other physical disturbance factors. The current aroga moth (*Aroga websteri*) outbreak reached epidemic levels in 2012, primarily affecting the Warm-Dry Sagebrush Steppe; however, recent monitoring has found that the aroga moth is affecting all of the most common species of sage at a large variety of elevations and habitat types. When the outbreak began is unclear, but it may have begun in the mid-2000s with observed smaller scale outbreaks in northern Nevada (Bentz et al. 2008) and eastern Oregon. In some locations, the population peak has lasted for 3 years. Past aroga moth outbreaks typically resulted in partial crown mortality in sagebrush and scattered complete mortality. However, the scale and duration of the current outbreak is believed to greatly exceed the smaller outbreaks of the recent past. The last outbreak at the current scale occurred in the mid-1960s (Hall 1965). Frequent or extensive defoliation can cause sagebrush mortality (Hall 1965), although the degree of mortality from the current outbreak is not yet known. The observed impacts on sagebrush foliage are believed to be a factor in the scale of wildfires on the Burns and Vale Districts during the summer of 2012.

Invasive Plants

Some actions and events have altered the historic range of native species composition, structure, and distribution across the landscape, which has allowed weeds to invade and establish themselves. Under current management, the BLM estimates that noxious weeds on BLM-administered lands in Oregon are spreading at an annual rate of 12 percent, far exceeding the rate of treatment (BLM 2010a). Preliminary analyses for District-level herbicide environmental documents indicate the fastest spreading invasive species are dalmation toadflax (*Linaria dalmatica*), thistles and knapweeds, invasive plant species, and whitetop (*Cardaria* spp.). Many of these noxious weed species are within the three-mile lek buffers and invasive plant spread into leks and surrounding brood-rearing habitat is of concern. Increasing weed populations in these locations could degrade suitable habitat.

Changing climate in combination with changing land uses and increased global commerce may be assisting plant invasions (Bradley et al. 2010). For example, increasing atmospheric carbon dioxide concentrations appear to favor invasive plant species and yellow star thistle at the expense of native species (Mayeux et al. 1994; Meyer et al. 2001; Ziska et al. 2005; Jessup and Anderson 2007; Bradley et al. 2010; Dukes et al. 2011). Interactions between increasing atmospheric carbon dioxide and changing temperature and precipitation regimes are complex and may favor some invasive species while disfavoring others (Bradley et al. 2010). The effects of climate change, including changing atmospheric carbon dioxide concentrations, remain largely unknown for most invasive species as well as for most herbaceous native species.

In addition, recreational use is expected to continue to grow throughout the planning area (as described in **Section 3.8**, Recreation), and ongoing natural events such as wildfires, will likely increase the potential for weed introduction and establishment across the planning area. Since most invasive species are well-adapted to exploit recently burned areas, any increases in average fire size or the frequency of fires is of particular concern. See **Section 3.6**, Wildland Fire Management, for more detail on trends in wildfires. The current aroga moth outbreak may also favor invasive species where higher sagebrush mortality occurs in formerly dense stands with sparse native understories and invasive plants already present.

Juniper Woodland

Most of the current vegetation treatments are focused on reducing juniper; however, current treatment rates appear to be lower than the current expansion rate, based on field observations. Comparing Forest Service juniper assessments suggests that the extent of juniper has declined within the Brothers/La Pine and Upper Deschutes RMP areas (Gedney et al. 1999; Azuma et al. 2005). These declines are likely due to displacement by other conifers and human population growth and subsequent development. These same assessments indicate continued increase of juniper in the remainder of the planning area, but the greatest increases over the last 60 years have been within the Baker and Southeastern Oregon RMP boundaries (Gedney et al. 1999; Azuma et al. 2005). Continued fire exclusion, increases in atmospheric carbon dioxide concentrations, and biological inertia are thought to be the primary causes (Soulé and Knapp 1998; Knapp et al. 2001; Soulé et al. 2004).

The expansion of juniper woodland is likely to continue. The presence of seedlings in juniper savannas suggests that juniper is still in an establishment stage, and that the probability of these lands continuing to increase in tree density is larger than for areas that have a single old juniper standing on it. Juniper woodland is also expected to continue to develop in suitable areas that currently lack juniper. Gedney et al. (1999) speculated there might be as much as 6 million acres of juniper woodland and savanna in the future, assuming no additional changes in current conditions.

Crested Wheatgrass Seedings

Due to its demonstrated ability to compete, crested wheatgrass continues to be one of the preferred species in rehabilitation efforts where invasive plant species are either known or expected to be a problem. However, most seed mixes now include native grasses and forbs as well. The conversion of sagebrush to crested wheatgrass monoculture seedings no longer occurs in sagebrush steppe and has not for many years. Sagebrush cover continues to increase at varying rates within existing seedings, but increases in native grasses and forbs remain limited. At present, little effort is expended on further manipulation of crested wheatgrass seedings due to limited resources and higher priorities for vegetation treatments, primarily of juniper expansion areas.

Riparian and Wetland

Proper functioning condition is a qualitative method of assessing the ecological integrity of a stream and its associated riparian vegetation. Streams rated as properly functioning or on an upward trend also should have characteristic riparian vegetation species mix. Of the stream miles assessed, 83 percent within designated PPH were rated as properly functioning or on an upward trend and only 8 percent as nonfunctional or on a downward trend. Within PGH, 82 percent of stream miles were rated as properly functioning or on an upward trend and 7 percent as nonfunctional or trending downward. Elsewhere, 75 percent of stream miles were rated as properly functioning or trending upward and 11 percent as nonfunctional or trending downward. Photo trend monitoring generally shows an increase in native riparian vegetation, including willows, sedges and rushes, as well as stream channel narrowing and deepening, and increases in streambank stability.

Special Status Plants

For the vast majority of BLM sensitive plants on the BLM special status species list, there is little quantitative trend data or formal monitoring of the number of individuals, demographic structure, seedbank viability, response to disturbance, or changing climate. Monitoring of sensitive plant populations usually takes 10 years to fully understand population demographics, document population trends, and to observe annual fluctuations of populations due to climatic variability. Long-term monitoring has been cost prohibitive in the decision area for the majority of the BLM special status plants. Less than 10 percent of the sensitive plants have had any long-term, statistically rigorous monitoring projects (Institute for Applied Ecology 2012; Meinke 2012). Much of what is known is observational, or monitoring that has been inconsistent, incomplete, or at only a few locations. In most cases, any documented species trends are variable (i.e., some populations stable, some increasing, or some decreasing).

BLM sensitive plants can be affected by a number of factors. The biggest factors are activities that result in direct physical impacts on plants and occupied habitat. Schemske et al. (1994) listed the top six threats to sensitive plants as 1) development; 2) grazing; 3) collecting; 4) water control; 5) oil, gas, and mining; and 6) trampling. Wilcove et al. (1998) at a coarse scale identified habitat destruction and alien species invasion as the greatest threats and within habitat destruction (finer scale), listed: land conversion (development), agriculture, livestock grazing, outdoor recreation, and disruption of the fire ecology as the greatest threats to sensitive plants. Kaye and Meinke (1997) identified the major threats to sensitive plant species for Oregon with a similar list. The list of threats seems to be directly correlated with land use patterns, with development (including agriculture), logging, livestock grazing, and recreation as the most significant threats to sensitive plants. All of these threats are occurring in Oregon to some degree and likely indicate a declining trend in prevalence of special status plant species over time. Ground-disturbing activities such as energy development, power-line ROW construction, road construction and maintenance, rock, sand and gravel operations, and mining can directly impact populations by physical removal of the plants and soil, destruction of seed banks, habitat alteration and fragmentation. As patch sizes for most populations are very small, the physical destruction of an occupied patch can have deleterious consequences for a population.

Direct herbivory from insects, rodents, native ungulates, and livestock has also been documented on sensitive plants (Newton et al. 2010; Gisler and Kaye 2004). Direct impacts on sensitive plant populations from livestock grazing have been documented, especially from trampling of plants in high use area.

OHV recreation can cause direct destruction of sensitive plants and the general habitat in high use and play areas. Direct impacts on plants can also occur from fuel treatments (slashing, pile burns) and juniper removal, if physical impacts occur within occupied habitats. Wildfire suppression can also physically affect plants and habitat, causing impacts from bulldozers and hand crews. However, known sensitive plant populations are identified during or preceding fire incidents and are avoided where such actions do not compromise life and safety.

Other impacts on sensitive plants are indirect. The introduction and spread of invasive, non-native species from disturbance can increase competition with sensitive plants for space, light, water, and nutrients. Water especially can be a limiting factor in the Great Basin, and many weeds are better competitors for this limited resource, sending down deep tap roots or forming large monocultures. Cheatgrass and other invasive plant species have drastically altered the intensity, frequency, and duration of wildfire, which is affecting the sagebrush ecosystem in which many sensitive plants occur. These fires can displace native vegetation and create monocultures of invasive plant species over large areas (Runyon et al. 2012). Disturbance, especially at large scales, can also affect the native pollinator populations (native butterflies, bees, flies, and ants) on which many plants depend. The current understanding of these pollinator interactions on sensitive plants is largely unknown, as few studies have occurred and observations have been largely anecdotal.

A significant existing and potential threat to sensitive plants is climate change. Many special status plants have limited distributions, a low number of sites, small population sizes, and likely lack resilience in response to changing climate and habitat conditions. Under future climate scenarios, sensitive plants can migrate to habitats for which they are better adapted, adapt to the changing environment in their natural or original place, or go extinct (Hawkins et al. 2008). It is estimated that sensitive plants in Oregon comprise between 5 and 15 percent of the known flora of Oregon (Kaye and Meinke 1997). It is likely, given the number of endemics in eastern Oregon, that this figure is true for eastern Oregon as well, although the exact number of plant species documented in the analysis area has not been determined.

The altered future climate may favor other, more common, plant species, particularly invasive and noxious weeds, that may be better adapted to the altered climate or have wider ecological tolerances, outcompeting sensitive native plants and potentially leading to their extinction.

The listed threats to sensitive plants do not act in isolation, but combine at different levels in different areas at different times. The cumulative impacts of these threats combined with climate change on sensitive BLM special status plants may be leading to increasing rarity for these species in Oregon and extirpation or extinction for narrow endemics.

3.4 Fish and Wildlife

General Wildlife

The BLM has broad responsibility to the public under the Federal Land Policy and Management Act (FLPMA), and other acts and presidential orders to maintain and improve the habitat for wildlife. While the BLM conducts habitat inventories, monitoring, protection, restoration, and development activities, FLPMA specifically reserved some responsibilities, particularly managing the wildlife itself (e.g., hunting regulations, wildlife damage control, and translocations/re-introductions) for the individual states (43 USC 1732), in this case the ODFW.

The following summaries briefly explain federal laws, policies, and orders relevant to BLM's management of general wildlife (see **Section 3.4.2**, Special Status Wildlife, for guidance relevant to BLM sensitive and federally listed species).

- FLPMA – The FLPMA directs the BLM to establish goals and objectives as guidelines for public land use planning "on the basis of multiple use and sustained yield unless otherwise specified by law." In addition, FLPMA mandates that the BLM manage "public lands in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric water resources, and archeological values; that, where appropriate, [the BLM] will preserve and protect certain public lands in their natural condition; [and] that [the BLM] will provide food and habitat for fish and wildlife …"
- Migratory Bird Treaty Act (MBTA) – The Migratory Bird Treaty Act (MBTA) of 1918, as amended, implements various treaties and conventions between the US, Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under the act, it is unlawful to pursue, hunt, take, capture (or kill) a migratory bird except as permitted by regulation (16 USC 703-704). The regulations at 50 CFR 21.11 prohibit the take, possession, import, export, transport, sale, purchase, barter, or offering of these activities, or possessing migratory birds, including nests and eggs, except under a valid permit or as permitted in the implementing regulations (Director's Order No. 131). A migratory bird is any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle.
  - The USFWS is the lead federal agency for managing and conserving migratory birds in the US; however, under Executive Order 13186, all other federal agencies are charged with the conservation and protection of migratory birds and the habitats on which they depend. In response to this order, the BLM and Forest Service have implemented management guidelines that direct migratory birds to be addressed in the NEPA process when actions have the potential to negatively or positively affect migratory bird species of concern.
- Memorandum of Understanding (MOU) – The purpose of the MOU is, "to strengthen migratory bird conservation by identifying and

implementing strategies that promote conservation and avoid or minimize adverse impacts on migratory birds through enhanced collaboration between the BLM and the Fish and Wildlife Service and in coordination with state, tribal, and local governments." Following are provisions of the MOU that relate specifically to planning and NEPA compliance.

- The BLM shall:
    - Maintain or update current policy guidance regarding management of migratory birds and their habitat pursuant to the MBTA and Executive Order 13186.
    - Address the conservation of migratory bird habitat and populations when developing, amending, or revising management plans for BLM-administered lands, consistent with the FLPMA, ESA, and other applicable law. When developing the list of species to be considered in the planning process, the BLM will consult the current (updated every 5 years) USFWS Species of Concern lists.
    - At the project level, evaluate the effects of the BLM's actions on migratory birds during the NEPA process, if any, and identify where take reasonably attributable to agency actions may have a measurable negative effect on migratory bird populations, focusing first on species of concern, priority habitats, and key risk factors. In such situations, the BLM will implement approaches lessening such take.
    - Work with federal and non-federal partners such as the Strategic Habitat Conservation partnership and Joint Ventures to integrate migratory bird and habitat conservation into BLM planning efforts.
    - Integrate migratory bird conservation measures, as applicable, into future activity management planning (e.g., grazing, recreation, cultural resources, and wildlife), surface operating standards and guidelines for oil and gas exploration and development, and renewable (wind, solar, and geothermal) energy development NEPA mitigation. This will address habitat loss and minimize negative impacts.

- Bald Eagle Protection Act – The Act, as amended, provides for the protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds. By policy, the BLM will not issue a notice to proceed for any project that is likely to result in take of bald eagles and/or golden eagles until the applicant completes its obligation under applicable requirements of the Act, including completion of any required procedure for coordination with the USFWS or any required permit (WO-IM-2010-156).

- Executive Order 13443 – Facilitation of Hunting Heritage and Wildlife Conservation direct federal agencies that have programs and activities that have a measurable effect on public land management, outdoor recreation, and wildlife management to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

It is BLM's policy, under BLM Manual 6500 – Fish and Wildlife Conservation, to sustain fish and wildlife resources on BLM-administered lands. To carry out this policy, the BLM must manage public lands in a manner that will "provide food and habitat for fish and wildlife" (FLPMA 102(8)). Through the planning process, the BLM must consider and address how to provide habitat of sufficient quantity and quality to meet species' life history needs to sustain populations. In the development and implementation of RMPs, the BLM must consider fish and wildlife resources, including associated habitats, with the same level of consideration given to other resources and uses of BLM-administered lands. Fish and wildlife habitat includes all elements of a wild animal's environment which the animal needs to naturally complete its life cycle including to maintain a healthy life and perpetuate its population through normal reproduction; these elements are usually described as food, cover, water and living space; and are required in the amounts, qualities, and locations that an animal needs to complete its life cycle.

Manual 6500 further directs the BLM to identify priority species and/or habitats within the planning area. A priority species is one having unique importance for its ecological, recreational, social, cultural, or economic value that warrants special consideration in management and land-use planning decisions. Quantifiable habitat goals (e.g., acres of habitat) are established during the land use planning process for these species and are informed by regional and local habitat assessments, State Wildlife Action Plans, or other appropriate sources. Therefore, the following affected environment section focuses on those wildlife species considered to be priority species.

Special Status Species

The BLM's policy for special status species is to conserve and recover threatened and endangered species and the ecosystems on which they depend so that ESA protections are no longer needed, and to initiate proactive conservation measures that reduce or eliminate threats to BLM sensitive species to minimize the likelihood of and need for listing of these species under the ESA. The BLM Manual 6840, Special Status Species Management (BLM 2008c), sets policy for the management of candidate species and their habitat. BLM sensitive species include candidate species for ESA listing, including GRSG. BLM Manual 6840 directs the BLM to conserve special status species and the ecosystems on which they depend on BLM-administered land and reduce the likelihood and need for future listing under the ESA. BLM Manual 6840 also directs the BLM to undertake conservation actions for such species before listing is warranted and also to "work cooperatively with other agencies, organizations, governments, and interested parties for the conservation of sensitive species and their habitats to meet agreed on species and habitat management goals."

BLM Manual 6840 requires that the BLM identify strategies, restrictions and management actions necessary to conserve and recover listed species and provide provisions to conserve BLM sensitive species when the BLM engages in the planning process, LUPs, and implementation plans. BLM Manual 6840 also requires managers to determine, to the extent practicable, the distribution, abundance, population condition, current threats, and habitat needs for sensitive species, and to evaluate the significance of actions in conserving those species.

In Oregon, the State BLM Director has designated another category of rare species called strategic species (BLM 2012e). While these species are not special status species for management purposes per BLM Manual 6840, they are uncommon and rare species. These species are tracked by the Oregon Heritage program (ORBIC 2012), but do not meet the BLM criteria to be classified as sensitive. Strategic species are ones that are often poorly understood, have taxonomic uncertainty, and are formerly sensitive species that are still tracked. **Appendix L**, Special Status Species contains a list of special status species for the planning area.

3.4.1 Existing Conditions

Fisheries and Aquatic Wildlife

Fisheries and aquatic habitat in the planning area include perennial and intermittent streams, springs, lakes, and reservoirs that support fish through at least a portion of the year.

The Great Basin portion of the planning area is found in south-central Oregon and covers most of Lake and Harney counties. Streams in this area never reach the ocean, but are instead confined, typically resulting in terminal lakes, marshes, or sinks that are saline. The fish in this area are adapted to extreme conditions. Trout are found in lakes and streams at all elevations within the Great Basin in Oregon (Sigler and Sigler 1987).

Stream systems occurring in the planning area outside the Great Basin drain into the John Day River and Snake River. The climate is generally arid, and annual runoff patterns tend to be dominated by annual spring snowmelt. Summer flows are provided by snowmelt, subsurface storage, and thunderstorm events. Native fish species are generally redband trout (*Oncorhynchus mykiss*), speckled dace (*Rhinichthys osculus*), and sculpins. Other less common native fish species are also present.

Conditions within the Planning Area

The condition of fisheries and aquatic habitat is related to hydrologic conditions of the upland and riparian areas associated with, or contributing to, a specific stream or waterbody, and to stream channel characteristics. Riparian vegetation reduces solar radiation by providing shade and thereby moderates water temperatures, adds structure to the banks to reduce erosion, provides overhead cover for fish, and provides organic material, which is a food source for macroinvertebrates. Intact vegetated floodplains dissipate stream energy, store water for later release, and provide rearing areas for juvenile fish. Water quality (especially factors such as temperature, sediment, and dissolved oxygen) also greatly affects fisheries and aquatic habitat.

Fish and aquatic habitat on BLM-administered lands within the planning area includes approximately 1,237 miles of fish-bearing streams (**Table 3-10**, Summary of Greater Sage-Grouse Habitat Containing Fish-Bearing Stream Miles on BLM-Administered Lands), and 209,760 surface acres of lakes, ponds and reservoirs (**Table 3-11**, Summary of Greater Sage-Grouse Habitat Containing Perennial Lake, Pond, and Reservoir Fish Habitat on BLM-Administered Lands). Currently, these aquatic systems support a variety of game and non-game fish species.

Table 3-10
Summary of Greater Sage-Grouse Habitat Containing Fish-Bearing Stream Miles on BLM-Administered Lands

Sage-Grouse Habitat	Stream Miles
Preliminary Priority Habitat (PPH)	383.84
Preliminary General Habitat (PGH)	339.57
Outside Sage-Grouse Habitat	513.92

Source: Oregon/Washington BLM 2013

Table 3-11
Summary of Greater Sage-Grouse Habitat Containing Perennial Lake, Pond, and Reservoir Fish Habitat on BLM-Administered Lands

Sage-Grouse Habitat	Fish Habitat (acres)
Preliminary Priority Habitat (PPH)	10,550
Preliminary General Habitat (PGH)	19,030
Outside Sage-Grouse Habitat	180,180

Source: Oregon/Washington BLM 2013

BLM-administered land provides habitat for 24 native and 4 non-native fish species, 6 of which are federally protected under the ESA (**Table 3-12**, Fish Species or Subspecies on BLM-Administered Lands within the Planning Area).

Table 3-12
Fish Species or Subspecies on BLM-Administered Lands within the Planning Area

Common Name	Scientific Name	Status		
		BLM[1]	Federal[2]	Native
Borax Lake chub	*Gila boraxobius*		E	X
Bull trout	*Salvelinus confluentus*		T	X
Foskett speckled dace	*Rhinichthys osculus* spp.		T	X
Hutton tui chub	*Gila bicolor ssp.*		T	X
Lahontan cutthroat trout	*Oncorhynclus clarki henshawi*		T	X
Warner sucker	*Catostomus warnerensis*		T	X
Catlow tui chub	*Gila bicolor* spp.	Sensitive	S	X
Redband trout	*Oncorhynchus mykiss*	Sensitive	S	X
Alvord chub	*Gila alvordensis*	Assessment		X
Bridgelip sucker	*Catostomus columbianus*			X
Lahontan redside shiner	*Richardsonius egregius*	Sensitive		X
Largescale sucker	*Catostomus macrocheilus*			X
Longnose dace	*Rhinichthys cataractae*			X
Malheur mottled sculpin	*Cottus bairdi* ssp.	Sensitive		X
Mountain whitefish	*Prosopium williamsoni*			X
Mountain sucker	*Catostomus platyrnynchus*			X
Oregon Lakes tui chub	*Gila bicolor oregonensis*	Sensitive		X
Pit brook lamprey	*Lampetra lethophaga*			X
Redside shiner	*Richardsonium balteatus*			X
Sheldon tui chub	*Gila bicolor eurysoma*	Sensitive		X
Speckled dace	*Rhinichthys osculus*			X
Summer Basin tui chub	*Gila bicolor* ssp.	Sensitive		X
Tahoe sucker	*Catostomus tahoensis*	Sensitive		X
Warner Basin tui chub	*Gila bicolor* ssp.	Strategic		X
Brook trout	*Salvelinus fontinalis*			
Brown trout	*Salmo trutta*			
Rainbow trout, generic	*Oncorhynchus mykiss*			
Smallmouth bass	*Micropterus dolomieu*			
Common carp	*Cyprinus carpio*			

[1] BLM status per BLM 2012e
[2] Federal Status (USFWS): E-endangered; T-threatened; S-Species of special concern with conservation agreements.

The most significant group of native fishes found in the planning area, in terms of their ecological, cultural, and commercial importance, is the salmonid family. All members of this group, which includes trout, require relatively pristine, cold freshwater habitats during part or all of their life cycles and, as such, depend greatly on the conditions of the surrounding forests and rangelands to ensure their survival (Meehan 1991).

Lahontan cutthroat trout

Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), historically inhabited most cold waters of the Lahontan Basin of Nevada, California, and extreme southeastern Oregon (Behnke 1979). The species currently occurs only within the Burns District within the planning area.

Lahontan cutthroat trout were originally listed as endangered by the USFWS in 1970 (USFWS 2013b). It was reclassified as threatened in July of 1975 (USFWS 2013b). A recovery plan was published in 1995 (USFWS 2013b). All Lahontan cutthroat trout populations within the Burns District are considered as out of basin, transplanted populations; however, they retain their protections under the ESA.

In 1971, 1976, and 1980, ODFW biologists introduced Lahontan cutthroat trout from Willow and Whitehorse Creeks in Malheur County, Oregon, into nine streams in the Burns District. Steep gradients, erratic and high seasonal flows, and presence of few pools appear to limit the distribution and abundance of Lahontan cutthroat trout introduced into these streams. Habitat availability is generally limited to a few miles per stream due to upstream gradient and downstream loss of surface flow. The current condition of Lahontan cutthroat trout populations in these systems is not known, but given the lack of disturbance since a 2004 genetics study that found Lahontan cutthroat trout in all seven streams, it is expected that the populations have remained intact.

Bull trout

The coterminous US population of the bull trout (*Salvelinus confluentus*) was listed as threatened on November 1, 1999 (USFWS 2012a). Critical habitat was designated on October 26, 2005 (USFWS 2012a); however, the 2005 USFWS final rule designating Critical Habitat for bull trout did not include BLM-administered land until 2010 when the USFWS added the Oregon-Washington BLM administrative units (USFWS 2010b). A recovery plan was drafted in 2005 and has not been finalized.

The Malheur River Basin Critical Habitat Unit is in eastern Oregon within Grant, Baker, Harney, and Malheur Counties. A total of 169 miles (272 kilometers) of streams and 1,769 acres (716 hectares) of reservoir surface area are designated as critical habitat. In the Burns District, occupied bull trout habitat is restricted to the Malheur River in the area north of Highway 20 to the Malheur National Forest boundary. This area is considered migration/overwintering/foraging habitat (USFWS 2010c). Approximately 2.5 miles of this segment of the Malheur River and riparian habitat are under BLM-administration; the remainder is private. The BLM-administered land portion is functionally excluded from grazing by fences, channel characteristics (boulder substrate), topography, and river flows (adjacent lands grazed in spring during high flow periods).

Due to their need for clear and very cold waters and a long incubation time, bull trout are more sensitive to increased water temperatures, poor water quality and degraded stream habitat than many other salmonids. Throughout its range, the bull trout is threatened by the combined effects of habitat degradation, fragmentation, and alterations associated with dewatering; road construction and maintenance; mining; grazing; the blockage of migratory corridors by dams or other diversion structures; poor water quality; incidental angler harvest; entrainment (a process by which aquatic organisms are pulled through a diversion or other device) into diversion channels; and introduced non-native species (USFWS 1999).

Borax Lake chub

Borax Lake chub (*Gila boraxobius*), a federal endangered species, is endemic to Borax Lake, Lower Borax Lake, and the connecting waterways located in the northern end of Pueblo Valley approximately six miles northeast of the town of Fields, Oregon, in southern Harney County. Because of its highly restricted distribution, dependence on a single water source, and perched topographic position, and existing threats to their fragile habitat, the Borax Lake chub is vulnerable to catastrophic loss. The thermal waters feeding Borax Lake face a long-term threat from geothermal energy development. Proposals to drill wells near the lake prompted an emergency listing of this species as endangered in 1980. Other threats include modification of the lakes fragile shorelines, which could easily divert water away from the lake, and overgrazing by livestock. The fragile salt-crust shoreline of the lake also is easily damaged by off-road vehicle use. The area is currently fenced to exclude livestock. The Borax Lake chub was emergency-listed as endangered in 1980; a final listing rule with critical habitat was published in 1982, and a recovery plan was published in 1987 (USFWS 2013c).

In response to the listing of the species, the BLM designated 520 acres of BLM-administered land surrounding Borax Lake in 1983 as an ACEC. In 1987, the USFWS designated 640 acres of the area surrounding Borax Lake as critical habitat. Two 160-acre inholdings, encompassing Borax Lake and portions of the spring complex north of the lake, have been privately owned since their purchase in 1993 by The Nature Conservancy.

Redband trout

Redband trout occupy a wide array of habitats (USFWS 2009a) and are found throughout the planning area. Distribution of redband trout varies according to water year and annual fluctuation of instream flow. Where suitable habitat and water flow are available, redband trout are likely to be present (ODFW 2005). Populations found in the southern Oregon deserts inhabit turbid and alkaline waters that range from near freezing to over 77 degrees Fahrenheit (°F; Kunkel 1976; USFWS 2009a). Redband trout tolerate warmer waters than many other salmonids (Gamperl et al. 2002); however, in warmer and drier environments the loss of riparian cover has been associated with reduced numbers and production of fish (Tait et al. 1994).

Redband trout are considered a species of special concern by the American Fisheries Society and all states in the historical range, and are classified as a tracking species by the BLM (Williams et al. 1989). Six Great Basin populations, including populations in the planning area, were petitioned for listing as threatened or endangered under the ESA in 1997. The USFWS grouped the six populations a single Distinct Population Segment, and in 2000, the USFWS found that listing for these populations is not currently warranted (USFWS 2009a). This determination was based in part upon evidence of moderate to high densities of redband trout in each of the six subbasins (Dambacher et al. 2001).

Warner Sucker

Warner suckers (*Catostomus warnerensis*) are endemic to the Warner Valley and were listed as a threatened species in 1985 (USFWS 2013d). There are 43 miles of designated critical habitat in the planning area, including 13.5 miles of designated habitat on BLM-administered lands.

A recovery plan for the Warner sucker was approved in 1998 (USFWS 2013d). Many of the actions required to remove the species from listing, such as screening and providing passage over irrigation diversions, are needed on private lands and are beyond the scope of this plan. The BLM has worked on determining the population status of the species to establish the self-sustaining meta-population requirements of the plan. The BLM has also worked to identify existing habitats, assess their quality, and improve habitats by managing and excluding livestock.

Foskett Speckled Dace

The Foskett speckled dace (*Rhinichthys osculus* ssp.), listed as threatened in 1985 (USFWS 2013e), occurs in a spring on BLM-administered land in Coleman Valley. The BLM acquired this land in an exchange with the private land owner and has maintained livestock exclusion on the spring area. A habitat creation project was completed in 2009 and fish were moved into the habitat in 2010 in order to establish fish in an adjacent spring (Dace Spring), as recommended in the recovery plan (USFWS 1998). Successful reproduction has been documented at the Dace Spring site. Work, as outlined in the recovery plan (USFWS 1998), is planned to enhance the existing dace habitat through the promotion of open water habitat at Foskett Spring.

Nonnative Fish

Several nonnative fish have been introduced into the planning area. Most of the nonnative species have been introduced to promote sport fishing opportunities, though some were introduced illegally. Introduced salmonids (such as hatchery-raised rainbow trout [*Oncorhynchus mykiss*] and brown trout [*Salmo trutta*]), and centrarchids (such as bass and sunfish) now support many, if not most, of the nonnative sport fishing opportunities within this region. ODFW no longer routinely stocks warm water fish species, but largemouth bass (*Micropterus salmoides*), black crappie (*Pomoxis nigromaculatus*), white crappie (*P. annularis*), and brown bullhead (*Ameiurus nebulosus*) have become established from previous introductions in the lakes and some smaller reservoirs. Invasive common carp (*Cyprinus carpio*) uproot and destroy submerged aquatic vegetation and increase water turbidity (WDFW 2013). Carp populations in the Malheur National Wildlife Refuge have increased exponentially since their introduction in the 1950s which has led to substantial reductions in waterfowl habitat and use (USFWS 2012b). Anglers have illegally introduced these species in other reservoirs in the planning area.

Other Aquatic Species

Amphibians and aquatic invertebrates are integral components of the fish community. One amphibian, the Columbia spotted frog (*Rana lutiventris*), is a candidate for federal listing. Other fish of concern, because of limited habitat and range, include the Alvord chub (*Gila alvordensis*) and Catlow tui chub (*Siphateles bicolor* ssp.).

<u>Alvord chub</u>

Alvord chub are a rare cyprinid fish endemic to the Alvord Basin of southeastern Oregon and northwestern Nevada. It is a moderately sized minnow that inhabits marshes, creeks, and springs with little or no current. Many populations are small and vulnerable to extirpation through habitat alteration, groundwater pumping, and competition with exotic fishes. The American Fisheries Society considers the Alvord chub to be a species of special concern (Williams et al. 1989), and it is a BLM assessment species.

The Alvord chub occurs in a wide variety of available habitats such as isolated springs, reservoirs, and lakes, and in the mid to lower elevation reaches of cool and warm water creeks in the Alvord basin. Williams and Williams (1981) reported Alvord chubs from 15 localities within the basin as well as locations within the basin extending into Nevada.

<u>Catlow tui chub</u>

The Catlow tui chub, a small- to medium-sized minnow, is a recognized though undescribed subspecies of the more widespread tui chub. Genetic analysis of the Catlow tui chub is underway at Oregon State University. Due to its restricted distribution and threats to remaining habitat, the subspecies is considered of special concern by the American Fisheries Society (Williams et al. 1989), and it is a BLM tracking species.

Historically, Catlow tui chubs occurred in three streams (Three Mile, Skull, and Home Creeks) that drain the west flank of the Catlow Rim and in Rock Creek along the western edge of Catlow Valley (Bills 1977; Kunkel 1976). The Catlow tui chub has a restricted range but appears to be locally abundant in streams and in Three Mile Reservoir. An exception is Rock Creek, where only a few were found in 1994. The limited distribution of the Catlow tui chub, as well as the

Catlow redband trout, prompted the "Catlow Redband Trout and Catlow Tui Chub Conservation Agreement" (USFWS 1997). This Conservation Agreement was entered into by the BLM, USFWS, Malheur NWR, ODFW, and a private land owner in order to expedite conservation measures needed for the recovery of the species.

Due to the Catlow tui chub's restricted distribution, disturbances such as drought and fire, and human land use practices, including livestock grazing, channelization and dewatering for irrigation, place populations at risk.

Columbia spotted frog

The population of Columbia spotted frogs outside the Great Basin distinct population segment in the planning area was removed as a federal candidate species in 2010 while the population within the Great Basin distinct population segment is still a federal candidate species. This species is known to occur throughout the planning area (USFWS 2009b).

Columbia spotted frogs are experiencing declines in some areas. Destruction of wetland habitat for agriculture and land development, alteration of natural springs, removal of beaver dams, the introduction of non-native fish, and livestock grazing are all possible threats to this species (NatureServe 2013).

The Great Basin population occurs in southwestern Idaho, southeastern Oregon, and Nevada. Currently, Columbia spotted frogs appear to be widely distributed throughout southwestern Idaho (mainly in Owyhee County) and eastern Oregon, but local populations within this general area appear to be isolated from each other by either natural or human induced habitat disruptions. The largest local population of Columbia spotted frogs in Oregon occurs in Malheur County in the Dry Creek drainage. All of the known local populations of Columbia spotted frogs in eastern Oregon appear to be functionally isolated (USFWS 2004).

Western toad

Western toads (*Anaxyrus boreas*) occur in a wide variety of habitats ranging from desert springs to mountain wetlands. They range into various upland habitats around ponds, lakes, reservoirs, and slow-moving rivers and streams; sometimes they move up to a few kilometers through uplands. Rapid losses and declines of this species have occurred in many populations across its range for unknown reasons, even in relatively pristine environments (NatureServe 2012).

Springsnails

Springsnails (e.g., *Pristinicola* spp., *Pyrgulopsis* spp.) occur in several springs scattered around the planning area. They tend to be endemic to the spring in which they occur. Some species have been described, but many others have yet to be identified as unique. New records of springsnails, reported by Hershler and Liu (2009), are distributed disjunctively among five small groups of springs in southeastern Oregon (Owyhee River near Three Forks, Rattlesnake Creek drainage, Owyhee Spring area, lower Owyhee River, and Malheur River drainage). Modifications to springs that negatively impact springsnails include livestock grazing, recreational activities, diversion of water source, and introduction of nonnative or invasive species (Sada and Vinyard 2002). Since thermophilic springsnails are generally very rare and highly endemic, they are particularly sensitive to the above threats.

Big Game

Conditions within the Planning Area

The planning area hosts a wide variety of big game species including mule deer, pronghorn, and elk that use habitats associated with sagebrush steppe and riparian habitats. Other big game species that are found in these habitats but in lesser amounts include bighorn sheep, moose, and white-tailed deer. The planning area provides habitat for all seasonal use periods for mule deer, pronghorn, elk, bighorn sheep, and other species. These species are generally widespread across the entire planning area except bighorn sheep, which are closely associated with areas containing broken cliffs, rock outcrops, and canyons.

Mule deer are native to eastern Oregon. Winter habitat is found predominately in lower elevation areas; while summer habitat is common throughout eastern Oregon in areas varying from low elevation agricultural lands to high elevation mountain areas. Mule deer achieved maximum abundance during the 1950s and 1960s. Since then, mule deer have declined across the West and in Oregon. The most recent decline happened since the early 1990s and, though not fully understood, it is believed to be primarily due to the combined effects of habitat loss and drought. Historically, deer populations rebounded quickly after such climatic extremes. However, in recent years, survival of fawns has remained at depressed levels. Low fawn recruitment, severe winters, dry summers, changing predator/prey relationships, and increased habitat loss have pushed deer populations well below the statewide management objective of 347,400 mule deer established by the ODFW in 2005.

The ODFW launched its Mule Deer Initiative to bring mule deer numbers up to the population management objective (the number of animals considered compatible with habitat and primary land uses) in five wildlife management units in parts of eastern Oregon, including Heppner, Maury, Murderers Creek, Steens Mountain, and Warner. The following website is for Oregon's Mule Deer Initiative: http://www.dfw.state.or.us/resources/hunting/big_game/mule_deer/MDI.asp.

Mule deer are primarily browsers, their diet is composed mostly of leaves and twigs of shrubs, especially during the winter. Grasses and forbs are also crucial components of their diet in the spring and summer. The quality and quantity of nutritious forage in spring (April to July) has major implications on the production and survival of fawns. Summer-fall ranges are important because this is where deer produce fat reserves that will allow survival through winter. The quality of summer-fall forage also directly influences pregnancy and ovulation rates and, therefore, fawn production. Changes in mule deer habitats (reduced shrubs, increased invasive annual grasses and juniper) particularly on winter ranges, have likely reduced the ability of mule deer to survive unfavorable weather conditions, especially with a higher abundance of predators. Increasing levels of development and disturbance due to increases in human population have contributed to habitat fragmentation and decreased habitat effectiveness for mule deer.

Pronghorn numbers in Oregon steadily increased from an estimated 2,000 pronghorn during the 1920s to 8,950 by 1964 (Nelson 1925; Yoakum 1968), and continued to rise in the 1990s to between 13,000 and 15, 000. Pronghorn are established in much of Oregon east of the Cascade Range. They are usually considered denizens of open plains, but broad areas dominated by big sagebrush and intermittent lakes seem to form the primary habitats used in Oregon (Yoakum 2004). In sagebrush habitats, pronghorn diets consist of sagebrush and other shrubs during all seasons, but particularly in the fall and winter (Yoakum 2004). Forbs are preferred by pronghorn when available (Yoakum 2004). The availability of forbs may have important implications for pronghorn because they are rich in nutritional values required for reproduction (Pyrah 1987; Yoakum, 2004). Large landscape level fires have reduced the availability of sagebrush in parts of their range. In portions of the planning area extensive fencing has contributed to the inability of some populations to access otherwise suitable habitats. Predation of pronghorn fawns may be a factor limiting populations on marginal pronghorn rangelands or in areas where numbers of predators are high in relation to pronghorn numbers. Noxious weeds, improper livestock grazing, and drought has also impacted current pronghorn populations and their habitat.

During the great westward emigration along the Oregon Trail during the mid-1800s, Rocky Mountain elk were frequently seen by settlers in eastern Oregon (Bailey 1936). However, by the late 1880s, the combined effect of unregulated hunting, heavy livestock grazing, and tillage of native grasslands nearly caused the extirpation of Rocky Mountain elk in the Blue Mountains of Oregon (Irwin et al. 1994). In 1907, the total Rocky Mountain elk population in Oregon was estimated to be 200 head (Seton 1927). The remaining population in northeastern Oregon was augmented with Rocky Mountain elk from Jackson Hole, Wyoming and Yellowstone National Park in 1912 and 1913. Rocky Mountain elk numbers increased over the ensuing decades, and by 1976, the estimated Rocky mountain elk population for eastern Oregon was 60,000 head (Bryant and Maser 1982).

Rocky Mountain elk are found in the planning area in sagebrush steppe and associated conifer/forested woodlands. Rocky Mountain elk are considered generalists and are not totally dependent upon sagebrush steppe, but they do require food, water, and, where hunted, hiding cover and security areas. The combination of the resources determines the distribution and number of Rocky Mountain elk within sagebrush steppe. Cow elk prefer rolling topography and riparian areas during the spring, especially during the calving period. Cow elk tend to increase the use of flat terrain as the season progresses. Peak use of flat terrain by cow and bull elk occurs in the fall.

Migratory Birds

Migratory birds are those that breed in the US and winter south of the border in Central and South America. Many of our well known passerine songbirds, flycatchers, vireos, swallows, thrushes, warblers, and hummingbirds, fall in this category. Most others are included in the resident category. Birds are a vital element of every terrestrial habitat in North America. Conserving habitat for birds will therefore contribute to meeting the needs of other wildlife and entire ecosystems. Continent wide declines in population trends for many avian species has developed into an international concern and led to the creation of the North American Bird Conservation Initiative (NABCI). Under this initiative, plans have been developed for the conservation of waterbirds, shorebirds, seabirds and landbirds.

The landbird initiative known as Partners-In-Flight has developed a series of bird conservation plans for every state. Partners-In-Flight has gained wide recognition as a leader in the landbird conservation arena. Partners-In-Flight Bird Conservation Regions are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues. Bird Conservation Regions are a hierarchical framework of nested ecological units delineated by the Commission for Environmental Cooperation (CEC). The overall goal of these Bird Conservation Regions is to accurately identify the migratory and resident bird species (beyond those already designated as federally threatened or endangered) that represent our highest conservation priorities by ecoregions. Bird Conservation Region lists are updated every 5 years by the USFWS.

Conditions within the Planning Area

Continental and local declines in numerous bird populations have led to concern for the future of migratory and resident songbirds. Reasons for these declines are complex. Habit loss, degradation, and fragmentation on breeding and wintering grounds and along migratory routes have been implicated for many species. Additional factors may include reproductive problems associated with nest predation, brood parasitism, and competition with exotic species. The vegetation of the Columbia Plateau has changed dramatically in the last 150 years since European settlement of the region. The loss and alteration of historic vegetation communities has impacted landbird habitats and resulted in species range reductions, population declines, and some local and regional extirpations. Native shrub-steppe communities have been diminished both in extent and condition. The principle factors were livestock overgrazing, invasion and dominance of nonnative plants, and extensive conversion to agriculture (Wisdom et al. in press). Other contributing factors included development, sagebrush eradication programs, and changes in fire regimes (Paige and Ritter 1999). In eastern Washington, nearly 60 percent of the native shrub-steppe has been converted to agriculture (Dobler et al. 1996). Even in extant shrub-steppe, what appears to be a natural landscape dominated by an "ocean of sagebrush" is actually a considerably altered ecosystem that compositionally and functionally differs from prior conditions. These changes have had effects on wildlife species with many bird species continuing to decline long after the worst of the impacts on habitats have ceased.

While these losses are significant, perhaps of even more concern are changes that have occurred throughout the mostly sagebrush dominated ecosystem of the shrub-steppe. Grazing, exotic species, and altered fire regimes have impacted this ecosystem to the effect that it is difficult to find stands which are still in relatively natural condition. The greatest changes are the reduction of bunchgrass cover in the understory and an increase in sagebrush cover. Soil compaction is also a significant factor in heavily grazed lands affecting water percolation, runoff and soil nutrient content. Western juniper woodlands have greatly expanded their range, now occupying much more of the sagebrush ecosystem than prior to EuroAmerican contact. The reasons for the expansion are complex and include interactions between climate change and changing land use, but fire suppression and grazing have played a prominent role in this dramatic shift in structure and dominant vegetation.

In December, 2008, the USFWS released The Birds of Conservation Concern Report which identifies species, subspecies, and populations of migratory and resident birds not already designated as federally threatened or endangered that represent highest conservation priorities and are in need of additional conservation actions. While the bird species included in the Birds of Conservation Concern Report are priorities for conservation action, this list makes no finding with regard to whether they warrant consideration for ESA listing. The goal is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions. It is recommended that these lists be consulted in accordance with Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds." The following Bird Conservation Regions (**Table 3-13**, Bird Conservation Region 9, Avian Species List (Great Basin)) are within the Oregon Sub-region, however not all these species will be affected by the plan activities. Those that have potential negative or positive effects will be discussed in Chapter 4.

The Conservation Strategies for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington, and the Columbia Plateau of Eastern Washington and Oregon as well as the USFWS Birds of Conservation Concern species list for the project area were reviewed and incorporated into this

Table 3-13
Bird Conservation Region 9, Avian Species List (Great Basin)

Greater Sage-Grouse (Columbia Basin distinct population segment)[1]	Black-chinned Sparrow
Eared Grebe (non-breeding[4]) Black Swift	Sage Sparrow
Calliope Hummingbird	Tricolored Blackbird
Lewis's Woodpecker	Black Rosy-Finch
Williamson's Sapsucker	Bald Eagle[2]
White-headed Woodpecker	Ferruginous Hawk
Willow Flycatcher[3]	Golden Eagle
Loggerhead Shrike	Peregrine Falcon[2]
Pinyon Jay	Yellow Rail
Sage Thrasher	Snowy Plover[3]
Virginia's Warbler	Long-billed Curlew
Green-tailed Towhee	Marbled Godwit (non-breeding[4])
Brewer's Sparrow	Yellow-billed Cuckoo (with US distinct population segment)
	Flammulated Owl

[1]ESA candidate
[2]ESA delisted
[3]non-listed subspecies or population of Tor E species
[4]non-breeding in this Bird Conservation Region.

analysis. Those species and habitats that are within the project area are incorporated and effects disclosed later in this document. **Table 3-14** displays the full list of Birds of Conservation Concern in the planning area. **Table 3-14**, Bird Conservation Region 9 (Great Basin, US portion only), shows the species that are known or likely to be present in the planning area and could be affected by the proposed actions.

Table 3-14
Bird Conservation Region 9 (Great Basin, US portion only)

Bird Species	Preferred Habitat
Greater Sage-Grouse (Columbia Basin distinct population segment) [1]	Sagebrush obligate, found east of the Cascades. They require large expanses of sagebrush with healthy native understories of forbs.
Loggerhead Shrike	Inhabits grasslands, pastures with fence rows, agricultural fields, and sagebrush with scattered juniper and open woodlands. Requires elevated perches throughout for hunting and nesting.
Pinyon Jay	In Oregon, juniper, sagebrush, and scrub oak habitats.
Sage Thrasher	A sagebrush obligate dependent on large patches and expanses of sagebrush steppe and bitterbrush with shrub heights between 30 and 60 centimeters (12 to 24 feet) height. Prefers bare ground over grassy understories.

Table 3-14
Bird Conservation Region 9 (Great Basin, US portion only)

Bird Species	Preferred Habitat
Green-tailed Towhee	In Oregon, prefers vigorous shrub stands with high shrub species diversity interspersed with trees.
Brewer's Sparrow	A sagebrush obligate found in shrublands of contiguous big sagebrush, greasewood, rabbitbrush, and shadscale habitats.
Sage Sparrow	Found in southeast and central Oregon. Associated with semi-open evenly spaced shrubs 1 to 2 meters (3 to 6 feet) high in big sagebrush up to 6,800 feet.
Ferruginous Hawk	Occupy habitats with low tree densities and topographic relief in sagebrush plains of the high desert and bunchgrass prairies in the Blue Mountains.
Golden Eagle	Inhabits shrub-steppe, grassland, juniper, and open ponderosa pine and mixed conifer/deciduous habitats, preferring areas with open shrub component for foraging.

[1]ESA candidate

Other Special Status Species

Conditions within the Planning Area

The list of special status species for BLM-administered lands in Oregon includes mammals, birds, reptiles, amphibians, fish, invertebrates, and plants. There are 282 special status species documented to occur or suspected to occur in the planning area. Of these species, 11 are mammals, 27 are birds, 2 are reptiles, 7 are amphibians, 27 are fish, 21 are invertebrates, 1 is a fungus, and 186 are plants. In addition to special status species, the BLM State Director in Oregon lists 13 plants as strategic species (**Appendix K**). For a complete discussion regarding Special Status Plant species, see **Section 3.3**, Vegetation.

The proposed action will occur largely in sagebrush habitat, as well as in areas of conifer encroachment (primarily juniper) targeted for sagebrush restoration to benefit GRSG. Therefore, only those species that depend on sagebrush habitat or that are strongly associated with juniper will be analyzed relative to the proposed action. **Table 3-15**, Special Status Species Documented or Suspected to Exist in on BLM-Administered Lands within the Planning Area, lists the animals and plants closely associated with sagebrush and/or juniper vegetation that are likely to occur within the BLM districts. For a list of special status plant species that have the potential to inhabit the planning area, see **Table 3-10**.

3.4.2 Trends

Fisheries and Aquatic Wildlife

Where certain fish populations have been identified as declining, they are a management concern. Threats to fish and aquatic species include reduced water

Table 3-15
Special Status Species Documented or Suspected to Exist in on BLM-Administered Lands within the Planning Area

Scientific Name	Common Name	Status	Occurrence Status by BLM District			
			Burns	Lakeview	Prineville	Vale
BIRD						
Ammodramus savannarum	Grasshopper Sparrow	S	D		D	D
Centrocercus urophasianus	Greater Sage-Grouse	S	D	D	D	D
Dolichonyx oryzivorus	Bobolink	S	D		S	D
Falco peregrinus anatum	American Peregrine Falcon	S	D	D	D	D
Haliaeetus leucocephalus	Bald Eagle	S	D	D	D	D
Tympanuchus phasianellus columbianus	Columbian Sharp-tailed Grouse	S				S
FISH						
Catostomus microps	Modoc Sucker	FE		S		
Catostomus tahoensis	Tahoe Sucker	S				D
Catostomus Warnerensis	Warner Sucker	FT		D		
Gila alvordensis	Alvord Chub	S	D			
Gila bicolor eurysoma	Sheldon Tui Chub	S		D		
Gila bicolor oregonensis	Oregon Lakes Tui Chub	S		D		
Gila bicolor ssp.	Catlow Tui Chub	S	D			
Gila bicolor ssp.	Hutton Tui Chub	FT		D		
Gila bicolor ssp.	Summer Basin Tui Chub	S		D		
Gila boraxobius	Borax Lake Chub	FE	D			
Oncorhynchus clarkii henshawi	Lahontan Cutthroat Trout	FT	D			D
Oncorhynchus mykiss	Redband Trout	S	D	D		D
Rhinichthys osculus	Foskett Speckled Dace	FT		D		
Richardsonius egregius	Lahontan Redside Shiner	S				D
AMPHIBIAN						
Anaxyrus woodhousii woodhousii	Woodhouse's Toad	S				D
Rana luteiventris	Columbia Spotted Frog	S	D	D	D	D

Table 3-15
Special Status Species Documented or Suspected to Exist in on BLM-Administered Lands within the Planning Area

Scientific Name	Common Name	Status	Occurrence Status by BLM District			
			Burns	Lakeview	Prineville	Vale
Rana pretiosa,	Oregon Spotted Frog	S		S	D	
MAMMALS						
Antrozous pallidus	Pallid Bat	S	D	D	D	D
Brachylagus idahoensis	Pygmy Rabbit	S	D	D	D	D
Canis lupus	Gray Wolf	FE				D
Corynorhinus townsendii	Townsend's Big-eared Bat	S	D	D	D	D
Euderma maculatum	Spotted Bat	S	D	S	D	D
Myotis thysanodes	Fringed Myotis	S	D	D	D	D
Spermophilus washingtoni	Washington Ground Squirrel	S			D	D
Vulpes macrotis	Kit Fox	S	D	D		D
INVERTEBRATE ANIMAL						
Cryptomastix populi	Hells Canyon Land Snail	S				D
Monadenia fidelis ssp. nov. *(Deschutes)*	Deschutes Sideband	S			D	
Monadenia fidelis ssp. nov. *(Modoc Rim)*	Modoc Rim Sideband	S		D		
Pyrgulopsis fresti	Owyhee Hot Springsnail	S				D
Pyrgulopsis owyheensis	A Springsnail	S				D
Bombus occidentalis	Western Bumble Bee	S		S		
Boloria selene	Silver-bordered Fritillary	S			D	S

documented (D)
suspected (S)
Status codes:
S = Sensitive
FT = Federally Threatened
FE = Federally Endangered

supply, fish passage barriers, impacts on riparian habitat, reduced water quality from sedimentation and increased turbidity. Land management planning has helped to improve habitat for fish and aquatic species in several ways.

Grazing systems have been redesigned to limit livestock utilization and have proven successful at promoting riparian vegetation recovery. Similar improvements to lake and reservoir aquatic habitat have occurred with implementation of the RMPs. The exclusion of livestock from specific reservoirs, lakes, springs and ponds has reduced siltation and turbidity. Increased vegetative cover around the shoreline of these waters has reduced erosion from wave action and filter overland flows.

Fish habitat and streambank stabilization projects have improved and expanded aquatic habitats within the planning area. These projects have reduced streambank erosion, increased vegetative bank cover, and ultimately have increased late season streamflow.

Borax Lake chub

Ongoing monitoring at Borax Lake has shown that the population is health. Population abundance estimates obtained from 1986 to 1996 indicated a fluctuating population ranging from approximately 4,100 and 37,000 fish. Recent estimates have ranged between approximately 8,200 and 25,500 chub. Recommendations outlined in the Borax Lake Chub Recovery Plan have been met short of providing protections to the water quality and quality from geothermal development throughout the Alvord Desert subbasin.

Alvord chub

Historic data indicate that the species was once abundant and well distributed throughout the Alvord subbasin. Site visits in 2012 show that these historical sites were dry and unavailable to the fish and only 10 percent (2 sites) still had extant populations. The BLM's records show 32 miles of stream channel within Trout, Denio, Van Horn, Oliver, and Alvord Creeks; Juniper, Alvord, and Tumtum Lakes, and Pueblo Slough where Alvord chub has been sampled since 1934. Today, of those 32 miles, approximately 22 miles (69 percent) of habitat are located on privately owned land, and another 6 miles (19 percent) of formerly perennial stream is now dry throughout most years.

Lahontan cutthroat trout

Lahontan cutthroat trout in the Burns District are considered out of basin due to their transplant here. Monitoring in the nine streams where Lahontan cutthroat trout are known have shown that as recently as 2004, all streams contained Lahontan cutthroat trout. The actual population estimate of Lahontan cutthroat trout is unknown, but fluctuations in numbers observed between the 1970s and 2012 confirm that populations are viable and reproducing. Van Horn Creek on Pueblo Mountain is suspected to have lost all or most of its genetic strength with the illegal introduction of German brown trout. While Lahontan cutthroat trout or hybrids are likely still present in the stream, the Van Horn Lahontan cutthroat trout population is considered lost.

Bull Trout

The factors that have contributed to the decline of bull trout population within each distinct population segment include the restriction of migratory routes by dams and other unnatural barriers; forest management, improper grazing, and agricultural practices; road construction; mining; and introduction of non-native species resulting in adverse habitat modification, excessive timber harvest, and poaching (Rieman and McIntyre 1993). Generally, where status is known and population data exist, bull trout populations in the Columbia River distinct population segment are declining. Bull trout in the Columbia River basin occupy about 45 percent of their estimated historic range (Quigley and Arbelbide 1997). Quigley and Arbelbide (1997) considered bull trout populations strong in only 13 percent of the occupied range in the interior Columbia River basin. Rieman et al. (1997) estimated that populations were strong in 6 to 24 percent of the subwatersheds in the entire Columbia River basin.

Historically, bull trout were thought to utilize the entire Malheur River downstream to the Snake River. Summer and spawning habitat is assumed to have included most of the upper basin tributaries in the upper mainstem and North Fork basins.

Distribution in the North Fork Malheur River has remained unchanged since bull trout were first documented in the basin in. Currently in the North Fork Malheur bull trout are present in and upstream of Beulah Reservoir including most upper basin tributaries. Spawning, juvenile rearing, and adult resident bull trout exist in Horseshoe, Swamp, Sheep, Elk, Little Crane, and Flat Creeks. Migratory bull trout overwinter in Beulah Reservoir and river reaches upstream of the reservoir, and move to the upper basin to spawn.

Bull trout in the Upper Malheur population are distributed upstream of the confluence with Wolf Creek, including many of the upper basin tributaries. Bull trout are not documented in Warm Springs Reservoir, however it may provide suitable overwinter habitat.

Bull Trout only occupy 2.5 miles of BLM-administered habitat in the planning area which includes the North Fork Malheur River and Upper Malheur River. These miles are heavily intermixed between public and private lands making management and restoration efforts difficult to undertake and subsequently measure.

Migratory Birds

The Breeding Bird Survey (Robbins et al. 1986) is the primary source of population trend information for North American landbirds. However, it only has data for the last 30 years, and extensive habitat changes occurred prior to that time which undoubtedly affected bird populations, but for which there are no quantitative data. Attempts to assess the extent of bird population changes prior to the Breeding Bird Survey have been documented through an examination of historical habitats prior to EuroAmerican contact (approximately 1850) and knowledge of bird species-habitat relationships (Wisdom et al. in press).

Columbia Plateau is the only Breeding Bird Survey Physiographic Region within – the planning area. Of the 16 species with significantly declining trends in the Columbia Plateau, 6 could be considered exclusively or primarily associated with shrub-steppe, 4 with open or agricultural lands, 5 with riparian/wetland habitat, and 1 with forest habitat (**Table 3-16**, Native Landbird Species with Significantly Declining Population Trends in the Columbia Plateau Breeding Bird Survey Physiographic Region). Additionally, some species that lack sufficient Breeding Bird Survey data are considered by many to be declining in the Columbia Plateau (e.g., sage-grouse, sharp-tailed grouse, Lewis' woodpecker) based on anecdotal knowledge of bird species-habitat relationships, and the extent of those habitats historically across the planning area (Wisdom et al. in press). This includes some local and regional extirpations of breeding populations such as sage-grouse in much of eastern Washington, and sharp-tailed grouse throughout Oregon. One species, yellow-billed cuckoo, may have been completely extirpated as a breeding species from the region.

Table 3-16
Native Landbird Species with Significantly Declining Population Trends in the Columbia Plateau Breeding Bird Survey Physiographic Region

Shrub-Steppe	**Riparian/Wetland**
Horned lark (L,R)	Wilson's phalarope (R)
Western meadowlark (L,R)	Spotted sandpiper (L)
Grasshopper sparrow (L)	American coot (R)
Brewer's sparrow (L,R)	Sandhill crane (R)
Black-throated sparrow (L)	Northern pintail (L,R)
Loggerhead shrike (L)	
Agricultural/Open	**Forest/Juniper**
Killdeer (L,R)	Chipping sparrow (L,R)
Mourning dove (L,R)	
American kestrel (R)	
Brewer's blackbird (L, R)	

Source: Sauer et al. 1999
L= long-term trend (1966-1998); R= recent trend (1980 – 1998)

Other Special Status Species

In general, special status wildlife species populations are declining across Oregon. Degradation of habitat as a result of human activities and natural resource development are the primary drivers that contribute to the downward trend of sensitive wildlife species in Oregon. Other factors that contribute to the decline of special status wildlife species in Oregon include habitat fragmentation, loss of migratory corridors, reduced gene flow, hybridization, disease, drought, and increased predation/competition with nonnative species.

As mentioned above, droughts pose a substantial threat to special status species and have had notable impacts on fish, wildlife, and plant species in the planning area. Climate change data from the past 100 years indicate that annual temperatures have been increasing and will continue to increase in the future. See **Section 3.19**, Climate Change, for additional details on climate change in the planning area. Drought and other extreme weather effects are also expected to increase in frequency and will likely contribute to impacts on special status plant and animal species and their habitat as climate change continues.

3.5 WILD HORSE AND BURROS

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 that also include 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. BLM policy 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. Herd areas (HAs) are locations where wild horse and burro populations were found when the Act was passed. Herd Management Areas (HMAs), displayed in **Figure 3-6**, Herd Management Areas in the Planning Area are areas within the HAs where it was decided through LUPs that populations of wild horses and burros would be managed.

3.5.1 Existing Conditions

Conditions on BLM-Administered Lands

There are 24 HAs within the planning area, 22 of which contain either PGH or PPH.

Table 3-17, Acres of Wild Horse and Burro Herd Management Areas within Sage-Grouse Habitat in the Planning Area, displays the acres of PPH and PGH in herd areas.

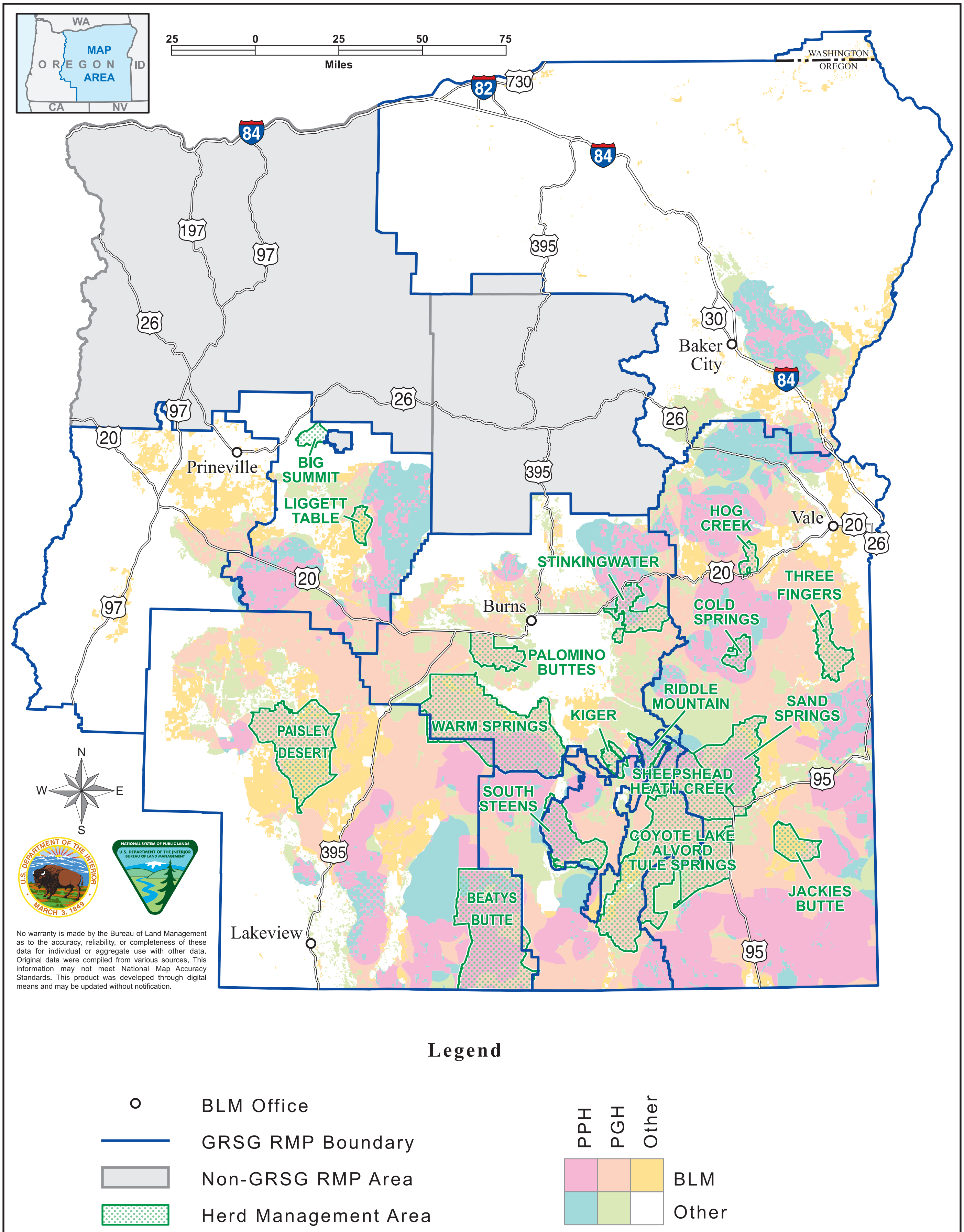


Figure 3-6: Herd Management Areas in the Planning Area

M11-11-04

Table 3-17
Acres of Wild Horse and Burro Herd Management Areas within Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres within Sage-Grouse Habitat	Acres within PGH	Acres within PPH
BLM	IV	548,100	302,100	246,000
	V	1,815,000	1,260,100	554,900
Forest Service	IV	0	0	0
	V	0	0	0

Source: Manier et al. 2013

Wild horse and burro populations are managed within Appropriate Management Levels (AML) and corresponding forage (allocations in AUMs). The AML for each HMA is expressed as an acceptable range with a single number being the high end of that range. Forage allocations for horses in the HMA are based on that maximum number of the AML range. AMLs, as well as the boundaries of each HMA, were established through previous LUPs. AMLs are based on best available science and rangeland monitoring studies and are established 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. To date, the data gathered during HMA monitoring supports established AMLs.

The BLM manages 17 HMAs in the planning area. Out of the 17 HMAs, 15 contain some type of sage-grouse habitat within the planning area.

Current AML, forage allocations, and HMA acreages by habitat type are shown in **Table 3-18**, Oregon Subregion – HMAs. Healthy populations of wild horses and burros are maintained through periodic gathers, removals, and other approved methods of population growth suppression. The initiation of gathering or other population growth suppression is based on inventory data, herd health, rangeland health, climatic conditions, and occurrence of catastrophic events such as wild fire and drought. Horses are also gathered if they stray outside the boundaries of the HMA. Generally, gathering is scheduled every three to five years, depending on reproductive rates, death rates, funding, public concern, and other special management considerations.

Population control measures have been and may continue to be conducted in all of the HMAs. These measures include, but are not limited to, fertility control using immunocontraceptives, adjusting sex ratios, releasing a gelding component into an HMA, and non-reproducing HMAs. All of these measures are an attempt to balance the reproduction rate of wild horse herds with public adoption demand to control holding costs of excess horses.

Table 3-18
Oregon Subregion – HMAs

HMA	District	GRSG MZ	Acres				AML	AUMs
			Non Habitat	PGH	PPH	Total		
Beatys Butte	Burns/ Lakeview	V	249	101,383	298,228	399,860	100-250	3,000
Cold Springs	Vale	IV	0	0	29,904	29,904	75-150	1,800
Coyote Lake-Alvord-Tule Springs	Burns/ Vale	V	51,884	501,553	489	553,926	198-390	4,680
Hog Creek	Vale	IV	3,126	15,014	3,692	21,832	30-50	600
Jackies Butte	Vale	IV	48,084	15,939	1,254	65,277	75-150	1,800
Kiger	Burns	IV, V	411	24,534	1,939	26,884	51-82	984
Ligget Table	Prineville	V	23,638	4,443	0	28,081	10-25	300
Paisley Desert	Lakeview	V	114,600	182,826	41	297,467	60-150	1,800
Palomino Buttes	Burns	V	1,314	70,355	0	71,669	32-64	768
Pokegama	Lakeview	NA	12,193	0	0	12,193	30-50	600
Riddle Mountain	Burns	IV	1,113	1,326	25,956	28,395	33-56	672
Sand Springs	Vale	IV	14,263	87,174	91,405	192,842	100-200	2,400
Sheepshead-Heath Creek	Burns/ Vale	IV, V	891	139,443	58,674	199,008	161-302	3,624
South Steens	Burns	V	1,341	43,090	82,324	126,755	159-304	3,648
Stinkingwater	Burns	IV	2	41,226	37,086	78,314	40-80	960
Three Fingers	Vale	IV	3,356	59,415	0	62,771	75-150	1,800
Warm Springs	Burns/ Lakeview	V	30,397	264,903	141,902	437,202	111-202	2,424
Total			***306,862***	***155,2624***	***772,894***	***2,632,380***	***1,340-2,605***	

Source: Oregon/Washington BLM 2013

3.5.2 Trends

Wild horse and burro population and habitat monitoring are evaluated every 3 to 5 years, when environmental analysis of specific population control activities is conducted. Past evaluations indicate that when wild horse and burro populations remain within current AML range, HMAs are generally capable of meeting all applicable rangeland health standards; however, as populations exceed high AML, wild horses and burros can be causal factors for failing to meet applicable standards.

It should be noted that wild horse and burro grazing can have different physical and spatial ecological impacts compared with domestic cattle grazing due to different timing and space of use. As a result, AMLs are set at levels of use that would meet BLM rangeland health standards, not a direct balancing of forage allocation with domestic livestock and wildlife.

As of May 2013, population estimates indicate wild horse and burro populations are within AML on 12 of the 17 HMAs within the planning area. Cold Springs, South Steens, Ligget Table, Palomino Butte, and Beatys Butte HMAs are above high AML levels, and the total population estimate for the planning area is 3,006, approximately 15 percent above the high AML level. It should be noted that wild horse and burro populations are dynamic and these figures represent best estimates for a static point in time only.

It is also recognized that inventory methods can influence population estimates. Historically, inventories utilized direct count methods which may undercount populations by as much as 32 percent (Lubow and Ransom 2009). The BLM has been working with the USGS's Fort Collins Science Center to develop methods that will achieve greater accuracy in population estimates which correct for sightability and detection. Population estimates for wild horse and burro populations now routinely apply an undercount bias correction factor based on topography, vegetative cover, and weather and flight conditions.

Populations may be impacted by limitation on gathers; the time period between gathers is influenced by limitations in short- and long-term holding facilities, adoptions, and other HMAs outside of Oregon where emergency situations may mandate adjustments in gather schedules. Rangeland health standards may not be met if periodic gathers are not conducted to maintain AML.

Finally, factors other than wild horse and burro populations may contribute to failure to meet all rangeland health standards within HMAs in some instances. These factors include western juniper encroachment, invasive plants and noxious weed infestations, and impacts from livestock and wildlife grazing.

3.6 Wildland Fire Management

The wildland fire management program consists of hazardous fuels management and wildfire management. The hazardous fuels program has two main emphasis areas: 1) reduction of risk to human life and property, including key infrastructure such as power lines and communication towers; and 2) ecosystem restoration. Wildfire management can be further broken into prevention, education and mitigation; preparedness; detection; and response. Wildfire response, in turn, is governed by threats to human life and safety and threats to social, cultural, and natural resource values identified in the resource management plan.

The Federal Wildland Fire Management Policy (FWFMP) was developed by the secretaries of the Departments of Interior and Agriculture in 1995 in response to dramatic increases in the frequency, size, and catastrophic nature of wildland fires in the US. The 2001 review and update of the 1995 FWFMP (DOI et al. 2001) consists of findings, guiding principles, policy statements, and implementation actions, replaces the 1995 FWFMP, and is the primary interagency wildland fire policy document. This document directs federal agencies to achieve a balance between fire suppression to protect life, property, and resources, and fire use to regulate fuels and maintain healthy ecosystems. Multiple updates have been provided in memorandum and current implementation direction has been provided in the February 2009 *Guidance for Implementation of Federal Wildland Fire Management Policy* (USDA and DOI 2009). The BLM's policies follow this plan and implementation guidelines.

Wildland fire has been identified as a primary factor associated with GRSG population declines. Fire can result in the loss of habitat and loss of a food source.

Additional direction for fire management in GRSG habitat is provided in BLM Instruction Memorandum 2011-138, Sage-Grouse Conservation Related to Wildland Fire and Fuels Management (BLM 2011a).

3.6.1 Existing Conditions

Conditions of the Planning Area

Currently, there are more than 15 million acres of sagebrush habitat in Oregon, much of it in the Great Basin ecosystem. USFWS identified long-term loss of sagebrush and conversion to exotic annual grassland as the primary threats arising from wildfire. From 1980 to 2011, approximately 3.9 million acres burned in the planning area, including the Burns, Lakeview, Prineville, and Vale BLM Districts and Hart Mountain and Malheur National Wildlife Refuges (http://fam.nwcg.gov/fam-web/weatherfirecd/). This total includes a mix of ecosystems, including sagebrush-steppe, juniper woodland, coniferous forest, salt desert shrub, and annual grasslands and some lands outside the actual planning area. Lightning started 75 percent of these fires with the remainder started by humans. Approximately 87.5 percent of these fires burned less than 100 acres, which means the fires that pose the biggest threat to sage-grouse habitat encompass only 12.5 percent of all fires. Of these larger fires, only 2 percent exceeded 5,000 acres. In Wyoming big sagebrush sites, full recovery to pre-burn sagebrush canopy cover conditions will take over 100 years (Cooper 2007); however, some higher elevation habitats, where mountain big-sagebrush is the canopy dominant, rapid regeneration due to site potential, seed production, and layering can produce 25 percent cover within 20 years (Winward 2004) In addition, the area dominated by annual grasses continues to increase, partly as a result of wildfire (see Invasive Plant subsection for more details).

WAFWA Management Zones IV and V

Table 3-19, Acres of Wildfire within Sage-Grouse Habitat in the Planning Area, and **Table 3-20**, Acres with High Probability for Wildfire within Sage-Grouse Habitat in the Planning Area, display data compiled in a Baseline Environmental Report (BER) produced by the USGS and BLM (Manier et al. 2013). In each table, acres are presented by surface management agency and their occurrence within PGH and PPH in the planning area.

Table 3-19
Acres of Wildfire within Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres[1]	Acres within PGH	Acres within PPH
BLM	IV	294,300	114,700	179,600
	V	246,600	150,000	96,600
Forest Service	IV	0	0	0
	V	14,700	12,700	2,000
Tribal and Other Federal	IV	1,000	1,000	0
	V	5,200	100	5,100
Private	IV	64,800	29,200	35,600
	V	61,800	24,700	37,100
State	IV	12,400	2,600	9,800
	V	2,800	2,700	100
Other	IV	0	0	0
	V	0	0	0

Source: Manier et al. 2013
[1]Acres calculated from wildfires occurring between 2000 and 2012

Table 3-20
Acres with High Probability for Wildfire within Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres with High Probability for Wildfire[1]	Acres within PGH	Acres within PPH
BLM	IV	3,668,800	1,827,400	1,841,400
	V	4,234,600	2,478,500	1,756,100
Forest Service	IV	11,600	200	11,400
	V	58,600	39,000	19,600

Table 3-20
Acres with High Probability for Wildfire within Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres with High Probability for Wildfire[1]	Acres within PGH	Acres within PPH
Tribal and Other Federal	IV	53,500	29,600	23,900
	V	133,800	49,600	84,200
Private	IV	1,119,900	532,100	587,800
	V	1,110,300	632,500	477,800
State	IV	369,700	272,100	97,600
	V	109,900	71,400	38,500
Other	IV	0	0	0
	V	500	500	0

Source: Manier et al. 2013
[1]Derived from Forest Service FSim Burn data
Source data was reclassified to create three categories of data: non-burnable = 0, low probability = 0.00002 to 0.0043, and high probability = 0.0043 to 0.0732.

Table 3-20 displays the total acres and acres of GRSG habitat in the planning area that were affected by wildland fire over the past 12 years.

Table 3-20 displays acres with high probability for wildfire based on the Forest Service's FSim data, a large fire simulator that develops fire probability data based on historical weather data and current land cover data. Large fire burn probability is based on a national burn probability for the US that was generated for the 2012 Fire Program Analysis System.

Conditions on BLM-Administered Lands

During the 2012 fire season nearly 1 million acres burned, the majority of which was in designated PPH. The most substantial fires included Long Draw on the Vale District (the largest fire in Oregon in 100 years) at 557,648 acres, Miller Homestead on the Burns District with 160,000 acres, and Holloway which burned from Winnemucca District in Nevada onto Burns and Vale Districts with an estimated 224,786 acres burned in Oregon (BLM 2012f). Burning conditions in 2012 were unusually severe. Fuel loadings and available fuels were unusually high, the result of three good years of grass production followed by a very dry winter with little snow to compact the previous years' production and a multi-million acre outbreak of aroga moth, a sagebrush defoliator, that apparently resulted in very low live fuel moistures in sagebrush. In addition, weather conditions during summer were unusually severe with several consecutive days of high temperatures over 100°F, daytime relative humidity in the single digits, nighttime humidity recovery only into the low teens, and high winds. These weather conditions allowed for active burning at all hours of the day and night.

The three factors that govern whether a fire will become large and further degrade existing sage-grouse habitat conditions are fuel amount and continuity, weather, and topography. Of these, the BLM can only affect fuel amount and continuity. Fire regime condition class (FRCC) is intended to provide a general assessment of the threat wildfire may pose to ecological function and integrity based on the degree of departure from reference conditions. In the case of FRCC, reference conditions are defined as the mix of successional, or structure, classes that theoretically existed prior to 1850 (NIFTT 2010). The hazardous fuels program is designed to reduce those risks.

Wildfire response is intended to support the established RMP direction, although the BLM Washington Office and DOI, Office of Wildland Fire often provide additional direction. Such additional direction was provided through 2011-138 detailing wildfire response in sage-grouse habitat (BLM 2011a). . All wildfire response must be consistent with the FWFMP and implementation guidance (USDA and DOI 2009).

Fire Regime Condition Class

There are two departure facets to FRCC: the vegetation and the fire return interval (average period between fires). The LANDFIRE project includes both a fire regime data layer and a vegetation departure data layer, which were used to estimate the degree of ecological departure for each district. Extreme departure from the historical conditions 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).

Condition class indicates the degree of departure from the historic fire regime (Hann and Bunnell 2001; **Table 3-21**, Fire Regime Condition Classes). 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.

Table 3-21
Fire Regime Condition Classes

Fire Regime Condition Classes	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 a historical range.

Table 3-21
Fire Regime Condition Classes

Fire Regime Condition Classes	Attributes
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.
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: Hann et al. 2008

Fire regime (pattern, frequency and intensity of the wildfires that prevail in an area) has been divided into five categories based on typical fire severity with respect to vegetation and average fire return interval (**Table 3-22**, Fire Regime Groups and Descriptions). Vegetative condition class quantifies the amount that current vegetation has departed from the simulated historical vegetation reference conditions. Three condition classes describe low departure (Class 1), moderate departure (Class 2), and high departure (Class 3). Vegetative condition class is calculated based on changes to species composition, structural stage, and canopy closure using methods described in the Interagency Fire Regime Condition Class Guidebook (Hann et al. 2008). LANDFIRE vegetative condition class is based on departure of current vegetation conditions from reference vegetation conditions only, whereas the guidebook approach includes departure of current fire regimes from those of the reference period.

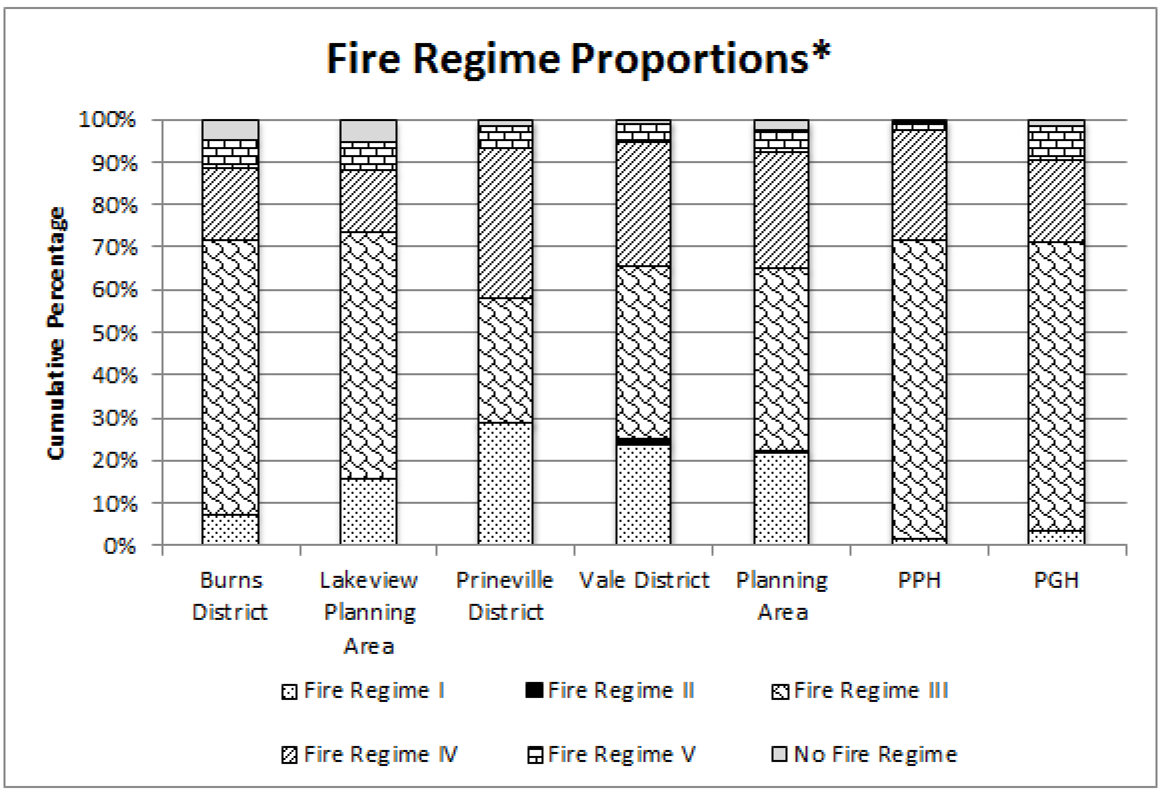
Fire regime III is the most common fire regime in the planning area based on LANDFIRE data (**Figure 3-7**, Proportion of Planning Area in each Fire Regime). Common vegetation types in this regime include mountain big sagebrush, low sagebrush-fescue, mixed (mountain) shrub, western juniper savanna. Fire regimes IV and I are also common, while fire regime II is the least common. Fire regime IV is characterized by Wyoming big sagebrush, low sagebrush-bluebunch wheatgrass, aspen, western juniper woodland, mountain-mahogany, lodgepole pine (Upper Deschutes planning area only), while Fire Regime II is characterized

Table 3-22
Fire Regime Groups and Descriptions

Group	Frequency	Severity	Severity Description
I	0-35 years	Low/mixed	Generally low-severity fires replacing less than 75% of the dominant over story vegetation; can include mixed-severity fires that replace up to 75% of the over story
II	0-35 years	Replacement	High-severity fires replacing greater than 75% of the dominant over story vegetation
III	35-200 years	Mixed/low	Generally mixed-severity; can also include low-severity fires
IV	35-200 years	Replacement	High severity fires
V	200+ years	Replacement/any severity	Generally high-severity; can also include any severity type in this frequency range

Source: Hann et al. 2008

Figure 3-7 Proportion of Planning Area in each Fire Regime



Source: LANDFIRE v. 1.1.0
*These values include in-holdings of other lands within a BLM-managed lands matrix, such as National Forests System lands, National Wildlife Refuges, National Parks and Monuments, Indian reservations, state and county lands, and private lands.

by native perennial grasslands. Common vegetation types in Fire Regime I include Ponderosa pine forest, dry mixed conifer forest and native perennial grasslands. Between one and six percent of the planning area has no fire regime as the land was classified as barren, snow and ice, water, too sparsely vegetated to classify or of indeterminate fire regime characteristics.

Most of the planning area is classified as moderately departed from historical conditions with respect to vegetation, estimated 65 percent departure. The proportion of land classified as highly departed from historical conditions is 15 percent overall. The degree of departure for sage-grouse habitat is very similar to the planning area-wide degree of departure.

Acres Treated in the Hazardous Fuels Reduction Program

Wildfire mitigation includes hazardous fuels reduction using mechanical treatment (i.e., brush beating, mowing, or cutting juniper) and prescribed burning. Herbicide use has been limited. Some treatment regimens also include seeding where native vegetation has been reduced below a desired threshold through successional processes. Reporting of hazardous fuels reduction treatments in a dedicated database has only occurred since 2003. Individual treatments that form a treatment regimen are reported separately. Thus, the reported acres are by treatment type for each activity on a given acre and not the actual geographic area treated on the landscape. For example, a given acre may have been thinned, machine piled, and the piles burned, but each treatment method is reported separately, resulting in double or triple-counting the same area. These various treatments on any given acre are all meant to cumulatively move the vegetation toward the desired future condition. The existing databases do not allow determination of the actual acres. Treatments conducted within the planning area over the past five years are outlined in **Table 3-23**, Average Acres Treated Annually (2005-2012). **Table 3-23** also outlines the average acres treated in PPH and PGH areas. Most of the treatments were conducted to reduce threats to wildland-urban interface areas or in juniper woodland attempting to restore sagebrush-steppe.

Within the planning area a variety of fuels treatments have been utilized to address the specific vegetative conditions found on the ground. In southeastern Oregon, a major concern is controlling the spread of nonnative invasive grasses. In Central Oregon, the focus has been more on restoration treatments involving juniper encroachment, as well as, treatment of fuels in the wildland-urban interface to protect communities.

Wildfire Response

The planning area can experience human-caused fires at any month of the year. However, the largest fires and severest fire seasons are associated with lightning fire occurrence and far more fires are started by lightning than people throughout the analysis area. Wildfire occurrence peaks in July and August.

Table 3-23
Average Acres Treated Annually (2005-2012)

Treatment Category	Total Acres Treated	Acres Treated in PPH	Acres Treated in PGH
Burn	146,495	65,109	81,386
Chemical	692,316	324,704	367,612
Harvest	893	191	702
Mechanical	162,389	75,602	86,787
Revegetation	139,2776	63,750	75,527

Sources: BLM GIS 2013
Burn includes: Broadcast Burn; Fire Use; Hand Pile Burn; Jackpot Burn; Machine Pile Burn; Underburn; and Unknown
Chemical includes: Herbicide; Monitor
Harvest includes: Commercial-Timber; Woodcutting - Domestic use
Mechanical includes: Clearing; Cutting; Designated No Treatment; Lop and Scatter; Mastication/Mowing; Piling ; Pruning; Scarification; Shrub/Weeds Removal
Revegetation includes: Range Seeding; Shrub Planting; Tree Planting; Tree Seeding-Artificial

Most fires are suppressed at a small size; approximately 88 percent burn less than 100 acres, and less than 2 percent burn over 5,000 acres. Within the planning area, central Oregon typically experiences the greatest number of fire starts while southeastern Oregon typically experiences the greatest number of acres burned.

On BLM-administered lands, wildfires burned approximately 15 percent of the designated PGH and 14 percent of the designated PPH across the planning area from 1980 through 2011. Approximately 85 percent of the acres burned have been in southeastern Oregon. The balance of the acres burned in both types of habitat has been in central Oregon, which also has the least amount of designated PPH or PGH.

3.6.2 Trends

Within the planning area, over the past century the combination of wildfire suppression and changing land use patterns has altered the natural cycle and role of fire. In moister, higher elevation sites fire suppression is altering what were historically sagebrush shrub lands by allowing encroachment of juniper and other conifers into the sagebrush. In some cases sagebrush within this habitat is also transitioning to older age class that is more decadent, with high fuel loading that can support large severe wildfires. In each case, these increased fuel loadings are leading to fires of higher severity (Miller et al. 2001). In other areas, such as where disturbance has resulted in replacement or invasion by cheatgrass, the fire return interval has decreased and vegetative structure and composition is changing significantly as a result (Brooks et al. 2004; Blomberg et. al. 2012). Fires in these areas spread rapidly and quickly become large because the fuels are continuous, fine, and flashy. In all cases, these changes from historic fire regimes typically result larger fires by increasing the resistance to control while decreasing the effectiveness of firefighting effort (USFWS 2013a).

3.7 LIVESTOCK GRAZING / RANGE MANAGEMENT

The foremost authority that provides for public land grazing is the Taylor Grazing Act which was passed on June 28, 1934, to protect public rangelands and their resources from degradation, to provide an orderly use to improve and develop public rangelands, and to stabilize the livestock industry. Following various homestead acts, the Taylor Grazing Act established a system for allotting grazing privileges. The FLPMA and Public Rangeland Improvement Act also provide authority for managing grazing on public rangelands. Grazing administration exclusive of Alaska is governed by 43 CFR Subpart 4100.

The grazing administration regulations were revised in 1995 to include Fundamentals of Rangeland Health and Standards and Guidelines for Grazing Administration (43 CFR Subpart 4180). In accordance with 43 CFR Subpart 4180.2, *Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the States of Oregon and Washington* was placed in effect on August 12, 1997. (**Appendix M,** Standards for Rangeland Health and Guidelines for Livestock Grazing Management) Standards are integrated into the BLM's land management through incorporation into LUPs, as a basis for environmental assessments and through National Environmental Policy Act (NEPA) analysis, and as a basis for monitoring. Guidelines are integrated into land management by applying them to livestock grazing authorizations. The standards and guidelines provide a clear statement of agency policy and direction for those who use BLM-administered lands for livestock grazing and for those who are responsible for their management and accountable for their conditions. Rangeland health evaluations are part of the permit renewal process. If standards are not being met, then management changes would be implemented to make progress toward attainment per current BLM grazing regulations. A grazing permit is the document which authorizes livestock grazing use of the BLM-administered lands within an established grazing district, whereas a grazing lease is the document which authorizes livestock grazing use of BLM-administered lands outside an established grazing district (43 CFR Subpart 4100.0-5). The kind and number of livestock, the period of use (seasonal), the allotment to be used, and the amount of use in AUMs are mandatory terms and conditions of every grazing permit or lease (43 CFR Subpart 4130.3). An AUM is the amount of forage necessary for the sustenance of one cow or its equivalent for one month. An allotment is an area of land designated and managed for grazing of livestock (43 CFR Subpart 4100.0-5).

3.7.1 Existing Conditions

The BLM manages livestock grazing on 749 allotments on 6,218,500 acres of BLM-administered land in the planning area containing either PGH or PPH. These allotments include 927,660 authorized AUMs; **Table 3-24**, Summary of Allotments and AUMs in Sage-Grouse Habitat by District, provides an overview of the authorized grazing in the planning area, and **Table 3-25**, Acres of Grazing Allotments within Sage-Grouse Habitat in the Planning Area, characterizes acres of grazing allotments in GRSG habitat based.

Table 3-24
Summary of Allotments and AUMs in Sage-Grouse Habitat by District

District Office	Number of Allotments	Authorized AUMs
Burns	232	244,370
Lakeview	100	161,553
Prineville	82	89,998
Vale	335	431,739
TOTAL	**749**	**927,660**

Source: Oregon/Washington BLM 2013

Table 3-25
Acres of Grazing Allotments within Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres	Acres within PGH	Acres within PPH
BLM	IV	3,924,300	1,843,900	2,080,400
	V	5,824,200	3,576,900	2,247,300
Forest Service	IV	32,100	7,800	24,300
	V	137,200	101,800	35,400
Tribal and Other Federal	IV	27,100	24,800	2,300
	V	3,800	2,700	1,100
Private	IV	718,500	317,500	401,000
	V	1,179,400	728,800	450,600
State	IV	61,500	40,100	21,400
	V	38,700	20,600	18,100
Other	IV	0	0	0
	V	3,700	3,700	0

Source: Manier et al. 2013

An assessment of rangeland health standards and guidelines completed between 1998 and 2011 evaluated 428 allotments that contain PPH or PGH. This information is summarized by district in **Table 3-26**, Land Health Standard Assessments for Allotments within Sage-Grouse Habitat by District and presented in full in **Appendix N**, Rangeland Health Standards by Grazing Allotment. Of the allotments assessed, 339 allotments (77 percent) are meeting all applicable standards and guidelines. An additional 48 allotments (11 percent) are not achieving all standards and guidelines due to livestock grazing; however appropriate management actions have been implemented to move toward achieving standards and guidelines in the future. On 41 allotments (9 percent), livestock grazing was not a causal factor for failing to achieve all standards and guidelines. Factors that may influence ability to achieve standards and guidelines include but are not limited to invasive species, encroachment of juniper into

Table 3-26
Land Health Standard Assessments for Allotments within Sage-Grouse Habitat by District

District	All Standards Met (Allotments)	Standards Not Met Due to Livestock Grazing (Allotments)	Standards Not Met due to other factors (Allotments)	No land –heath assessment completed (Allotments)
Burns	168	24	20	20
Lakeview	88	1	11	0
Prineville	18	15	6	43
Vale	65	8	4	258
TOTAL (Allotments; % of assessed allotments)	339 (77%)	48 (11%)	41 (9%)	321

Source: Oregon/Washington BLM 2013.
Note table represent assessments completed in allotments that contain PPH and or PGH.

sagebrush and other habitats, fire, and anthropogenic disturbances such as energy development or off-road vehicle use. Standards and guidelines assessments have not been completed on 321 allotments (43 percent of total allotments). Allotments are scheduled for land health assessments based on permit renewal cycles and allotment management category.

Of the 48 allotments (1,067,900 acres) in the planning area found to be not meeting land health standards with livestock grazing as the causal factor, approximately 350,000 acres contained PGH and 717,900 acres contained PPH (see **Table 3-27**, Allotments Not Meeting Land Health Standards within Sage-Grouse Habitat with Grazing as the Causal Factor).

Table 3-27
Allotments Not Meeting Wildlife Land Health Standards within Sage-Grouse Habitat with Grazing as the Causal Factor

Surface Management Agency	Management Zone	Total Acres of Allotments Not Meeting Land Health Standards[1]	Acres within PGH	Acres within PPH
BLM	IV	939,600	285,100	654,500
	V	128,300	64,900	63,400

Source: Manier et al. 2013
[1]Based on allotments on BLM-administered lands where land health standards have been assessed.

Livestock grazing allotments are administered under three selective management categories designed to concentrate public funds and management efforts on allotments with the most significant resource conflicts and the greatest potential for improvement (BLM Manual Handbook 1740-1).

The categories include:

- Improve (I) category allotments are managed to resolve high-level resource conflicts and concerns and receive highest priority for funding and management actions. These allotments include those where the BLM administers enough land to implement changes.
- Maintain (M) category allotments are managed to maintain currently satisfactory resource conditions and will be actively managed to ensure that resource values do not decline.
- Custodial (C) category allotments are typically small unfenced allotments intermingled with larger tracts of non-BLM lands, limiting BLM management opportunities.

In addition to criteria identified in the handbook, recent guidance (Washington Office IM 2009-018) provides additional criteria to be used to designate allotments as Category I, M, or C. For allotments assessed for rangeland health that contain PPH or PGH, approximately 139 allotments are managed in the "I" category, 135 in the "M" category, and 159 in the "C" category that contain PPH and PGH habitat.

Improvements and routine maintenance for livestock management on BLM-administered lands in the planning area occur at varying densities based upon management needs, land ownership patterns and other factors. These include, but are not limited to fences, cattleguards, corrals, pipelines, water troughs, wells, and reservoirs. Fences are used to delineate allotment boundaries, pastures within allotments, land ownerships, and to exclude the impact of ungulate grazing from certain resources. **Table 3-28**, Miles of Fences within Sage-Grouse Habitat in the Planning Area, characterizes the amount of fences in GRSG habitat.

Table 3-28
Miles of Fences within Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Miles[1]	Miles within PGH	Miles within PPH
BLM	IV	4,400	1,900	2,500
	V	5,200	3,100	2,100
Forest Service	IV	0	0	0
	V	300	200	100
Tribal and Other Federal	IV	100	100	0
	V	100	100	0
Private	IV	1,700	700	1,000
	V	2,200	1,400	800
State	IV	200	100	100
	V	0	0	0

Source: Manier et al. 2013
[1]Derived from a dataset that identifies pasture and allotment borders on BLM-administered and National Forest System land as potential fences

Additional structural improvements include watering facilities constructed by the permittee/lessee used to improve livestock distribution in areas where naturally occurring surface water is not available and to reduce livestock use of naturally occurring springs and streams.

3.7.2 Trends

In general, livestock grazing use within the region has significantly decreased from its peak in the early part of the last century. For the most part, these declines are due to reductions in use to more closely reflect the range's carrying capacity. Present levels of demand for forage resources are anticipated to continue. Other factors that impact livestock grazing management in the planning area include drought, infestations of noxious weeds, and wildfire. Changes in land use on private and BLM-administered lands, such as increased use for recreational purposes, have also influenced livestock grazing. Climate change may impact livestock grazing by changing the relative amount of forage available for livestock or wildlife use in a given area.

Domestic livestock grazing occurs in nearly all sagebrush habitat in the planning area. It does not occur in some wilderness and recreation areas. Understanding the impacts of current grazing practices as well as identifying where habitats may be at risk is crucial to the persistence of sagebrush habitats and the species that rely on them (Aldridge et al. 2008).

One important objective in managing livestock grazing relevant to GRSG is to maintain residual cover of herbaceous vegetation to reduce predation during nesting (Beck and Mitchell 2000). When all rangeland health standards have been met, it is expected that current grazing management is adequate to maintain perennial bunchgrass communities and support GRSG habitat objectives. This is consistent with Cagney et al. (2010) and France et al. (2008) who indicate that moderate levels of livestock use are generally compatible with maintenance of perennial bunchgrass, though sustainable use varies with a number of environmental factors.

3.8 Recreation

In accordance with the BLM's multiple-use mandate, per the FLPMA, the agency seeks to provide recreational opportunities that include dispersed, organized, competitive, and commercial uses. Recreation decisions made during the land use planning process are outlined in the BLM Land Use Planning Handbook (H-1601-1 – Appendix C; BLM 2005d) and in guidance contained in IM 2011-004 (BLM 2010b).

The BLM manages organized, commercial, and competitive recreation activities on BLM-administered lands and related waters with special recreation permits (SRPs). As a management tool, SRPs reduce user and resource conflicts, mitigate adverse impacts on resources, provide opportunities for monitoring activities, enhance visitor experience opportunities, and, through user fee requirements, allow for a fair return for these types of public land uses. Issuance of an SRP is discretionary, with proposed activities subject to NEPA compliance and determined mitigation requirements established specific to a proposed activity.

3.8.1 Existing Conditions

Conditions of the Planning Area

The diverse planning area offers multiple settings for a wide range of opportunities for recreation, most occurring on public land requiring no permits and no or minimal fees.

Popular recreational activities include driving for pleasure, hiking, mountain biking, camping, hunting, fishing, OHV riding, horseback riding, rock climbing, skiing, visiting cultural sites, bird watching, viewing wildflowers, backpacking, rockhounding, and motorized and non-motorized boating. Flying radio-controlled aircraft, rock crawling, parasailing, and geocaching are also growing in popularity in parts of the planning area.

Visitor use patterns within many parts of the planning area are seasonal. Due to variations in local climate, some areas receive very little summer use but become popular destinations during winter months.

Water-based recreation is an important component of the Oregon recreation landscape. Boating, sport fishing, and water sports (e.g., waterskiing, wakeboarding, etc.) are popular on Oregon's lakes, reservoirs, rivers, and coastal areas.

Snow-based winter recreation, including downhill and cross-country skiing, is popular in higher elevation areas. Cross-country skiing, backcountry skiing, and snowshoeing opportunities are available on public and private lands.

A "rockhound" is an amateur geologist who enjoys collecting unusual or interesting rock, mineral, and gem specimens. Rockhounding involves collecting not more than 250 pounds per year and is allowed free of charge on BLM-administered lands. Commercial collecting for the purpose of sale or barter is not allowed without special authorization. Also, rock cannot be collected on BLM-administered lands for construction or decorative purposes in landscaping without a permit. Rockhounds may use hand tools, such as shovels and picks, but must not use explosives or power equipment for excavation.

The majority of recreational opportunities on public lands are on lands administered by the BLM, Forest Service, Bureau of Reclamation, and other agencies.

Oregon's 13 national forests (including 1 national scenic area and 1 national grassland) provide a variety of structured and unstructured recreation opportunities similar to BLM-administered lands.

There are 29 units of the National Park System in Oregon, including 1 national park and 2 national monuments. These areas provide a wide variety of automobile touring, developed and dispersed camping, and dispersed quiet recreation opportunities. OHV recreation is generally more restricted in NPS units (also see **Section 3.15**, Special Designations).

Oregon State Parks manages 192 state parks, natural areas, state historic parks, scenic corridors, and other outdoor sites. Most state parks charge an entrance fee for day use, and developed recreation opportunities such as camping also require a fee. Once in a state park, dispersed recreation is generally free of cost.

A limited amount of state trust lands are available for a variety of recreational activities.

Non-government recreation providers also play an important role in producing recreation and tourism opportunities on public lands. Many local and regional businesses provide for a variety of direct recreation opportunities on public and state lands that enable visitors to realize specific recreation experiences via numerous commercial and competitive activities or events.

Conditions on BLM-Administered Lands

The 12,618,026 acres of BLM-administered lands in the planning area offer a wide variety of recreational experiences, ranging from hunting and fishing, hiking, horseback riding, and mountain biking, to motorcycle and OHV riding, boating, driving for pleasure, and more. Each BLM field office manages its own recreation program; local social and environmental conditions, land use plans, and recreation facilities usually dictate the types of activities that occur in a given area.

Visitation has remained relatively stable since 2002, although some areas show small increases in visitor visits versus visitor use days, meaning some visitors are shortening or lengthening their trips. Likely due to the economic downturn, many recreational users are staying closer to home and utilizing recreation resources within commuting distance. **Table 3-29**, Average Annual Visitor Days from 2002 to 2012, displays the average annual visitor days for popular recreation areas on BLM-administered lands from fiscal years 2002 to 2012.

SRPs are issued for various commercial and non-commercial activities on BLM-administered lands. Primary commercial activities include hunting and guiding, rafting, fishing, and motorized vehicle events. Non-commercial SRPs are commonly issued for organized group activities including, but not limited to, bird watching, rare plant viewing, and non-commercial events organized by motorized and non-motorized recreational clubs.

Table 3-29
Average Annual Visitor Days from 2002 to 2012

District	Annual Visits	Average Annual Visitor Days[1]
Burns	436,080	739,153
Lakeview	322,921	155,242
Prineville[2]	153,464	656,345
Vale	673,173	1,892,893

Source: BLM 2012g
[1] A recreation visitor day is a compilation of visitors that use public lands for 12 hours combining a multitude of activities. For example, one visitor may participate in hiking for 3 hours; another in picnicking for 7 hours; and a third person is fishing for 2 hours. This equates to 1 visitor day.
[2] Central Oregon Resource Area only

There are a number of developed recreation sites (e.g., sites with one or more facility associated with them, such as a kiosk, boat launch, wayside, overlook, or pullout and interpretive signs) located within PPH and PGH or along rivers that bisect GRSG habitat (see **Table 3-30**, Developed Recreation Sites).

Table 3-30
Developed Recreation Sites

District	Resource Area	Number of Developed Recreation Sites[1]
Burns	Andrews	4
	Steens Mountain	24
	Three Rivers	5
Lakeview	Lakeview	4
	North Lake	11
Vale	Baker	28
	Jordan	37
	Malheur	8

Source: BLM 2012g
[1] Includes sites with one or more facility (e.g., kiosk, boat launch, wayside, overlook, or pullout and interpretive signs) located within or in close proximity to PPH and PGH.

3.8.2 Trends

Due to the remote nature of the planning area and its distance to metropolitan centers, recreation in many parts of the planning area is not expected to grow.

Five key drivers are causing changes to recreation in the planning area:

1. Changing public expectations and demand for outdoor recreation opportunities, especially for dispersed recreation
2. Continued growth in the recreation and tourism industries

3. Increased energy development in portions of the planning area
4. Close proximity of BLM-administered lands to private property, and the growing use of public lands as a community-based recreation asset
5. Technological advances, such as all-terrain vehicles and mountain bikes, affordable GPS units, as well as better outdoor equipment and clothing

These drivers will impact the activity opportunities that can be offered and the recreation experience and benefit opportunities that can be produced by land managers and partners.

3.9 Travel Management

Off-highway vehicle (OHV) is synonymous with off-road vehicle. Off-road vehicle is defined in 43 CFR 8340.0-5(a):

> Off-road vehicle means any motorized/battery-powered vehicle capable of, or designed 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 in times of national defense emergencies. Types of OHVs commonly used in the planning area include passenger cars, dirt motorcycles, dune buggies, sand rails, jeeps, four-wheel drive vehicles, snowmobiles, and ATVs.

The BLM's regulations for OHV management, 43 CFR 8342.1, stipulate "the authorized officer shall designate all BLM lands as either open, limited, or closed to [OHVs]." As such, all BLM-administered lands within the planning area have been designated in one of three OHV designation categories, as follows:

> Open area designations are used for intensive OHV or other transportation use areas where there are no special restrictions or where there are no compelling resource protection needs, user conflicts, or public safety issues to warrant limiting cross-country travel.
>
> Limited area designations are used where travel must be restricted to meet specific resource or resource-use objectives. For areas classified as limited, the BLM must consider a full range of possibilities, including travel that will be limited to types or modes of travel, such as foot, equestrian, bicycle, and motorized; limited to existing roads and trails; limited to time or season of use; limited to certain types of vehicles (e.g., motorcycles, ATVs, and high clearance); limited to licensed or permitted vehicles or users; limited to BLM administrative use only; or other types of limitations. In addition, the BLM must provide specific

guidance about the process for managing motorized vehicle access for authorized, permitted, or otherwise approved vehicles for those specific categories of motorized vehicle uses that are exempt from a limited designation.

Closed area designations prohibit any and all motorized travel and transportation. Areas or trails are designated closed if closure to all vehicular use is necessary to protect resources, promote visitor safety, or reduce use conflicts. Non-motorized uses are permitted in these areas.

Airstrips are areas that are "open" to cross country vehicle travel. When an aircraft lands, it is considered a motorized vehicle. Areas going to "limited" from "open" would no longer allow aircraft landing.

This section focuses on travel management; discussion of the relationship between motorized travel and wildlife can be found in **Section 3.2**, Greater Sage-Grouse and Sage-Grouse Habitat and **Section 3.4**, Fish and Wildlife.

3.9.1 Existing Conditions

Conditions of the Planning Area

Oregon is served by an extensive network of state and interstate highway systems. The National Highway System provides access to major metropolitan centers and smaller cities alike. Other national and state highways connect multiple municipalities and provide access to destinations like Crater Lake National Park.

Table 3-31, Roads within Greater Sage-Grouse Habitat, displays the miles of roads in the planning area that are located within sage-grouse habitat. **Table 3-32**, Railroads within Greater Sage-Grouse Habitat, displays the miles of railroads in the planning area that are located within sage-grouse habitat.

Over the past 10 years, federal land management agencies have instituted policies to provide networks of roads and trails for motorized access. 43 CFR 8230 requires the BLM to designate all BLM-administered lands as open, limited, or closed to OHV travel. This policy has resulted in the implementation of a system of designated roads and trails whereby cross-country travel is only allowed in specified areas, and motorized vehicles must stay on those routes designated for motorized travel.

In response to 36 CFR 212, Subpart B, the Forest Service has instituted a similar policy for motorized travel, requiring each national forest to produce a map that depicts the routes on which motorized vehicles are allowed to travel. In Oregon, nine National Scenic Areas, National Grasslands, and National Forests have published their Motor Vehicle Use Map (Forest Service 2012). The

Table 3-31
Roads within Greater Sage-Grouse Habitat

Surface Management Agency	Management Zone	Miles of Roads			Acres of Roads		
		Total[1]	Within PGH	Within PPH	Total[1]	Within PGH	Within PPH
BLM	IV	4,795	2,128	2,667	48,000	21,200	26,800
	V	3,908	5,511	3,357	88,400	54,800	33,600
Forest Service	IV	58	8	50	600	100	500
	V	491	356	135	4,800	3,500	1,300
Tribal and Other Federal	IV	58	34	24	500	300	200
	V	439	173	266	4,400	1,800	2,600
Private	IV	2,498	1,235	1,263	25,100	12,300	12,800
	V	4,115	2,798	1,317	40,400	27,800	13,600
State	IV	481	374	107	4,900	3,800	1,100
	V	308	201	107	3,100	2,000	1,100

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 3-32
Railroads within Greater Sage-Grouse Habitat

Surface Management Agency	Management Zone	Miles of Railroads			Acres of Railroads[1]		
		Total	Within PGH	Within PPH	Total	Within PGH	Within PPH
BLM	IV	13	8	5	49	31	18
	V	0	0	0	0	0	0
Forest Service	IV	0	0	0	0	0	0
	V	1	1	0	0	3	0
Tribal and Other Federal	IV	0	0	0	0	0	0
	V	0	0	0	0	0	0
Private	IV	40	37	3	151	139	12
	V	17	17	0	65	65	0
State	IV	0	0	0	0	0	0
	V	0	0	0	0	0	0

Source: Manier et al. 2013
[1]Assumes footprint of 9.4 meters

remaining four National Forests are currently preparing their Motor Vehicle Use Maps.

Trail-based OHV use is prohibited in many National Park Service units, though driving for pleasure on paved roads is a popular activity.

On BLM- and National Park Service-administered and National Forest System lands, cross-country non-motorized travel remains largely permissible outside of some special designation areas. Mountain bicycle use is allowed on some designated trails and primitive roads within the National Parks System.

Conditions on BLM-Administered Lands

OHV use in the planning area is often associated with recreational activities (e.g., hunting, fishing, and driving for pleasure) and administrative purposes (e.g., livestock and facility management). Most motorized vehicular use in the planning area occurs on existing roads and trails, one intensively used Open area (Virtue Flats in the Baker Resource Area), and one managed trail system (Millican Valley in the Prineville Resource Area).

While route inventories on BLM-administered lands are incomplete, the number of acres managed as open, closed, or limited for OHVs in each RMP within the planning area is shown in **Table 3-33**, OHV Designations. Routine maintenance is conducted on all roads, routes, and trails.

Route designations for foot, horse, and bicycle travel have been implemented in some site-specific areas with their own implementation-level plans. Generally, cross-country foot, horse, and bicycle travel is allowed on most BLM-administered lands, although some field offices apply the same area and route limitations to bicycles and motorized vehicles. Historically, cross-country over-the-snow travel on most BLM-administered lands has not been restricted.

As in the remainder of the planning area, access can be seasonally limited on BLM-administered lands due to weather, resource concerns, or other limitations.

OHV Play Areas

There are two OHV play areas managed for intensive cross-country travel: Virtue Flats and Radar Hill.

Virtue Flats is located approximately 5 miles east of Baker City, entirely within PGH. It offers hills and rocky terrain with views of the Elkhorn and Wallowa Mountains and a variety of challenges for the beginner to advanced OHV enthusiast. Trails and routes are available year-round for all classes of OHVs, including motorcycles, four-wheels drives, snow machines, and quads. Additionally, this is also a popular mountain bike area and also includes equestrian activities. A staging area with seasonal restrooms, loading ramp,

Table 3-33
OHV Designations

RMP Area	Designation[1]	Within PGH	Within PPH	Outside GRSG Habitat
Lakeview	Open	709,424	637,579	465,619
	Closed	1,269	0	16,525
	Limited	648,637	337,549	575,467
Baker	Open	66,281	139,234	228,310
	Closed	0	0	0
	Limited	0	0	0
Southeast Oregon	Open	1,670,061	1,804,022	824,420
	Closed	983,541	942,158	219,262
	Limited	11,872	1,221	2,755
Brothers/LaPine	Open	0	0	0
	Closed	1,338	298	4,144
	Limited	17,107	11,763	60,890
Upper Deschutes	Open	0	0	0
	Closed	152,482	370	178,269
	Limited	26,552	0	97,460
Andrews	Open	529	0.5	24,768
	Closed	1103	94	3
	Limited	711,115	398,331	48,291
Steens	Open	0.2	0	0
	Closed	113,751	44,491	13,010
	Limited	84,810	163,575	8,999
Three Rivers	Open	656,911	188,111	284,475
	Closed	1,032	2,356	456
	Limited	46,696	18,099	33,460
Total	Open	3,103,206	2,768,947	1,827,592
	Closed	156,917	48,460	134,353
	Limited	2,644,388	1,871,845	1,124,638

Source: BLM 2012h
[1]"Limited" refers to areas where motorized travel is limited to either designated or existing routes

bulletin boards, maps, and parking is provided. Use of this area varies and is largely seasonal, with visitation peaking in late spring and early summer.

Radar Hill is a small OHV play area of less than 5,000 acres located near Burns, Oregon. It is not located within PPH or PGH. Use is largely from local users, with all vehicle types allowed.

3.9.2 Trends

Demand for public access in support of motorized uses is expected to continue to grow as the Pacific Northwest's population grows. Additional demands on BLM-administered lands will increase as the variety of motorized vehicles become more affordable and advances in equipment technology make BLM-administered lands more accessible to a wider range of users and age groups.

Current OHV use exceeds historic levels and new, more-powerful vehicles are capable of accessing steeper and rougher terrain. In the past, visitors drove principally Jeeps, trucks, and motorcycles. Today, the BLM has seen an increase in use of OHVs of all types and sizes. As with all types of use, increased visitation has contributed to the widening, deepening, braiding, and eroding of some existing routes as well as the development of numerous user created trails. The increased demand for cross-country opportunities has also led to an increasing number of hill-climb, play, and camping areas.

Some of the key drivers for the increase in travel in the planning area include:

- Increasing visitation on all BLM-administered lands within the planning area
- Increasing urban and suburban populations within the planning area
- Technological advances to all-terrain vehicles and mountain bikes, affordable GPS units, as well as better outdoor equipment and clothing.

3.10 Lands and Realty

Lands and realty actions can be divided between land tenure adjustments, withdrawals, and land use authorizations. Land tenure adjustments focus primarily on land exchange, acquisition (including purchase and easement acquisition), and disposal. Withdrawals change the management of land and, in some cases, transfer jurisdiction but do not result in the transfer of ownership. Land use authorizations consist of ROW authorizations, communication sites, and other leases or permits.

Land Tenure Adjustments

Land tenure adjustments refer to those actions that result in the disposal of BLM-administered land, or the acquisition by the BLM of nonfederal lands or interests in land. FLPMA requires that public land be retained in public ownership unless, as a result of land use planning, disposal of certain parcels is warranted because it meets the criteria for disposal as outlined in 43 CFR 2710.0-3. These criteria are that: the tract was acquired for a specific purpose and the tract is no longer required for that or any other federal purpose; disposal of such tract shall serve important public objectives; or such tract is difficult and uneconomic to manage. Tracts of land that are designated in BLM LUPs as potentially available for disposal may also have a disposal method identified. Some lands would only be available for disposal via exchange with other lands identified for acquisition. However, the BLM will evaluate and consider the full range of land disposal and acquisition tools to be able to accomplish these objectives prior to proceeding with a land exchange. Subject to the disposal criteria discussed above, the BLM can also identify lands for straight disposal without an exchange. Lands and interests in lands are exchanged, acquired, and disposed of for the following reasons:

- Improve management of natural resources through consolidation of federal, state, and private lands
- Secure key property necessary to protect endangered species, promote biological diversity, increase recreational opportunities, and preserve archeological and historical resources
- Meet the needs of communities
- Implement specific acquisitions authorized or directed by acts of Congress
- Foster sustainable development and fulfill other public needs

Withdrawals

Withdrawals are used to preserve sensitive environmental values, protect major federal investments in facilities, support national security, and provide for public health and safety.

A withdrawal is a formal action that accomplishes one or more of the following actions:

- Transfers total or partial jurisdiction of federal land between federal agencies
- Closes federal lands to appropriation under public land laws, including mineral laws
- Dedicates public land for a specific public purpose

There are three major categories of formal withdrawals: (1) congressional, (2) administrative, and (3) Federal Power Act or Federal Energy Regulatory Commission. A withdrawal segregates a portion of public lands and suspends certain operations of the public land laws, such as mining claims. Certain stock driveways are also withdrawn. Federal policy is to restrict 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.

Land Use Authorizations

The most common form of authorization to allow uses of BLM-administered lands by commercial, private, or governmental entities is the ROW. Per Title V of FLPMA, a ROW grant is an authorization to use a specific piece of BLM-administered land for certain projects (such as roads, pipelines, transmission lines, or communication sites) for a specific period of time.

ROW applications are reviewed using the criteria of following existing designated corridors wherever practical and avoiding proliferation of separate ROWs. The BLM's objective is to grant ROWs to any qualified individual, business, or government entity, and to direct and control the use of ROWs on BLM-administered lands in a manner that:

- Is consistent with the objectives of the RMP
- Protects the natural resources associated with BLM-administered lands and adjacent lands, whether private or administered by a government entity
- Prevents unnecessary or undue degradation to BLM-administered lands
- Promotes the use of ROWs in common, considering engineering and technological compatibility, national security, and RMP goals and objectives
- Coordinates, to the fullest extent possible, all BLM actions with local, state, tribal, and other federal agencies; interested individuals; appropriate quasi-public entities (43 CFR 2801.2); and applicable planning documents (e.g. Harney County Renewable Energy Plan).

In addition to ROW authorizations, Title III of FLPMA gives the BLM the authority to authorize land use agreements such as special use permits, easements, and leases. These authorizations can be long term (greater than 3 years) leases, such as leases for communication facilities, or short-term (less than 3 years), such as permits for movie filming or apiaries.

3.10.1 Conditions of the Planning Area

The lands within the planning area are owned by multiple federal, state, and local agencies, as well as 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, Forest Service, Bureau of Indian Affairs, private land owners, and other state and federal agencies.

Urbanization from community expansion is a contributing factor to overall GRSG health (Connelly et al. 2004). **Table 3-34**, Acres of Greater Sage-Grouse Habitat within City Limits in the Planning Area, displays data compiled in a baseline environmental report produced by the USGS and BLM (Manier et al. 2013). The table indicates acreages within the municipal boundary of a city or town presented by surface management agency and occurrence within PGH and PPH in the planning area.

Table 3-34
Acres of Greater Sage-Grouse Habitat within City Limits in the Planning Area

Surface Management Agency	Management Zone	Total Acres within City Limits	Acres within PGH	Acres within PPH
BLM	IV	100	100	0
	V	0	0	0
Forest Service	IV	0	0	0
	V	0	0	0
Tribal and Other Federal	IV	0	0	0
	V	100	100	0
Private	IV	200	200	0
	V	300	300	0
State	IV	0	0	0
	V	0	0	0
Other	IV	0	0	0
	V	0	0	0

Source: Manier et al. 2013

3.10.2 Conditions on BLM-Administered Lands

Land Tenure Adjustments

Land Status Zones

Within the planning area, BLM-administered lands have been classified for retention or disposal pursuant to Section 7 of the Taylor Grazing Act (43 USC 315f), FLPMA, and 43 CFR Subparts 2400 and 2500 and approved LUPs.

BLM-administered lands have been designated as three different zones (Zone 1, Zone 2, and Zone 3) and community expansion lands. Zone 1 lands have been identified as having national or statewide significance and are identified for retention in public ownership. These lands possess significant visual, wildlife, watershed, special status species, wilderness, recreational, vegetative, cultural, or other public values. Zone 2 lands have potentially high resource values for timber, recreation, riparian, watershed, special status species, cultural, and wildlife. Zone 2 lands are identified for retention or possible exchange for land with higher resource values or transfer through the Recreation and Public Purposes (R&PP) Act. Zone 3 lands are scattered, isolated tracts of BLM-administered lands having generally low or unknown resource values. Zone 3 lands are potentially suitable for transfer or disposal if significant recreation, wildlife, watershed, special status species, or cultural values are not identified. Community expansion lands possess high public values, due to their proximity to expanding communities, and provide important open space and dispersed recreation opportunities. These lands will be retained as undeveloped open space until such time as they may be transferred to another public entity to accommodate community expansion needs or used for other public purposes.

See **Table 3-35**, Land Status Zones, for the number of acres in each land status zone across BLM-administered lands in the planning area.

Table 3-35
Land Status Zones

Land Status Zone	Acres
Zone1*	***9,170,900***
PPH	3,501,400
PGH	4,142,300
Zone 2	***3,299,200***
PPH	991,700
PGH	1,468,500
Zone 3	***138,800***
PPH	50,400
PGH	48,600
Community Expansion	***5,200***
PPH	0
PGH	1,400

Source: Oregon/Washington BLM 2013
* Zone totals include the sum of GRSG habitat and non-habitat areas.

Disposals

Disposal areas include tracts of land that are economically difficult to manage or parcels that could serve important public objectives, including, but not limited to, expansion of communities and economic development. These lands are usually disposed of through land exchanges or land sales.

A land exchange is the process of trading lands or interests in lands. BLM-administered lands may be exchanged for lands or interests in lands owned by corporations, individuals, or government entities. Except for those exchanges that are congressionally mandated or judicially required, exchanges are voluntary and discretionary transactions with willing landowners. The lands to be exchanged must be of approximately equal monetary value and located within the same state. Exchanges also must be in the public interest and conform to applicable BLM LUPs.

Section 203 of FLPMA authorizes the sale of BLM-administered lands. The objective of BLM land sales is to provide a means for disposal of lands that are found, through the land use planning process to be suitable for disposal. BLM-administered lands must be sold at not less than fair market value and meet the sale criteria of the FLPMA.

There are approximately 39,700 acres of BLM-administered land in Zone 3 identified for disposal in the planning area located in the Burns District Office and identified in the Three Rivers and Andrews RMP.

There are approximately 54,300 acres of BLM-administered lands identified as Zone 3 and community expansion lands in the planning area located in Prineville District and identified in the Brothers La Pine and Upper Deschutes RMP.

There are approximately 7,758 acres of BLM-administered land in Zone 3 identified for disposal in the planning area, located in the Lakeview District and identified under the Lakeview RMP (BLM 2012i).

There are approximately 41,000 acres of BLM-administered land in Zone 2 and 62,100 acres in Zone 3 identified for disposal in the planning area located in the Vail District and identified in the Southeastern Oregon RMP.

There are two pending land exchanges within the planning area: one within the Three Rivers RMP and the other within the Steens Cooperative Management and Protection Area and Andrews RMP. The exchange in the Three Rivers RMP involves 720 acres of selected lands in PPH; 118 acres of offered land in PPH; and 320 acres of offered lands outside of the sage-grouse habitat area. The other land exchange involves mineral estate only and involves no surface ownership.

Acquisition

Acquisition of lands can be pursued to facilitate various resource management objectives. The BLM has the authority, under Section 205 of FLPMA, to purchase lands or interests in lands. The BLM also has the authority to receive lands through donation. Acquisition, either through purchase, exchange, or donation are used to enhance recreational opportunities, acquire crucial wildlife habitats, protect a site with cultural significance, or enhance a wilderness area or ACEC.

Withdrawals

There are approximately 212 withdrawals in the planning area, encompassing approximately 550,100 acres of federal land. These withdrawals are used for public water reserves, administrative sites, Department of Defense activities, research natural areas, and state wildlife reserves. There are 48,800 acres of military withdrawals in the planning area; however, these areas are located outside PPH and PGH (BLM 2012i).

Land Use Authorizations

Within the planning area, there are 361 active ROW authorizations. **Table 3-36**, Active ROW Authorizations, provides a summary by ROW type on BLM-administered land in the planning area.

Table 3-36
Active ROW Authorizations

Type	Number of Authorizations
Road	24
Railroad	29
Power	20
Telephone	21
Water facilities	9
Oil and gas	12
Communication sites	246
Total	361

Source: Oregon/Washington BLM 2013

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 are issued with surface reclamation stipulations and other mitigation measures. Restrictions and mitigation measures 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

ROW Avoidance and Exclusion Areas

Areas unsuitable for surface disturbance or occupancy are generally identified as avoidance or exclusion areas for ROWs. Restrictions and mitigation measures are considered on a case-by-case basis for avoidance areas depending on impacts on resources, while exclusion areas are strictly prohibited from ROW development. **Table 3-37**, ROW Avoidance and Exclusion Areas, shows the acreage of lands in ROW avoidance areas and exclusion areas on BLM-administered lands within the planning area.

Table 3-37
ROW Avoidance and Exclusion Areas

	Avoidance Areas (Acres)	Exclusion Areas (Acres)
PPH	1,338,500	257,300
PGH	1,678,900	288,500
Total BLM-Administered Land	3,416,300	856,400

Source: Oregon/Washington BLM 2013

ROW Corridors

Utility corridors were developed to concentrate the effects of utility uses in suitable and manageable locations on BLM-administered lands. The corridors may contain power lines, transcontinental fiber optic communication cables, and inter- and intra-state gas pipelines.

There are seven major ROW corridors presently traversing the planning area. Three of the corridors contain large (500-kV or larger) power transmission lines. One runs east-west, north of Summer Lake and south of Christmas Valley, Oregon. A second north-south corridor traverses east of Fort Rock and Silver Lake, Oregon. A third corridor runs north-south, east of Christmas Valley and west of Adel, Oregon. The remaining three corridors are occupied by State Highways 31 and 140 and US Highway 395 (BLM 2012i). See **Table 3-38**, Utility Corridors within Greater Sage-Grouse Habitat in the Planning Area, shows the miles and acreage of utility corridors within the planning area for various land management agencies, including the BLM. **Table 3-31**, Roads within Greater Sage-Grouse Habitat, in **Section 3.9**, Travel Management provides information regarding existing roadways in the planning area.

Table 3-38
Utility Corridors within Greater Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Miles of Utility Corridors			Acres of Utility Corridors		
		Total[1]	Within PGH	Within PPH	Total[2]	Within PGH	Within PPH
BLM	IV	111	49	62	40,700	18,200	22,500
	V	171	111	60	87,700	48,500	39,200
Forest Service	IV	0	0	0	0	0	0
	V	0	0	0	5,800	5,700	100
Tribal and Other Federal	IV	0	0	0	100	100	0
	V	0	0	0	0	0	0
Private	IV	0	0	0	5,200	2,900	2,300
	V	0	0	0	11,100	6,200	4,900
State	IV	0	0	0	500	300	200
	V	0	0	0	1,700	0	1,700
Other	IV	0	0	0	0	0	0
	V	0	0	0	0	0	0

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

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 Communications Use Lease or a ROW grant. BLM-administered lands will continue to be available for multiple use and single use communication sites and road access ROWs on a case by case basis pursuant to Title V of FLPMA, and 43 CFR 2800 regulations.

There are a total of 246 communication site leases (ROWs) and 69 individual communication towers in the planning area. See **Table 3-39**, Number of Communication Towers within Greater Sage-Grouse Habitat in the Planning Area, which includes the number of communication towers on BLM- and non-BLM-administered land within GRSG habitat.

Table 3-39
Number of Communication Towers within Greater Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Number of Communication Towers[1]	Number within PGH	Number within PPH
BLM	IV	23	9	14
	V	46	34	12
Forest Service	IV	0	0	0
	V	16	16	0
Tribal and Other Federal	IV	0	0	0
	V	0	0	0
Private	IV	20	11	9
	V	22	16	6
State	IV	4	4	0
	V	3	3	0
Other	IV	0	0	0
	V	0	0	0

Source: Manier et al. 2013
[1]Displays the number of Federal Communication Commission communication towers

Transmission Lines

Transmission lines are linear ROW features authorized by the BLM. See **Table 3-40**, Miles of Transmission Lines within Greater Sage-Grouse Habitat in the Planning Area, which includes miles of transmission lines in PPH and PGH by surface management agency.

Table 3-40
Miles of Transmission Lines within Greater Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Miles[1]	Miles within PGH	Miles within PPH
BLM	IV	11,400	6,600	4,800
	V	41,500	25,100	16,400
Forest Service	IV	0	0	0
	V	1,300	1,300	0
Tribal and Other Federal	IV	0	0	0
	V	800	800	0
Private	IV	2,600	1,100	1,500
	V	11,100	6,800	4,300
State	IV	400	100	300
	V	400	200	200
Other	IV	0	0	0
	V	0	0	0

Source: Manier et al. 2013
[1]Includes transmission lines greater than 115kV

Renewable Energy

Solar, wind, and biomass are considered renewable energy resources (geothermal is managed as a fluid leasable mineral). Solar and wind are authorized by ROWs through the Lands and Realty Program. Any forest products removed from BLM-administered lands, including biomass, would be authorized via a forest product sale permit, as a stewardship contract, or free use permit.

There are currently no ROW acres for solar energy and no biomass facilities in the planning area. The Vale District has issued two ROWs for access to utilize geothermal resources on private mineral estate at the Neal Hot Springs Project.

There are eight wind testing facilities and one wind development ROW (see **Table 3-41**, Acres of Wind Energy Rights-of-Way within Greater Sage-Grouse Habitat in the Planning Area).

Table 3-41
Acres of Wind Energy Rights-of-Way within Greater Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres	Acres within PGH	Acres within PPH
BLM	IV	811,200	276,100	535,100
	V	197,100	96,500	100,600
Forest Service	IV	0	0	0
	V	0	0	0

Table 3-41
Acres of Wind Energy Rights-of-Way within Greater Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres	Acres within PGH	Acres within PPH
Tribal and Other Federal	IV	1,800	100	1,700
	V	0	0	0
Private	IV	10,500	1,100	9,400
	V	4,800	3,200	1,600
State	IV	300	300	0
	V	0	0	0
Other	IV	0	0	0
	V	0	0	0

Source: Manier et al. 2013

3.10.3 Trends

Land Tenure Adjustments

The BLM will process land exchanges, acquisitions, easements, and potential sales within the planning area on a case-by-case basis as staff and workload allow. As opportunities present themselves, each proposal will be reviewed and given careful consideration to management goals and public benefit. In recent years, there is a trend for land tenure adjustment legislation to be considered and adopted as part of the legislative process. Congressionally mandated land tenure actions could continue to affect lands identified for disposal, acquisition or exchange. Otherwise, the land tenure program receives few land tenure adjustment requests per year and it is anticipated that this program will continue to experience low levels of activity.

Land Use Authorizations

Demand for land use authorizations in the planning area is expected to remain steady or gradually increase over time, particularly in response to inter- and intra-state energy, gas ROW development, and energy projects. The BLM anticipates land use authorizations associated with renewable energy projects, primarily utility-scale wind energy generation, to remain steady or gradually increase. The BLM anticipates that ROW authorizations for communication sites, roads, distribution lines, and other local-scale ROWs will remain at current levels.

3.11 Fluid Leasable Minerals

Fluid leasable minerals in the planning area include conventional oil and gas and geothermal resources. Fluid leasable minerals are governed by the Mineral Leasing Act of 1920 (February 1920; and 43 CFR 3000-3599, 1990), as amended, which authorized specific minerals to be disposed of through a leasing system. Geothermal resources are governed by the Geothermal Steam Act of 1970.

Acreage in this section refers to the federal mineral estate. The federal mineral estate includes BLM-administered minerals that occur beneath surface estate managed by the BLM, as well as beneath surface estate within state or private jurisdiction (known as split-estate lands). The total federal mineral estate within the planning area is 15,257,035 acres (12,618,028 acres BLM-administered surface and 2,639,007 acres private, state, or other federal surface with federal minerals).

Minerals data was compiled in a BER produced by the USGS and BLM (Manier et al. 2013) (**Appendix O**, Mineral Resources from Baseline Environmental Report). This report provides estimated acreages by surface management agency and their occurrence within PGH and PPH in the planning area by management zone. Discrepancies between BER data and data found in this section exist due to data keeping and mapping differences. As such, data found in the BER will only serve as the baseline for Chapter 5 (Cumulative Impacts), because these are the best available data covering the entire GRSG range. However, because localized data are available at a finer scale for the Oregon sub-region, the BER data will not be incorporated into the Chapter 4 (Environmental Consequences) analysis.

3.11.1 Existing Conditions

Leasable minerals are defined by the Mineral Leasing Act. The rights to explore for and produce fluid minerals on public land may be acquired through leasing. During the leasing process, the BLM may apply stipulations (no surface occupancy [NSO], controlled surface use [CSU], and timing limitation [TL]) to leases in order to protect a wide range of resources including soils, watersheds, cultural resources, and wildlife (e.g., sage-grouse). Stipulations, while not directly closing an area to fluid mineral leasing, impact the availability of fluid mineral resources by restricting the location of surface facilities and methods of development.

<u>No Surface Occupancy (NSO).</u> In areas where NSO stipulations are applied, federal fluid minerals could be leased, but the leaseholder/operator would have to use off-site methods, such as directional drilling to access the mineral resource.

<u>Controlled Surface Use (CSU)</u>. CSU stipulations allow some use and occupancy in areas where they are applied. While less restrictive than an NSO, a CSU stipulation allows the BLM to require special operational constraints, to shift the surface-disturbing activity associated with fluid mineral leasing more than the standard 200 meters (656 feet), or to require additional protective measures (e.g., special construction techniques for preventing erosion in sensitive soils) to protect the specified resource or value.

<u>Timing Limitations (TL).</u> Areas where TL stipulations are applied are temporarily closed to fluid mineral exploration and development, surface-disturbing

activities, and intensive human activity during identified time frames, usually based on seasons or species breeding times. While some operational activities would be allowed at all times (e.g., vehicle travel and maintenance), construction, drilling, completions, and other operations considered to be intensive in nature would not be allowed during the restricted time frame.

Conditions of the Planning Area

The planning area contains possible and potential leasable fluid minerals that include oil, gas, and geothermal resources. Oregon is considered a pioneering area, which is an area of unknown potential. There is no developed infrastructure, and limited exploration has occurred. Because of the lack of infrastructure and experienced workforce, initial exploration costs and profit risk would be much higher than in areas associated with developed fields. Therefore, as long as economic resource exists in other areas with fluid mineral development, focused exploration and development in the pioneering areas would not likely occur until such time that economics increase to make exploration and development warranted. While there has been a recent decline in oil and gas leasing and exploration on BLM-administered and private lands in the planning area, there has been a marked increase in geothermal interest, including the recent development of a producing geothermal facility on private land in Eastern Oregon.

Oil and Gas

As described above, Oregon is a pioneering locality for oil and gas. While there has been a continuous interest in petroleum in eastern Oregon and leases for oil and gas are issued, the interest has declined in recent years for the reasons also listed above. **Table 3-42**, Federal Oil and Gas Acreage Leased by Year, represents lease acreage sales per year in Oregon. However, many of the leases have been relinquished. As of May 17, 2013, there were 125 oil and gas leases encompassing 204,691 acres of federal mineral estate (these numbers account for the number of leases that have been relinquished) (Oregon/Washington BLM 2013). While leases have been issued for oil and gas, there have been no wells developed on these leases.

As shown in **Table 3-42**, Oregon realized a drastic increase in natural gas interest in 2006 (182 leases issued). The previous year, 2005, experienced peaks of natural gas value, reaching $10.33 per thousand cubic feet at wellhead in October, with maintained values above $9.00 for the subsequent months (EIA 2013). This increase in value was from a previous low of $5.30 per thousand the year before. This increase in value would make leasing for exploration viable in areas not yet proven, such as both eastern and western Oregon. As such, there was a drastic increase in industry lease nominations, resulting in offerings the following year (2006). The time delay was due to required process needed in RMP and NEPA evaluation of areas. Lease interest was not maintained, as 2006 saw a steady decrease in wellhead values, with October 2006 having a national

Table 3-42
Federal Oil and Gas Acreage Leased by Year

Year	Number of New Leases	Acres Leased	Year	Number of New Leases	Acres Leased
1996	10	28,418	2007	3	4,335
1997	1	80	2008	5	14,357
1998	4	3,593	2009	6	7,733
1999	4	15,043	2010	0	0
2000	1	160	2011	0	0
2001	4	4,112	2012	0	0
2002	7	5,166	2013	0	0
2003	0	0	Total	229	358,313
2004	0	0			
2005	2	1,794			
2006	182	273,522	*Average Acres:*		*21,077*

Source: BLM 2013c

value of $5.09 per thousand. Not only was there a drop in lease nominations, reflected in the 2007 numbers, but many leases purchased in 2006 have been relinquished. An increase in wellhead values for natural gas may once again result in an increase of interest and lease nominations to explore potential natural gas resources.

Table 3-43, Fluid Mineral Leasing in the Decision Area, illustrates the total acreage of the federal mineral estate closed to leasing, open to leasing subject to standard terms and conditions (i.e., not subject to additional stipulations), and open to leasing subject to stipulations (NSO, CSU, and TL).

There are approximately 3,134,159 acres of federal mineral estate closed to leasing within the decision area, of which 1,150,259 acres and 1,577,983 acres are within PPH and PGH, respectively. About 8,513,880 acres of federal mineral estate (2,639,007 acres of which is split-estate) are open to leasing subject to standard terms and conditions. This includes 2,428,521 acres in PPH (of which 209,824 acres are split-estate) and 2,549,563 acres in PGH (of which 69,826 acres are split-estate). The aforementioned lands are not subject to stipulations (e.g., NSO, CSU, and TL). There are an additional 905,983 acres of federal mineral estate open to leasing subject to NSO stipulations and 2,703,012 acres of federal mineral estate open to leasing subject to CSU and TL stipulations.

Geothermal Leasing

As illustrated in **Table 3-43**, approximately 8,513,880 acres of federal mineral estate in the decision area are managed as open to leasing, including 2,639,007 acres of split-estate. Approximately 3,134,159 acres of federal mineral estate comprised entirely of BLM-administered surface lands are closed to leasing. The

Table 3-43
Fluid Mineral Leasing in the Decision Area

Leasing Categories	Decision Area	PPH	PGH	Other Areas[1]
Closed to fluid mineral leasing (Total Federal Mineral Estate)	3,134,159	1,150,259	1,577,983	405,918
Leased				
Closed to leasing—BLM surface/federal minerals	0	0	0	0
Closed to leasing—Private or State surface/federal minerals	0	0	0	0
Unleased				
Closed to leasing—BLM surface/federal minerals	3,134,159	1,150,259	1,577,983	405,918
Closed to leasing—Private or State surface/federal minerals	0	0	0	0
Open to leasing subject to standard terms and conditions (i.e., not subject to NSO, CSU, or TL stipulations) (Total Federal Mineral Estate)	8,513,880	2,428,521	2,549,563	3,535,796
Leased				
Open to leasing subject to standard terms and conditions (i.e., not subject to NSO, CSU, or TL stipulations)—BLM surface/federal minerals	56,425	7,131	17,863	31,431
Open to leasing subject to standard terms and conditions (i.e., not subject to NSO, CSU, or TL stipulations)—Private or State surface/federal minerals	0	0	0	0
Unleased				
Open to leasing subject to standard terms and conditions (i.e., not subject to NSO, CSU, or TL stipulations)—BLM surface/federal minerals	5,818,448	2,211,566	2,461,874	1,145,008
Open to leasing subject to standard terms and conditions (i.e., not subject to NSO, CSU, or TL stipulations)—Private or State surface/federal minerals	2,639,007	209,824	69,826	2,359,357
Open to leasing subject to No Surface Occupancy (NSO) (Total Federal Mineral Estate)	905,983	305,238	405,932	194,813
Leased				
Open to leasing subject to No Surface Occupancy (NSO)—BLM surface/federal minerals	10,660	142	62	10,456
Open to leasing subject to No Surface Occupancy (NSO)— Private or State surface/federal minerals	0	0	0	0

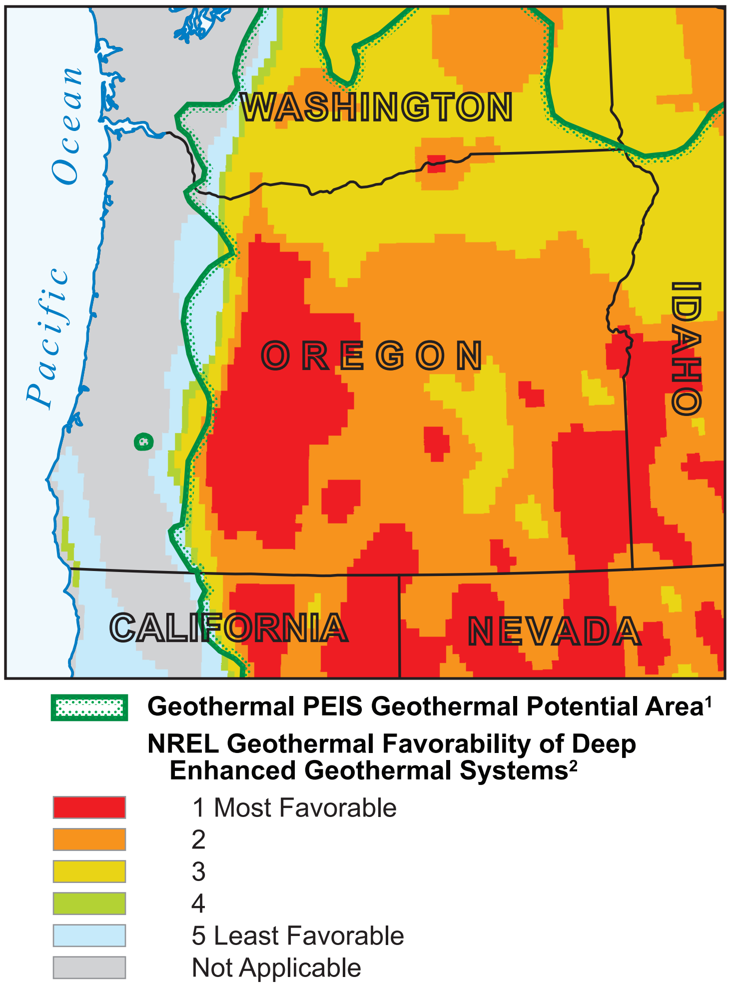
Table 3-43
Fluid Mineral Leasing in the Decision Area

Leasing Categories	Decision Area	PPH	PGH	Other Areas[1]
Unleased				
Open to leasing subject to No Surface Occupancy (NSO)—BLM surface/federal minerals	895,323	305,096	405,870	184,357
Open to leasing subject to No Surface Occupancy (NSO)— Private or State surface/federal minerals	0	0	0	0
Open to leasing subject to Controlled Surface Use (CSU/TL) (Total Federal Mineral Estate)	2,703,012	872,849	1,198,980	631,183
Leased				
Open to leasing subject to Controlled Surface Use (CSU/TL)—BLM surface/federal minerals	142,708	5,283	50,700	86,725
Open to leasing subject to Controlled Surface Use (CSU/TL)— Private or State surface/federal minerals	0	0	0	0
Unleased				
Open to leasing subject to Controlled Surface Use (CSU/TL)—BLM surface/federal minerals	2,560,304	867,566	1,148,280	544,458
Open to leasing subject to Controlled Surface Use (CSU/TL)— Private or State surface/federal minerals	0	0	0	0
Total Federal Mineral Estate	**15,257,034**	**4,756,867**	**5,732,458**	**4,767,710**

Source: Oregon/Washington BLM 2013
[1]Other Areas are defined as areas outside of PPH and PGH that contribute to the acreage within the sage-grouse planning area.

2008 Geothermal Programmatic EIS (BLM and Forest Service 2008) identifies the majority of the planning area as having potential for geothermal resource (see **Figure 3-8**, Geothermal Energy Potential). While under explored, interest and study of the potential resource is being completed by governmental, academic, and private entities.

Similar to oil and gas resources described above, while there is geothermal interest and lease activity, no geothermal wells have yet been developed on BLM-administered lands in the planning area. However, BLM issued a Finding of No Significant Impact in July 2013 to permit geothermal exploration and production wells on BLM-administered lands. All of the approved wells will be in Lake County, but the project will include some lands in Harney County as well.



[1] *Idaho National Engineering and Environmental Laboratory, 2003*

[2] *Southern Methodist University Geothermal Laboratory, Blackwell & Richards, 2009 and National Renewable Energy Laboratory, 2009*

Figure 3-8: Geothermal Energy Potential

The potential for development of the geothermal resource is realized from two critical factors, the diversified geology of Oregon and developing technical advances of geothermal production. Central and Eastern Oregon geology is young in the perspective of geologic time. The entire area is influenced by both recent volcanism and tectonic extension. The young age of the Cascade caldera systems and the Western Volcanoes provide for shallow high temperature dry and wet geothermal resources (Orr et al. 1992). Small-scale private entities have used these resources for energy and recreation, ranging from home heating systems to utilizing surface hot springs.

Related to the caldera systems and extending into the planning area is the tectonic extension system of southern Central and Eastern Oregon. This extension province is the northwestern extent of the "Basin and Range" Province of Nevada and California. The earth's crust is thinning, being stretched by rotation, movement, and interaction of the tectonic plates in this area. This results in a "horst and grabben" structure, with uplifted and subsided blocks creating basins and mountain ranges. The net result of this extension and thinning of the crust is a very steep thermal gradient allowing for economic resource at shallow depths. The northern and northeastern portion of the state may have some influence from both the Cascade caldera and extension systems. However, it is capped by the recent volcanisms of the Columbia River Basalt. These consist of flood basalt flows up to multi-thousands of feet thick. While they are old enough that they may not have the shallow thermal gradient signatures of the extension and Cascade caldera systems, they maintain thermal prospects, much of which has not yet been explored.

The second factor that is increasing potential for geothermal development is the rapid advancement of technology. While at one time a dry hole (a prospect with heat but not fluid) was not commercially economical, new technologies such as Enhanced Geothermal Systems are providing a venue to not only make dry holes productive but also allow economic development of moderate and low-grade temperature gradients. The economics of developing Oregon's geothermal potential is becoming increasingly favorable.

3.11.2 Trends

A reasonably foreseeable development scenario was not completed for this exercise. All future-looking estimates are based on broad scaled "trends" review, which is an opinion as opposed to a methodological approach. The exception is a national-scale reasonably foreseeable development scenario completed for the 2008 Geothermal PEIS.

Oil and Gas

The planning area contains possible and potential leasable fluid minerals that include oil, gas, and geothermal resources. However, as described above, Oregon is considered a pioneering area. As was realized in 2006, focused exploration and development is sluggish in the pioneering areas until such time that economics increase, or supply decreases, to make exploration and development warranted. The current decline in oil and gas leases is expected to continue in the near future.

Geothermal Leasing

The main long-term trend that is expected to influence geothermal energy development within the planning area is the ongoing national rapid expansion of renewable energy development and the possible future trend toward locally produced renewable energy.

While there has been a recent decline in oil and gas leasing and exploration on public and private lands, there has been a marked increase in geothermal interest, including the development of a producing geothermal facility on private land in Eastern Oregon. It is expected that the development of Enhanced Geothermal Systems will increase the potential return from dry geothermal systems as well as lower temperature systems. Geothermal exploration for commercial production is expected on lands within the planning area over the next 10 to 15 years.

3.12 LOCATABLE MINERALS

3.12.1 Existing Conditions

Locatable minerals in the planning area include, but are not limited to borax, gold, silver, lead-silver-zinc, dimension stone, copper, mercury, limestone, zeolites, diatomaceous earth, uranium, kaolinite, perlite, and gemstones-sunstone. Claim documentation also lists iron, arsenic, and bentonite. Other locatable minerals that would require a common/uncommon variety review or are considered a "recreational" mineral include jasper, oolites, opal, geodes (thunder eggs), granite, and agate.

Mineral exploration and the development of locatable mineral deposits are allowed under the General Mining Law of 1872 on all BLM-administered lands, unless they are withdrawn from mineral entry by a prior Secretarial Public Land Order or an act of Congress. Subject to valid existing rights, these areas are withdrawn from further location of mining claims or sites. To restrict locatable mineral development, the BLM must petition the Secretary of the Interior for withdrawal actions, with subsequent valid existing rights reviews for existing claims.

Acreage in this section refers to the federal mineral estate. The federal mineral estate includes BLM-administered federal minerals that occur beneath surface estate managed by the BLM, as well as beneath surface estate within state or private jurisdiction (known as split-estate lands). The total federal mineral estate within the planning area is 15,257,035 acres (12,618,028 acres BLM-administered surface land and 2,639,007 acres private, state, or other federal surface with federal minerals).

Minerals data was compiled in a BER produced by the USGS and BLM (Manier et al. 2013) (**Appendix O**, Mineral Resources from Baseline Environmental Report). This report provides estimated acreages by surface management agency and their occurrence within PGH and PPH in the planning area by management zone. Discrepancies between BER data and data found in this section exist due to data keeping and mapping differences. As such, data found in the BER will only serve as the baseline for Chapter 5 (Cumulative Impacts), because these are the best available data covering the entire GRSG range. However, because localized data are available at a finer scale for the Oregon sub-region, the BER data will not be incorporated into the Chapter 4 (Environmental Consequences) analysis.

Conditions of the Planning Area

Table 3-44, Locatable Minerals in the Decision Area, illustrates the total acreage of the federal mineral withdrawn from locatable mineral entry, petitioned for withdrawal from locatable mineral entry, and open to locatable mineral exploration or development.

Table 3-44
Locatable Minerals in the Decision Area

	Decision Area	PPH	PGH	Other Areas[1]
Withdrawn from locatable mineral entry (Total Federal Mineral Estate)	996,760	254,777	562,489	179,493
Withdrawn from locatable mineral entry —BLM surface/federal minerals	996,760	254,777	562,489	179,493
Withdrawn from locatable mineral entry —Private or State surface/federal minerals	0	0	0	0
Petitioned for withdrawal from locatable mineral entry (Total Federal Mineral Estate)	20,453	12,835	7,616	3
Petition for withdrawal from locatable mineral entry —BLM surface/federal minerals	20,453	12,835	7,616	3
Petition for withdrawal from locatable mineral entry —Private or State surface/federal minerals	0	0	0	0
Open to locatable mineral exploration or development (Total Federal Mineral Estate)	14,239,821	4,489,255	5,162,353	4,588,213
Open to locatable mineral exploration or development —BLM surface/federal minerals	10,618,667	3,932,357	4,684,771	2,001,539

Table 3-44
Locatable Minerals in the Decision Area

	Decision Area	PPH	PGH	Other Areas[1]
Open to locatable mineral exploration or development — Private or State surface/federal minerals	2,639,007	209,824	69,826	2,359,357
Wilderness Study Area/No Reclamation/Other[2]	982,147	347,074	407,756	227,317
Total Federal Mineral Estate	**15,257,034**	**4,756,867**	**5,732,458**	**4,767,710**

Source: Oregon/Washington BLM 2013
[1]Other Areas are defined as areas outside of PPH and PGH that contribute to the acreage within the sage-grouse planning area.
[2] Developing locatable minerals in these areas would require a Plan of Operations according to 43 CFR 3802 and 43 CFR 3809.11.

Approximately 996,760 acres of the total federal mineral estate for locatable minerals are withdrawn to the location of mining claims. An additional 20,453 acres have been identified to be petitioned for withdrawal from the Secretary of the Interior. A total of 14,239,821 acres of the federal mineral estate (including 2,639,007 acres of split-estate) for locatable minerals are open to locatable mineral exploration and development.

Table 3-45, Locatable Minerals Claims, Plans of Operations, and Notices, illustrates the number and acres of claims, plans of operation, and notices on BLM-administered surface lands in the planning area. As of March 22, 2013, there are 671 mining claims encompassing approximately 94,441 acres within PPH and PGH. Of that, 50,597 acres are within PPH and 43,843 acres are within PGH. There are 128 notices covering approximately 18,552 acres, and 136 approved plans of operation, covering 29,394 acres. There is one plan of operation (encompassing 40 acres) not yet approved within PGH; no plans of operations are within PPH (Oregon/Washington BLM 2013). For mineral activities such as Casual Use and Plans of Operations, see 43 CFR 3809.

All locatable minerals have potential to exist within the planning area but exploration efforts have been minimal so potential is unknown. Mineral Potential Reports completed for past RMP efforts are out of date because new technologies, techniques, and developments could make what was once identified as low potential now high.

There is locatable mineral exploration and production occurring through central Oregon. In BLM-administered areas managed as open to locatable mineral exploration and development, minerals of commercial interest include diatomaceous earth, limestone, perlite, sunstone, bentonite, and gold:

Table 3-45
Locatable Minerals Claims, Plans of Operations, and Notices

	Planning Area	PPH	PGH	Total PPH/PGH	Other Areas[1]
Mining Claims	1,544 *(252,607 acres)*	293 *(50,597 acres)*	378 *(43,844 acres)*	671 *(94,441 acres)*	873 *(158,159 acres)*
Notices	215 *(47,709 acres)*	65 *(9,545 acres)*	63 *(9,007 acres)*	*128 (18,552 acres)*	87 *(10,605 acres)*
Plans of Operation – Approved	186 *(37,447 acres)*	45 *(7,442 acres)*	91 *(21,952 acres)*	*136 (29,394 acres)*	50 *(8,054 acres)*
Plans of Operation – Not Yet Approved	26 *(2,193 acres)*	0 *(0 acres)*	1 *(40 acres)*	*1 (40 acres)*	25 *(2,153 acres)*

Source: Oregon/Washington BLM 2013

- Diatomaceous earth mines are operating and expanding within the Burns and Vale Districts.
- One limestone mine is operating in the Baker Resource Area.
- Perlite and sunstone are being mined in the Lakeview District.
- Bentonite is being mined in Prineville District, with historic interest in other districts.
- Placer gold mines are operating and expanding in all of the districts.

3.12.2 Trends

A Mineral Potential Report was not completed for this RMPA/EIS. All estimates are based on broad scaled "trends" review, which is an opinion as opposed to a methodological approach.

There is potential for economic development of locatable minerals. The planning area consists of geology preferential to the formation of precious and semi-precious locatable minerals, as well as uncommon variety. However the area is under-utilized and under-analyzed.

Trends for development are based on economic value and exploration. Increasing precious metal and industrial mineral values will increase interest in location (filing of claims), exploration (filing of Notices), and development (filing of plans of operation). As initial projects, it can be anticipated that additional resources will be found, and original prospect boundaries will likely be increased, as with future expansion of current diatomaceous earth projects.

Notices and plan of operations are expected to increase, based on price of precious metals and industrial minerals. This is based on past increase of Notices and plan of operations submittals compared to increasing gold values and depressed economic conditions. There are no indications of changes in any of the variables, therefore, claims, notices, and plan of operations are expected to increase as new discoveries are realized.

Given the increasing value and scarcity of minerals, it is expected the claim acreage is to remain the same or increase in the foreseeable future, depending on resource prices and regulatory fees.

3.13 Mineral Materials

3.13.1 Existing Conditions

Mineral materials in the planning area include, but are not limited to, common varieties of construction materials and aggregates such as sand, gravel, cinders, roadbed, landscape boulders, decorative rock, dimension stone, and ballast material.

Mineral materials are sold or permitted under the Mineral Materials Sale Act of 1947 and Federal Aid Highway Act of 1921. Mineral materials are sold at a fair market value or through free use permits to governmental agencies. Local government agencies and non-profit organizations may obtain these materials free of cost for community purposes. County and state road construction divisions obtain rock for road surfacing material and are significant users of gravel and sand resources.

Sand, gravel, and crushed rock used as construction aggregates are an extremely important resource. The extraction of the resource, which is necessary for that infrastructure development, varies directly with the amount and kind of development (road building and maintenance and urban development) nearby. More than for other resources, however, the proximity of both transportation and markets are key elements in the development of a deposit.

Acreage in this section refers to the federal mineral estate. The federal mineral estate includes BLM-administered federal minerals that occur beneath surface estate managed by the BLM, as well as beneath surface estate within state or private jurisdiction (known as split-estate lands). The total federal mineral estate within the planning area is 15,257,035 acres (12,618,028 acres BLM-administered surface land and 2,639,007 acres private, state, or other federal surface with federal minerals).

Minerals data was compiled in a BER produced by the USGS and BLM (Manier et al. 2013) (**Appendix O**, Mineral Resources from Baseline Environmental Report). This report provides estimated acreages by surface management agency and their occurrence within PGH and PPH in the planning area by management zone. Discrepancies between BER data and data found in this section exist due to data keeping and mapping differences. As such, data found in the BER will only serve as the baseline for Chapter 5 (Cumulative Impacts), because these are the best available data covering the entire GRSG range.

However, because localized data are available at a finer scale for the Oregon sub-region, the BER data will not be incorporated into the Chapter 4 (Environmental Consequences) analysis.

Conditions of the Planning Area

Nearly all BLM-administered land in the planning area has some potential for production of mineral materials. These include clay, cinders, sand and gravel, crushable rock, and common variety facing stone. Most of the planning area has a moderate to high potential for the occurrence of mineral materials.

Demand for mineral materials typically exists near population centers and along major roadways. For example, population growth in central Oregon has led to an increasing need for mineral materials to build and maintain roads and highways. Aggregate is used in concrete and is the base used for most structures and building projects. Mineral materials are also used for bridges and other infrastructure projects, including the development of renewable energy systems.

Approximately 2,091,631 acres of federal mineral estate are closed to mineral material disposal (**Table 3-46**, Mineral Materials in the Decision Area). An additional 660,903 acres of federal mineral estate are subject to an NSO stipulation. Disposition of mineral materials requires surface mining, so NSO stipulations applied to actions associated with mining mineral material would effectively close these areas to mineral mining unless an exception was granted. Mineral development could occur on the remaining 11,665,024 acres of federal mineral estate open but not subject to stipulations (comprised of 9,026,017 acres of BLM-administered surface lands and 2,639,007 acres of split-estate), and 839,476 acres of BLM-administered surface lands open and subject to CSU/TL stipulations.

3.13.2 Trends

A mineral potential report was not completed for this RMPA/EIS. All estimates are based on broad scaled "trends" review, which is an opinion as opposed to a methodological approach.

Future demand for mineral materials will vary depending upon market conditions, which differ according to economic conditions and construction activity. The BLM expects that, as the current recession ends and demand for renewable energy projects increases, construction activity will increase and economic conditions will improve, resulting in an increased demand for construction materials including gravel from areas within the sage-grouse planning area. The BLM and county road departments routinely extract rock for aggregate and rip-rap for road construction and repairs, and sand and gravel for road maintenance; this use is reasonably consistent. Additionally, it is expected that local governments and private construction firms may increasingly look to BLM-administered lands for aggregate sources during the life of this plan, which

Table 3-46
Mineral Materials in the Decision Area

	Decision Area	PPH	PGH	Other Areas[1]
Closed to mineral material disposal (Total Federal Mineral Estate)	2,091,631	646,426	998,197	447,009
Closed to mineral material disposal —BLM surface/federal minerals	2,091,631	646,426	998,197	447,009
Closed to mineral material disposal —Private or State surface/federal minerals	0	0	0	0
Open for consideration of mineral materials disposal (not subject to stipulations) (Total Federal Mineral Estate)	11,665,024	3,699,557	4,029,299	3,936,168
Open for consideration of mineral material disposal —BLM surface/federal minerals	9,026,017	3,489,733	3,959,473	1,576,811
Open for consideration of mineral material disposal —Private or State surface/federal minerals	2,639,007	209,824	69,826	2,359,357
Open for consideration of mineral material disposal subject to NSO stipulations (de facto closure) (Total Federal Mineral Estate)	660,903	279,680	311,722	69,501
NSO Stipulations (de facto closure) —BLM surface/federal minerals	660,903	279,680	311,722	69,501
NSO Stipulations (de facto closure)—Private or State surface/federal minerals	0	0	0	0
Open for consideration of mineral material disposal subject to CSU/TL stipulations (Total Federal Mineral Estate)	839,476	131,204	393,240	315,032
CSU/TL Stipulations—BLM surface/federal minerals	839,476	131,204	393,240	315,032
CSU/TL Stipulations—Private or State surface/federal minerals	0	0	0	0
Total Federal Mineral Estate	**15,257,034**	**4,756,867**	**5,732,458**	**4,767,710**

Source: Oregon/Washington BLM 2013
[1]Other areas are defined as areas outside of PPH and PGH that contribute to the acreage within the sage-grouse planning area.

would lead to new mineral authorizations for negotiated and non-negotiated sales, free use permits, community pits/common use areas, and authorizations under Title 23 of FHWA.

3.14 Nonenergy Leasable Minerals

3.14.1 Existing Conditions

Nonenergy solid leasable minerals in the planning area are undetermined, but may include sodium, potash, and other evaporate deposits. Nonenergy solid leasable minerals are governed by the Mineral Leasing Act of 1920, as amended, which authorized specific minerals to be disposed of through a leasing system. Nonenergy solid leasable minerals in the planning area include revested mineral estates (i.e., lands brought back to the BLM through purchase or donation).

Conditions of the Planning Area

Mineral Potential Reports are not completed for traditional nonenergy solid leasables or metals and minerals that are normally locatable or that can be considered nonenergy solid leasable minerals on certain acquired lands (e.g., BLM-administered land gained through purchase or donation). Coupled with the fact that there is currently no commercial interest in nonenergy solid leasables, this means that the potential is unknown.

3.14.2 Trends

Reasonably foreseeable development scenarios and Mineral Potential Reports were not completed for this RMPA/EIS. All estimates are based on broad scaled "trends" review, which is an opinion as opposed to a methodological approach.

The geologic condition provides only minor traditional nonenergy solid leasable mineral potentials. Therefore, economic occurrences are unlikely, and, as such, probable trends would be minimal development of traditional solid leasable minerals.

However, precious, semi-precious, and uncommon variety minerals contained within acquired lands may be considered leasable commodities (rather than locatable minerals). Trends for development of these leasable materials are the same as that identified for locatable minerals.

3.15 Special Designations

This section is a description of the special designation areas in the planning area and follows the order of topics addressed in Chapter 2:

- Wilderness Areas
- Wilderness Study Areas
- Cooperative Management and Protection Areas
- National Trails
- Areas of Critical Environmental Concern
- Wild and Scenic Rivers

The various special designation areas within GRSG habitat in the planning are shown in **Table 3-47**, Special Designations[1] within Greater Sage-Grouse Habitat in the Planning Area. These include BLM ACECs, USFWS National Wildlife Refuges, national conservation easements, National Park System units, BLM National Landscape Conservation System units, conservation areas on private and state land, and congressionally designated Wilderness areas.

Table 3-47
Special Designations[1] within Greater Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres[1]	Acres within PGH	Acres within PPH
BLM	IV	963,000	486,400	476,600
	V	1,460,800	881,800	579,000
Forest Service	IV	0	0	0
	V	0	0	0
Tribal and Other Federal	IV	23,000	14,800	8,200
	V	298,400	51,000	247,400
Private	IV	5,200	1,500	3,700
	V	19,200	13,200	6,000
State	IV	300	100	200
	V	100	0	100
Other	IV	0	0	0
	V	0	0	0

Source: Manier et al. 2013
[1]Includes BLM ACECs, USFWS National Wildlife Refuges, national conservation easements, National Park System units, BLM National Landscape Conservation System units, conservation areas on private and state land, and congressionally designated Wilderness areas.

3.15.1 Wilderness Areas

The FLPMA identifies wilderness values as part of the spectrum of public land resource values and uses to be considered in the BLM's planning, inventory, and management activities. A BLM Wilderness Area is an area of public lands that Congress has designated for the BLM to manage as a component of the National Wilderness Preservation System in accordance with the Wilderness Act of 1964.

Subject to valid existing rights and special provisions, the BLM administers Wilderness Areas within the National Wilderness Preservation System in accordance with the Wilderness Act of 1964; BLM Wilderness Regulations (43 CFR 6300); and BLM Manual Section 6340, Management of Designated Wilderness Areas (BLM 2012p); the specific directives of their enabling legislation (e.g., the Steens Mountain Cooperative Management and Protection Act, the Omnibus Public Lands Act of 2000); and Appendix A of the Committee on Interior and Insular Affairs of the House of Representatives accompanying H.R. 2570 of the 101st Congress (commonly called the Congressional Wilderness Grazing Guidelines). In addition, the BLM, USFWS, Forest Service, and National Park Service, have adopted use of the Minimum Requirements Decision Guide (Arthur Carhart National Wilderness Training Center 2011) for all project proposals within wilderness areas.

Existing Conditions

The BLM manages three Wilderness Areas consisting of approximately 200,400 acres within the planning area. Both wilderness areas contain GRSG habitat

(**Figure 3-9**, Special Designations in the Planning Area, and **Table 3-48**, Wilderness Areas in the Planning Area with PPH or PGH). The areas containing habitat are discussed in this section.

Table 3-48
Wilderness Areas in the Planning Area with PPH or PGH

Wilderness Area	District	Acres			
		Non-habitat	PGH	PPH	Total
Hells Canyon Wilderness	Vale	946	0	0	946
Oregon Badlands Wilderness	Prineville	28,153	1,032	0	29,185
Steens Mountain Wilderness	Burns	13,021	112,758	44,445	170,224
Total		42,120	113,790	44,445	200,355

Source: Oregon/Washington BLM 2013

Oregon Badlands Wilderness Area

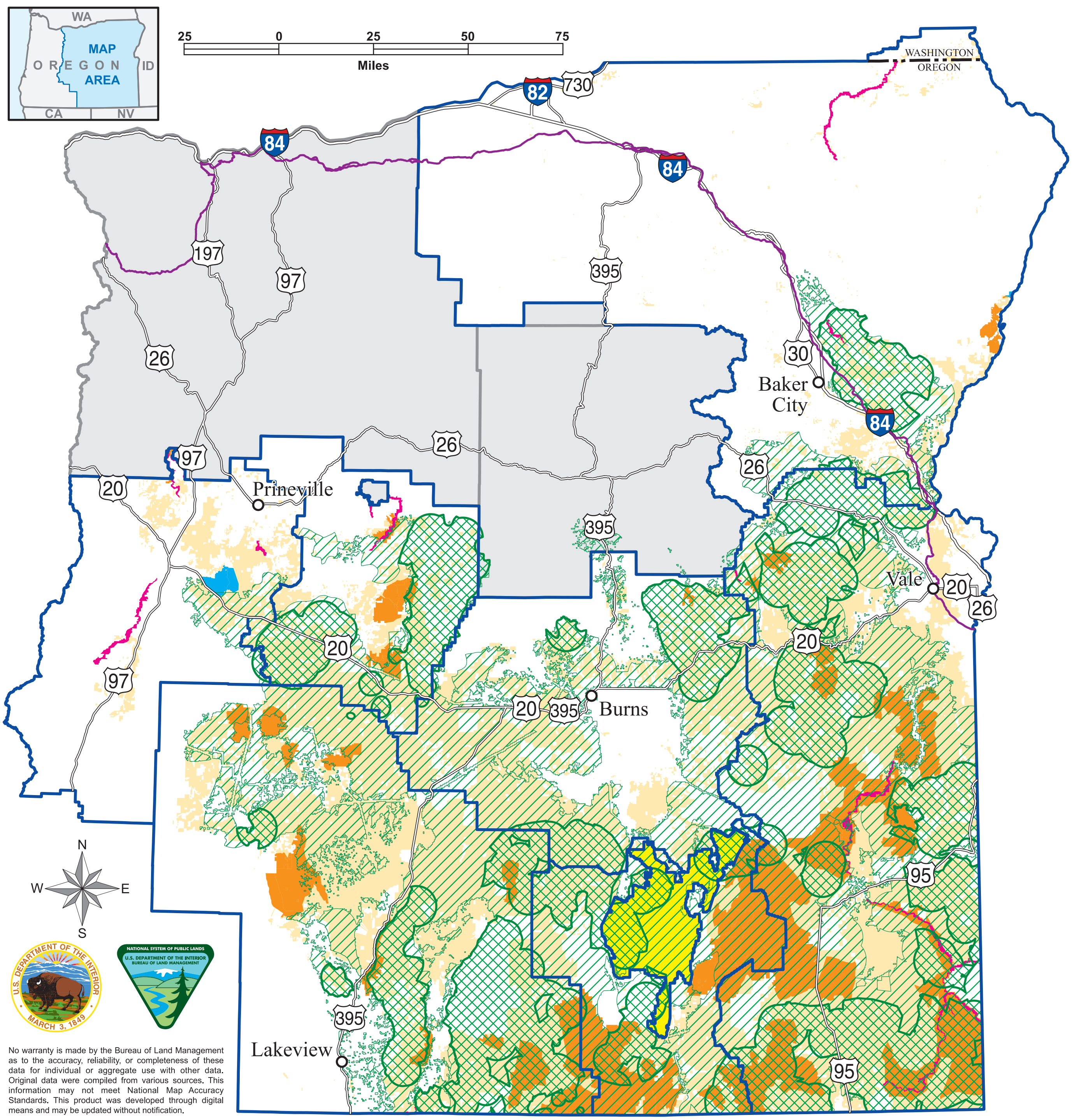
The Omnibus Public Land Management Act of 2009 established the Oregon Badlands Wilderness consisting of 29,185 acres of BLM-administered land. The Oregon Badlands Wilderness is located on terrain associated with a volcanic rootless shield (rootless lava shields are accumulations of lava flows fed from skylights above lava tubes; they are common features at basaltic shield volcanoes). The Oregon Badlands Wilderness contains mature juniper woodlands, unique geologic formations, and primitive recreation opportunities. Approximately 1,000 acres of the Oregon Badlands Wilderness include PGH. The remaining 28,200 acres do not include PPH or PGH.

Steens Mountain Wilderness Area

The Steens Mountain Cooperative Management and Protection Act (Public Law 106-399) established the Steens Mountain Wilderness consisting of approximately 170,200 acres of BLM-administered land. Within the Steens Mountain Wilderness is approximately 95,000 acres of the approximate 97,200-acre No Livestock Grazing Area, which was also designated by the Steens Act. The Steens Mountain Wilderness was the first congressionally designated livestock-free wilderness in the US. Some of the most unique attributes of the Steens Mountain Wilderness are the scenic vistas and spectacular geology. PPH exists within approximately 44,400 acres of the Steens Mountain Wilderness. PGH exists within approximately 112,800 acres of the Steens Mountain Wilderness. Approximately 13,021 acres of the Steens Mountain Wilderness do not fall within PPH or PGH.

Trends

The BLM will continue to manage Wilderness Areas in accordance to Congressional legislation as a component of the National Wilderness Preservation System in accordance with the Wilderness Act of 1964. The wilderness characteristics (untrammeled, natural, undeveloped, outstanding



Legend

- BLM Office
- GRSG RMP Boundary
- Non-GRSG RMP Area

Greater Sage-Grouse Habitat

- Preliminary Priority Habitat
- Preliminary General Habitat

Special Designations

- Oregon National Historic Trail
- Wild and Scenic River Corridor
- Wilderness
- Wilderness Study Area
- Steens Mountain Cooperative Management and Protection Area*
- Other BLM Administered Land

** The Steens CMPA contains areas with additional designations as Wilderness, Wilderness Study Area, and Wild and Scenic River Corridor*

Figure 3-9: Special Designations in the Planning Area

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opportunities for solitude or primitive and unconfined recreation, and unique or supplemental values) within Wilderness Areas would continue.

3.15.2 Wilderness Study Areas

The FLPMA referenced and incorporated the goals and criteria of the Wilderness Act of 1964. As a consequence, the BLM was mandated in 1976 to review public land for possible wilderness designation and to offer recommendations by October 21, 1991, through the Secretary of the Interior, to the President. In November 1980, as part of this review, the BLM in Oregon designated more than 80 Wilderness Study Areas (WSAs). A WSA is a parcel of public land determined through intensive inventories to possess certain characteristics described in the Wilderness Act. Only Congress can ultimately decide which areas, if any, would be designated as Wilderness and added to the National Wilderness Preservation System. Until Congress acts on the recommendations, and either designates them as Wilderness or releases them for other uses, these areas are managed according to BLM Manual 6330, Management of Wilderness Study Areas (BLM 2012c) to preserve their wilderness values. Activities that would impair wilderness suitability are prohibited in WSAs. This nonimpairment standard applies to all uses and activities, except those specifically exempted, as described in BLM Manual 6330, Management of Wilderness Study Areas (BLM 2012c).

Existing Conditions

There are 74 WSAs encompassing over 2.5 million acres in the planning area (**Figure 3-9**, Special Designations in the Planning Area, and **Table 3-49**, Wilderness Study Areas in the Planning Area with PPH or PGH), of which 68 (2,478,200 acres) include PPH and/or PGH. Of these 68 WSAs, approximately 993,800 acres (40 percent) include PPH, and approximately 1,202,900 acres (49 percent) include PGH, for a total of 2,196,700 acres (89 percent) of PPH and PGH.

The remaining six WSAs do not contain PPH or PGH. Therefore, these WSAs are not considered in detail.

Trends

The BLM will continue to manage WSAs in a manner that would not impair the suitability of the area for preservation as wilderness, and to prevent unnecessary or undue degradation. Beyond the exceptions described in BLM Manual 6330, Management of Wilderness Study Areas (BLM 2012c), permitted activities in WSAs are temporary uses that create no new surface disturbance. Thus, the trend for WSAs is the continuing presence of their suitability for preservation as wilderness.

Table 3-49
Wilderness Study Areas in the Planning Area with PPH or PGH

Name	District	Acres		
		Non-habitat	PGH	PPH
Abert Rim	Lakeview	8,513	3,627	12,952
Alvord Desert	Burns/Vale	31,816	204,586	0
Basque Hills	Burns/Lakeview	4,120	81,440	54,755
Beaver Dam Creek	Vale	0	1,103	17,996
Blitzen River	Burns	1	2,045	29,879
Blue Canyon	Vale	173	8,103	4,254
Bowden Hills	Vale	0	59,066	0
Bridge Creek	Burns	0	0	14,326
Camp Creek	Vale	0	0	19,894
Castle Rock	Vale	0	3,367	2,797
Cedar Mountain	Vale	0	31,561	1,897
Clarks Butte	Vale	2,144	19,805	9,385
Cottonwood Creek	Vale	0	0	8,115
Cougar Well	Prineville	4,268	8,967	6,111
Devils Garden Lava Bed	Lakeview	12,742	15,424	0
Diablo Mountain	Lakeview	101,885	16,792	0
Disaster Peak	Burns/Vale	0	0	17,386
Dry Creek	Vale	0	18,441	4,920
Dry Creek Buttes	Vale	5,061	46,264	0
East Alvord	Burns	0	22,153	0
Fifteenmile Creek	Vale	0	268	50,115
Fish Creek Rim	Lakeview	4,377	3,255	11,497
Four Craters Lava Bed	Lakeview	5,782	6,691	0
Gold Creek	Vale	97	424	12,889
Guano Creek	Lakeview	0	0	10,552
Hampton Butte	Prineville	6,847	3,098	303
Hawk Mountain	Burns/Lakeview	275	54,475	15,009
Heath Lake	Burns	1	5,515	15,695
High Steens	Burns	318	13,781	0
Home Creek	Burns	0	1,178	0
Honeycombs	Vale	1,960	36,842	0
Jordan Craters	Vale	15,861	5,115	6,793
Lookout Butte	Vale	1	7,769	58,479
Lost Forest Instant Study Area	Lakeview	428	7,653	0
Lower Owyhee Canyon	Vale	12,277	49,384	3,956
Lower Stonehouse	Burns	2,358	4,902	205
Mahogany Ridge	Burns/Vale	0	545	26,847
Malheur River-Bluebucket	Burns	0	0	5,550
North Fork	Prineville	7,469	3,917	0
Oregon Canyon	Vale	0	21,808	20,291
Orejana Canyon	Lakeview	0	2,558	21,590
Owyhee Breaks	Vale	0	10,072	1,724
Owyhee River Canyon	Vale	345	40,660	130,735

Table 3-49
Wilderness Study Areas in the Planning Area with PPH or PGH

Name	District	Acres		
		Non-habitat	PGH	PPH
Palomino Hills	Vale	5	50,786	3,521
Pueblo Mountains	Burns	2,335	58,821	12,302
Red Mountain	Burns	0	3,113	12,578
Rincon	Burns/Lakeview	0	52,496	56,049
Saddle Butte	Vale	3,531	40,116	42,253
Sage Hen Hills	Lakeview	48	5,003	2,924
Sand Dunes	Lakeview	13,510	1,988	0
Sand Dunes WSA/Lost Forest Instant Study Area	Lakeview	109	854	0
Sheepshead Mountains	Burns/Vale	28	22,101	30,713
Slocum Creek	Vale	99	6,668	768
South Fork Donner Und Blitzen	Burns	29	10,521	17,440
South Fork	Prineville	13,365	1,618	5,345
Spaulding	Lakeview	0	475	67,854
Sperry Creek	Vale	0	2,324	2,982
Squaw Ridge Lava Bed	Lakeview	17,841	10,831	0
Stonehouse	Burns	3	417	22,360
Table Mountain	Burns/Vale	0	39,884	187
Twelvemile Creek	Vale	0	0	28,142
Upper Leslie Gulch	Vale	0	2,812	101
Upper West Little Owyhee	Vale	0	0	61,536
West Peak	Burns	0	8,597	0
Wild Horse Basin	Vale	1,477	10,505	0
Wildcat Canyon	Burns/Vale	0	34,767	0
Willow Creek	Burns/Vale	0	0	29,869
Winter Range	Burns	0	15,510	0
Total		**281,499**	**1,202,861**	**993,821**

Source: Oregon/Washington BLM 2013

3.15.3 Cooperative Management and Protection Areas

The Steens Mountain Cooperative Management and Protection Act (Public Law 106-399) established the Steens Mountain Cooperative Management and Protection Area encompassing approximately 428,200 acres of BLM-administered land in the BLM Burns District. The area offers diverse scenic and recreational experiences. It encompasses a landscape with deep glacier-carved gorges, stunning scenery, wilderness, wild rivers, and a rich diversity of plant and animal species. The Steens Mountain Cooperative Management and Protection Area (428,200 acres) is entirely within the Burns District and entirely within the planning area. The BLM manages the Steens Mountain Cooperative Management and Protection Area in accordance with the direction provided in BLM Manual 6220, National Monuments, National Conservation Areas, and Similar Designations (BLM 2012t).

3.15.4 National Trails

The Oregon National Historic Trail is a 2,000-mile historic east-west large-wheeled wagon route and emigrant trail that connected the Missouri River to valleys in Oregon. A total of 279 miles of the trail occur in the planning area, 28 miles of which traverse BLM-administered lands. Of the 28 miles on BLM-administered land, 4 miles are in PPH, 1 mile is in PGH, and 23 miles are in non-habitat.

The BLM manages National Historic Trail resources, qualities, values, and associated settings, and the primary use or uses in accordance with the direction provided in BLM Manual 6280, Management of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation (BLM 2012s).

3.15.5 Areas of Critical Environmental Concern

Areas of Critical Environmental Concern (ACECs) are defined in the FLPMA, 43 USC 1702(a), and 43 CFR 1601.0-5(a) as "areas within the public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish, wildlife and botanical resources or other natural systems or processes, or to protect life and safety from natural hazards." The intent of Congress in mandating the designation of ACECs was to give priority to the designation and protection of areas containing unique and significant resource values. ACECs, including Research Natural Areas (RNA) and Outstanding Natural Areas, are areas on BLM-administered lands where special management attention is required to protect or to prevent irreparable damage to relevant values. These values identified in the ACEC nomination process must meet a set of importance criteria (BLM 1988). The value, resource, process or natural system, or hazard present must have one of more of the following:

- More than locally significant qualities which give it special worth, consequence, meaning, distinctiveness, or cause for concern
- Qualities or circumstances that that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change
- Recognition as warranting protection in order to satisfy national priority concerns or to carry out mandates of FLPMA
- Qualities that warrant highlighting in order to satisfy public or management concerns about safety and public welfare
- Qualities that pose a significant threat to human life and safety or to property

An ACEC must also require special management attention to protect the identified relevant and important values. Special management attention refers to management prescriptions that are developed during preparation of an RMP or

RMP amendment expressly to protect relevant and important values of an area from the potential effects of actions permitted by the RMP. These are management measures that would not be necessary and prescribed if the critical and important features were not present (FLPMA 1976; BLM 1988).

RNAs are a unique type of ACEC created to preserve examples of all significant natural ecosystems for comparison with those influenced by man; provide educational and non-destructive research for ecological and environmental studies; and preserve gene pools of typical and endangered plants and animals. RNAs are areas that are part of a national network of reserved areas under various ownerships that contain important ecological and scientific values and are managed for minimum human disturbance. RNAs are intended to represent the full array of North American ecosystems with their biological communities, habitats, natural phenomena, and geological and hydrological formations. In RNAs, natural processes are allowed to predominate and are primarily used for non-manipulative research and baseline data gathering on relatively unaltered plant community types. Under certain circumstances, deliberate manipulation may be used to maintain the unique features for which the RNA was established. Because natural processes are allowed to dominate, RNAs also make excellent controls for similar communities that are being actively managed, and for long-term monitoring for climate change. In addition, RNAs provide an essential network of diverse habitat types that will be preserved in their natural state for future generations.

RNAs have important biological or physical attributes that are identified and designated in cooperation with the Pacific Northwest RNA Committee (Forest Service, BLM, and Washington and Oregon States) following the Oregon Natural Areas plan (Oregon Natural Heritage Advisory Council 2010). One of the guiding principles in management of RNAs is to prevent unnatural encroachments or activities that directly or indirectly modify ecological processes or conditions. Permitted activities that could impair scientific or education values of the RNAs (e.g., energy development, logging, road building, livestock grazing, and recreation use) are generally limited, restricted, or not allowed so to provide areas within the RNA that have intact ecological conditions and processes. These areas can be used for long-term baseline plant community monitoring; areas where few management activities have influenced the plant community for which the RNA was established. Management practices necessary to maintain or restore ecosystems can be allowed, and perhaps necessary to maintain the values, especially invasive weed control.

Existing Conditions

Within the planning area there are 92 ACECs on 715,000 acres. There are 76 ACECs and RNAs (83 percent) with some acres in PPH (200,400 acres, or 28 percent) or PGH (251,200 acres, or 35 percent); these ACECs with some acres in PPH or PGH are shown in **Table 3-50**, ACECs in the Planning Area with PGH or PPH. There are 16 ACECs that provide no GRSG habitat. Thirty

Table 3-50
ACECs in the Planning Area with PGH or PPH

ACEC	Type	District	Acres		
			Non-habitat	PGH	PPH
Abert Rim	ACEC	Lakeview	2,889	3,172	11,977
Alvord Desert	ACEC	Burns	2,244	19,383	0
Benjamin	RNA	Prineville	0	637	0
Big Alvord Creek	RNA	Burns	0	1,677	0
Biscuitroot	ACEC	Burns	0	911	5,613
Black Canyon	RNA	Vale	0	1,080	1,561
Black Hills	RNA	Lakeview	0	3,048	0
Borax Lake	ACEC	Burns	503	97	0
Castle Rock	ACEC	Vale	0	12,208	10,654
Coal Mine Basin	RNA	Vale	0	0	756
Connley Hills	RNA	Lakeview	2,238	1,362	0
Devils Garden Lava Beds	ACEC	Lakeview	12,803	15,440	0
Diamond Craters	ONA	Burns	14,187	2,847	0
Dry Creek Bench	RNA	Vale	0	0	1,637
Dry Creek Gorge	ACEC	Vale	0	12,209	3,833
Dry Mountain	RNA	Burns	1,113	1,017	0
East Fork Trout Creek	RNA	Burns	0	0	361
East Kiger Plateau	RNA	Burns	309	907	0
Fir Groves	ACEC	Burns		172	307
Fish Creek Rim	RNA	Lakeview	1,592	1,241	5,885
Foley Lake	RNA	Lakeview	0	0	2,228
Foster Flat	RNA	Burns	0	0	2,686
Guano Creek-Sink Lakes	RNA	Lakeview	0	0	11,185
Hammond Hill Sand Hills	RNA	Vale	0	3,716	0
Hawksie-Walksie	RNA	Lakeview	107	13,434	3,766
High Lakes	ACEC	Lakeview	0	0	38,942
Honeycombs	RNA	Vale	1,610	14,258	0
Horse Ridge	RNA	Prineville	0	609	0
Jordan Craters	RNA	Vale	16,039	5,452	9,868
Juniper Mountain	RNA	Lakeview	0	6,330	0
Keating Riparian	ACEC	Vale	320	682	1,172
Keating Riparian	RNA	Vale	0	0	51
Kiger Mustang	ACEC	Burns	1,525	26,288	27,776
Lake Abert	ACEC	Lakeview	47,304	1,764	980
Lake Ridge	RNA	Vale	0	0	3,860
Leslie Gulch	ACEC	Vale	177	11,505	0
Little Blitzen	RNA	Burns	0	2,255	0
Little Whitehorse Creek	RNA	Vale	0	0	61
Little Wildhorse Lake	RNA	Burns	0	241	0
Long Draw	RNA	Burns	0	441	0
Lost Forest	RNA	Lakeview	537	8,385	0

Table 3-50
ACECs in the Planning Area with PGH or PPH

ACEC	Type	District	Acres		
			Non-habitat	PGH	PPH
Lost Forest-Sand Dunes-Fossil Lake	ACEC	Lakeview	19,256	7,480	0
Mahogany Ridge	RNA	Vale	0	136	545
Mendi Gore Playa	RNA	Vale	0	149	0
Mickey Basin	RNA	Burns	0	560	0
Mickey Hot Springs	ACEC	Burns	0	42	0
North Fork Crooked River	ACEC	Prineville	5,884	784	0
North Fork Malhuer River	ACEC	Prineville/Vale	0	1,199	614
North Ridge Bully Creek	RNA	Vale	0	0	1,569
Oregon Trail	ACEC	Vale	433	264	1206
Oregon Trail, Birch Creek	ACEC	Vale	79	0	41
Oregon Trail, Tub Mountain	ACEC	Vale	5,765	0	145
Owyhee Below Dam	ACEC	Vale	6,262	4,748	0
Owyhee Views	ACEC	Vale	9,709	42,620	176
Palomino Playa	RNA	Vale	0	47	599
Powder River	ACEC	Vale	0	0	5,909
Pueblo Foothills	RNA	Burns	0	2,424	0
Rahilly-Gravelly	RNA	Lakeview	65	476	18,139
Red Knoll	ACEC	Lakeview	10	809	10,302
Rooster Comb	RNA	Burns	0	683	0
Saddle Butte	ACEC	Vale	55	1,725	5,316
Serrano Point	RNA	Burns	153	527	0
Silver Creek	RNA	Burns	541	1,393	0
South Bull Canyon	RNA	Vale	0	0	790
South Fork Crooked River	ACEC	Prineville	2,989	660	3
South Fork Willow Creek	RNA	Burns	0	186	0
South Ridge Bully Creek	RNA	Vale	0	0	621
Spanish Lake	RNA	Lakeview	162	566	3,978
Spring Mountain	RNA	Vale	0	0	996
Stockade Mountain	RNA	Vale	0	1,768	0
Table Rock	ACEC	Lakeview	399	4,740	0
Toppin Creek Butte	RNA	Vale	0	0	3,998
Tumtum Lake	RNA	Burns	1,151	539	0
Unity Reservoir Bald Eagle Nest	ACEC	Vale	347	9	0
Warner Wetlands	ACEC	Lakeview	48,034	3,888	0
Winter Roost	ACEC	Prineville	0	41	295
Total			**206,791**	**251,231**	**200,401**

Source: Oregon/Washington BLM 2013

ACECs and RNAs (33 percent of total ACECs) are primarily within PPH. There are 2 ACECs and 14 RNAs (16 percent of total ACECs) occupying 75,648 acres of GRSG habitat that are wholly within PPH. There are 11 ACECs in PPH or PGH that have active or recently occupied GRSG leks, namely Albert Rim ACEC, Devils Garden Lava Beds ACEC, Guano Creek-Sink Lakes RNA, High Lakes ACEC, Kiger Mustang ACEC, North Ridge Bully Creek RNA, Powder River ACEC, Rahilly-Gravelly RNA, Red Knoll ACEC, South Ridge Bully Creek RNA, and Toppin Creek Butte RNA. There are seven ACECs in PPH or PGH where the relevant and important values for which the ACEC was designated include GRSG: High Lakes ACEC, Lake Ridge RNA, North Ridge Bully Creek RNA, Rahilly-Gravelly RNA, Red Knoll ACEC, South Ridge Bully Creek RNA, and Toppin Creek Butte RNA. Although GRSG was a value for which only seven of the existing ACECs or RNAs in PPH or PGH were designated, many of them likely provide high-quality GRSG habitat and may contain GRSG leks. The RNAs that contain PPH could serve as future areas to provide baseline monitoring for sagebrush communities, and as areas to document the changes in the plant communities due to climate change without major influences from management activities.

Trends

Numerous ACECs and RNAs have value for the conservation of GRSG. Nearly 30 percent of the total acres fall within PPH and likely contain sagebrush habitats important for GRSG conservation, even though few (7 of 76) of these areas were specifically designated for GRSG as a value. The exact trends for ACECs and RNAs are mostly unknown. Little or no formal monitoring of the values for ACECs or the plant community cells for RNAs has occurred within the planning area. It is assumed that for ACECs, BLM actions do not detract from the values that the ACECs were designated for, and that these areas will be afforded protection following policy; therefore, it is assumed that the values are being maintained.

3.15.6 Wild and Scenic Rivers

Wild and scenic rivers are rivers or river sections designated by Congress under the authority of the Wild and Scenic Rivers Act of 1968 (Public Law 90-542, as amended; 16 USC 1271-1287) for the purpose of preserving rivers or river sections in their free-flowing condition, preserving water quality, and protecting outstandingly remarkable values (ORVs) and tentative classification. River segment ORVs are identified on a segment-specific basis and may include scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. The Wild and Scenic Rivers Act defines a river as "a flowing body of water or estuary or a section, portion, or tributary thereof, including rivers, creeks, runs, kills, rills, and small lakes." The Act also defines free-flowing as "existing or flowing in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway. The existence, however, of low dams, diversion works, and other minor structures at the time any river is proposed for inclusion ... shall not automatically bar its consideration for such inclusion." The ORVs listed in the Act are scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values.

Existing Conditions

Within the planning area there are 23 WSRs on approximately 75,300 acres of BLM-administered lands. Of these, approximately 22,600 acres (30 percent) fall within PPH, and approximately 38,500 acres (51 percent) fall within PGH (**Figure 3-9**, Special Designations in the Planning Area, and **Table 3-51**, Wild and Scenic Rivers in the Planning Area with PPH or PGH). The Donner und Blitzen, Kiger Creek, and Wildhorse WSR corridors are all within the Steens Mountain CMPA.

The Grande Ronde River, Lower Crooked River, Middle Deschutes River, Upper Deschutes River, and Wallowa WSRs are within the planning area but do not have PPH or PGH within the WSR corridors. Therefore, these WSRs are not considered in detail.

Table 3-51
Wild and Scenic Rivers in the Planning Area with PPH or PGH

River Segment	District	Classification	Acres		
			Non-habitat	PGH	PPH
Donner und Blitzen-Ankle Creek	Burns	Wild	0	1,656	0
Donner und Blitzen-Fish Creek	Burns	Wild	1	1,089	147
Donner und Blitzen-Indian and Big Indian Creek	Burns	Wild	5	5,162	0
Donner und Blitzen-Little Blitzen River	Burns	Wild	5	6,051	152
Donner und Blitzen-Little Indian Creek	Burns	Wild	3	1,360	0
Donner und Blitzen-Main Stem	Burns	Wild	0	0	2,541
Donner und Blitzen-Mud Creek	Burns	Wild	0	1,515	0
Donner und Blitzen-South Fork	Burns	Wild	3	2,063	666
Donner und Blitzen-South Fork of Ankle Creek	Burns	Wild	0	476	0

Table 3-51
Wild and Scenic Rivers in the Planning Area with PPH or PGH

River Segment	District	Classification	Acres		
			Non-habitat	PGH	PPH
Kiger Creek	Burns	Wild	130	1,291	0
Main Owyhee River	Vale	Wild	1,326	10,645	4,522
North Fork Crooked River	Prineville	Recreational/ Scenic/Wild	3,266	734	0
North Fork Malheur River	Vale	Scenic	0	650	347
North Fork Owyhee River	Vale	Wild	0	932	762
Powder River	Vale	Scenic	0	0	2,511
West Little Owyhee River	Vale	Wild	0	1,854	10,929
Wildhorse-Little Wildhorse Creek	Burns	Wild	0	922	0
Wildhorse-Wildhorse Creek	Burns	Wild	0	2,097	0
Total			**4,739**	**38,497**	**22,577**

Source: Oregon/Washington BLM 2013

Trends

The BLM will continue to manage WSRs to preserve and protect their free-flowing nature and ORVs. Thus, the trend for WSRs is sustaining and protecting their ORVs.

3.16 Soil Resources

Soil processes determine, to a large extent, the structure and function of ecosystems. Soil health is integral to the BLM's mandate to sustain the health, diversity, and productivity of BLM-administered lands. The existing RMPs vary in the level of content and detail given to various soil resource topics, including desired outcomes for soil conditions, watersheds or specific soils that may need special protection, riparian areas, and use restrictions or other protective measures.

Soil type and quality, along with climate, determine whether sagebrush can grow in a given location, and can determine the type or variety of sagebrush community that is able to thrive. Among other factors, the presence of GRSG is dependent upon the presence of sagebrush. Due to sagebrush type and viability being dependent on soil type and quality, soils are an important element of GRSG habitat.

3.16.1 Existing Conditions

The NRCS provides soil mapping for individual counties across the United States. The major exception to this for the planning area is Malheur County in the southeast corner of Oregon, because NRCS soil data is currently being obtained through long term inventory and mapping work.

Conditions of the Planning Area

Soil Productivity

Soil productivity within the planning area varies widely due to the diversity of soils and site characteristics, specifically differences in elevation and slope gradient. The soil types in the planning area occur from approximately 2,000 to 9,700 feet above mean sea level. The planning area landscape varies greatly, from broad valleys to mountains.

Some of the most productive soils are found in well drained valley bottoms, toe-slopes, benches, and broad ridge tops. On uplands where rainfall is moderate to low, medium-textured soils may produce favorable conditions, depending on land uses such as livestock grazing. Soils that feature shallow claypans, hardpans, or salts are less productive and pose substantial constraints to land use and management.

When soil productivity is degraded in semi-arid high desert regions, natural processes are slow to return site productivity. Prevention of soil degradation is more cost-effective and time-effective than remediation or waiting for natural processes. Management practices (such as proper stocking rates for livestock, rotation of grazing, periodic rest from grazing, improved site design, proper construction and maintenance of roads, selective logging, rehabilitation of unnecessary surface disturbance, restricting vehicles to roads and trails, rehabilitating mined areas, and control of concentrated recreational activities) have reduced erosion effects and improved soil conditions.

Soil Erosion

Factors that influence erosion of soil include soil texture, soil structure, length and percent of slope, vegetative cover, and rainfall or wind intensity. Soils most susceptible to erosion by wind or water are typified by bare or sparse vegetative cover, non-cohesive soil particles with low infiltration rates, and moderate to steep slopes. Wind erosion processes are less affected by slope angles, but are highly influenced by wind intensity. Soils are prone to degradation when soil is removed by erosion in excess of the ability for soil to be rebuilt.

Wind erosion is particularly a hazard when surface disturbance, biological crusts, and vegetation are removed, especially after fire or other disturbances. Because of the semi-arid conditions found in the planning area, soil texture and wind speed are important factors affecting erosion of soil by wind. The overall majority of the planning area is considered to be of slight risk for wind erosion.

In general, the area between La Pine and Burns contains concentrations of lands that are most susceptible to wind erosion. Also, the area between Lakeview and Highway 95 has scattered lands that are most susceptible to wind erosion (Oregon/Washington BLM 2013).

The semi-arid planning area also allows for soil to erode naturally during infrequent rain events. The risk to erosion by water is slight, except in those very steep canyons and exposed bedrock ridges that have a severe to very severe rating from the county soil survey data. The potential for erosion increases with increasing slope. Due to the lack of data for Malhuer County, it is difficult to define the extent of those acres that exceed 35 percent slope within PPH and PGH in the planning area. However from the available counties it can be noted that there is a concentrated area mostly in the Burns and Lakeview Districts (Oregon/Washington BLM 2013). Steep slopes are concentrated in the areas where uplifted faults are exposed above the soil surface plane within the planning area.

NRCS soil map unit descriptions rate soils in the planning area according to their susceptibility to water and wind erosion. Soils in the planning area were screened based on several relevant characteristics that indicate potentially fragile soils or high erosion hazards. These characteristics include the following:

- Soils rated as highly or severely erodible by wind or water, as described in NRCS soil survey reports
- Soils on slopes greater than 35 percent

Based on current soil survey data, the most fragile or highly erodible soils occur in areas of the Burns and Lakeview Districts within the planning area. Malheur County in the Vale District will likely contain additional similar fragile or highly erodible soils as well, because it has a similar geomorphic origin.

Management actions also affect the rate at which soil erodes, because they influence the types of surface disturbing activities that occur. Surface-disturbing actions that remove vegetative cover increase the erosion rate. Some soils, such as shallow soils over bedrock, are particularly vulnerable to soil erosion.

Soil Types

Third-order soil surveys, provided by the NRCS, cover most of the planning area. The NRCS maps over 12,300 soil map units in the planning area, making summarization complex (NRCS 2012).

Soil can be classified in many ways according to a variety of parameters. For the generalization of soils in the planning area, the taxonomy of soil order is a convenient starting place. For the planning area, the largest soil order is the Mollisols. This order encompasses approximately 71 percent of the GRSG core habitat acres. The Aridisols correspond to 19 percent of the area and the

Alfisols correspond to 4 percent. The remaining areas are composed of similar young developmental soils in the Inceptisol, Entisol, Andisol orders with a very small amount of Histisols and Vertisols (Soil Survey Staff 2012).

The NRCS provides a suite of risk ratings, interpretations, and basic soil data that describes soil resources. The soil texture for most soils across the planning area is a loam as composed of the representative percent of sand, silt and clay. Some greater or lesser amounts of these percentages produce clayey loams and silty loams for the most part. The soils have very low amounts of organic matter (2 percent), low available moisture in the top 10 inches (3.3 inches) and are considered well drained.

When it comes to infiltration of water into the soil surfaces, these soils will take in water well. The silty and clay nature of the soil causes them to percolate water more slowly than sandy soil or rocky soil. But for most of the planning area, percolation rates do not cause standing water to form. The majority of the soils (71 percent) convey water at rates greater than 6 micrometers/second or about 1 inch per hour. Of particular note are those soils in the low wetland areas and in the northwest part of the planning area. They allow infiltration to equal or exceed 2 inches per hour. This is correlated to those same soils that have the highest wind erosion rates across the planning area. Others within the planning area have a very low rate of loss per acre and, therefore, are at low risk to wind erosion (Oregon/Washington BLM 2013).

Hydric (wet) soils, unique biological soil crusts, and prime agriculture land are special soil types in the planning area. Hydric soils or partially hydric soils constitute 27 percent of the planning area (Oregon/Washington BLM 2013). Hydric soils are associated with riparian areas. Riparian-wetland soils are found throughout the planning area along water courses, near springs, seeps, playas, and adjacent to reservoirs. Because of the presence of water, riparian-wetlands have soil properties that differ from upland areas. For example, most upland soils are derived from in-place weathering processes and relatively little soil is derived from offsite sources. In contrast, riparian-wetland soils are constantly changing because of the influx of new material being deposited by different storm events and overland flow. As a result, great variability in soil types can occur over short distances (BLM 2003b). An inventory of these soils has not been completed. Due to the dynamic nature of these soils, they require intensive monitoring and management.

Biologic soil crusts are made up of tiny living plants and bacteria that grow together on the soil surface. They help keep the soil from washing or blowing away, fix nitrogen from the atmosphere into the soil, help keep out weeds, and promote the health of plant communities. In areas where biologic soil crusts have been lost, there is a greater risk of annual grass (or other invasive) invasion than in areas with intact crusts. Biologic soil crusts are found throughout the planning area.

Prime farmland has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. It must also be available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, water management, and tillage. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding. NRCS rated soils for prime farmland in PPH and PGH covers 8,573,864 acres. Acres of cropland in PPH and PGH are identified in **Table 3-52**, Acres of Cropland within Sage-Grouse Habitat in the Planning Area, below. There are fewer acres in the table below, because the table displays the number of acres currently growing crops, instead of the number of acres capable of growing crops with irrigation or with irrigation and drainage developed.

Table 3-52
Acres of Cropland within Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres[1]	Acres within PGH	Acres within PPH
BLM	IV	500	300	200
	V	500	400	100
Forest Service	IV	0	0	0
	V	0	0	0
Tribal and Other Federal	IV	100	100	0
	V	300	300	0
Private	IV	26,700	18,600	8,100
	V	57,600	54,800	2,800
State	IV	100	100	0
	V	400	400	0
Other	IV	0	0	0
	V	0	0	0
Total		**86,200**	**75,000**	**11,200**

Source: Manier et al. 2013
[1]Based on data provided by the National Agricultural Statistics Service

3.16.2 Trends

Soil resources change slowly unless catastrophic or larger scale disturbance events, such as landslides, floods, volcanoes or wildfires, occur. Then, erosion or deposition would change the ground cover at one point or many. Thus, the degree of change in the planning area would be considered low or insignificant, with the direction of change being that most likely to occur naturally over time. There have been larger wildfire events and, to some degree, restoration activities that have altered the vegetation communities where juniper has been invading sagebrush communities. These activities alter the hydrologic condition of the soil and provide support for recovery of disturbance over time.

The overall trend for soil resources is to maintain or improve the ability of the soil to support native 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 the planning area, impacts on soil resources have resulted from energy development, improper grazing, recreation, natural processes, and other activities. The potential for maintaining or restoring these communities and conserving the soil resource depends on the specific soil types and how resource programs are managed.

3.17 Water Resources

Water on BLM-administered lands is regulated by the Clean Water Act, Safe Drinking Water Act, Public Land Health Standards, and other laws, regulations, and policy guidance at the federal, state, and local levels. Water resources in Oregon are legally administered through the Oregon Administrative Rules.

The Oregon Department of Environmental Quality (ODEQ) has granted designated management agency status to the BLM. As a designated management agency, the BLM must implement and enforce natural resource management programs for the protection of water quality on federal lands under its jurisdiction; protect and maintain water quality where it meets or exceeds applicable state and tribal water standards; monitor activities to assure that they meet standards and report the results to the State of Oregon; and meet periodically to recertify water quality best management practices (BMPs). BMPs include methods, measures, or practices to prevent or reduce water pollution, including but not limited to structural and nonstructural controls, operations, and maintenance procedures. BMPs are applied as needed to projects.

In Oregon, all water is publicly owned and falls under the management jurisdiction of the State of Oregon. Permits for water use from any source must be obtained from the Oregon Water Resources Department, with some exceptions (e.g., federal water rights). Laws pertaining to the use of surface water and groundwater are based on the principle of prior appropriation (first in time, first in right) and limited to the quantity of water needed to satisfy the specified use without waste. That is, the first person to obtain a water right will be the senior holder on a particular stream and has priority over all junior claims in times of water shortage.

3.17.1 Existing Conditions

The discussion of existing conditions includes a description of water resources for the planning area, regardless of land ownership. Where appropriate, it also includes a more detailed description of water resources for just BLM-administered lands within the planning area. For this, the description is limited to describing water resources associated with GRSG and their habitat. Wetlands and livestock water developments are important sources of water that influence GRSG and their habitat.

Conditions of the Planning Area

The BLM is the overwhelming land manager in the planning area. The Forest Service, USFWS, Bureau of Indian Affairs, and the State of Oregon all have lands within the planning area that also contain a suite of water resources.

The yearly precipitation for this area east of the Cascades ranges from 8 to 50 inches, with 19 inches being the average according to annual precipitation data. The northeast corner of the state has the higher average due to increased elevation. Similarly there are areas in the Burns and Lakeview Districts that have greater than average precipitations where rapid changes in elevation exist in those areas (Oregon/Washington BLM 2013).

Within the planning area, the major water features are springs, streams, lakes, wetlands, playas, and dry lakes. Streams can be ephemeral, intermittent, or perennial. Ephemeral streams do not flow during an average water year but do flow in response to large precipitation events. Intermittent streams flow during spring runoff for an average water year but generally dry up later in the summer. Perennial streams contain some water all year for an average water year. 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.

Stream channels and floodplains are important because their shape and condition affect how rapidly water flows through a river system, how much water is stored within the basins, the quality of the water, and how much erosion occurs. These functions, in turn, affect fish and wildlife habitat, agriculture, recreation, and the susceptibility of local communities and landowners to floods.

Surface Water

Stream flow in the planning area is regulated by the State of Oregon. Projects for irrigation, livestock, human use, and flood control are considered beneficial uses but may have significantly altered natural flow regimes. This may in turn have changed habitat conditions, channel stability, and timing of sediment and organic-material transport. Stream flow can be altered by management activities, such as water impoundments, water withdrawal, road construction, vegetation manipulation, grazing, fire suppression, and timber harvesting. All of these activities are currently and historically occur in the planning area.

Most surface runoff in the planning area is from snowmelt in the spring and early summer or rainfall at the higher elevations. Runoff at these times produces peak stream discharges. Many of the streams in the lower-elevation semi-arid areas are either intermittent, with segments of perennial flow near springs, or ephemeral, with flow only during spring runoff and intense summer storms. There are approximately 18,791 perennial and 66,116 intermittent miles of streams in the fourth field watersheds that contain some amount of habitat in the planning area. There are 5,216 perennial and 42,804 intermittent miles of stream miles in PPH and PGH (Oregon/Washington BLM 2013). .

Water developments are also influential sources of water for GRSG. 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, the BLM maintains an unknown number of water developments.

GRSG will use free water although they do not require it since they obtain their water needs from the food they eat. Information on the extent of habitat influenced by produced water and the net effects on GRSG populations is unknown (USFWS 2010a). Natural water bodies and reservoirs can provide mesic areas for succulent forb and insect production, thereby attracting GRSG hens with broods (Connelly et al. 2004). It is unknown whether wildlife guzzlers built to supply free water in normally arid habitats provide a net benefit to GRSG or if potential benefits are countered by potential negative consequences. These negative consequences may include increased competition from other species that benefit from guzzlers, such as domestic and wild ungulates, or predators and the associated increase in predation risk (Braun 1998). In addition, new water resources may become additional habitat for mosquitoes carrying West Nile Virus (Naugle 2004).Diverting the water sources has the secondary effect of changing the habitat present at the water source before diversion. This could result in the loss of either riparian or wet meadow habitat important to GRSG as sources of forbs or insects. Further study is needed to determine the effects of water management on the sagebrush biome.

Riparian Areas and Wetlands

Riparian areas are ecosystems that occur along rivers, streams, or water bodies. 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. Even though wetlands areas occupy only a small percentage of the planning area land (approximately 2.1 percent), these areas provide a wide range of functions critical to many different wildlife species, improve water quality, provide scenery, and provide recreational opportunities (Oregon/Washington BLM 2013). Additional uncalculated acres of functioning riparian areas would be adjacent to all intermittent and perennial streams across the planning area.

The BLM uses proper functioning condition (PFC) assessments for evaluating riparian-wetland areas and uses it to supplement existing stream channel and riparian area evaluations and assessments. Each riparian-wetland area has to be judged against its capability and potential. The capability and potential of natural riparian-wetland areas are characterized by the interaction of hydrology, vegetation, and erosion/deposition (soils). PFC is defined separately for lotic (moving water systems, such as rivers, streams, and springs) and lentic (standing water systems, such as lakes, ponds, seeps, bogs, and meadows) waters. If a riparian or wetland area is not in PFC, it is placed into one of three other categories: functional, at risk, nonfunctional, or unknown (BLM 1998, 2003b). The data for describing the planning area using PFC assessments is not sufficient to provide an accurate representation of the riparian environment, because the data is lacking for the greater proportion of the analysis area, predominately the Vale District. In addition, the use of PFC between districts was not well coordinated and the interpretations cannot be generalized over this large planning area.

Water Quality

Water quality, as defined by the Clean Water Act, includes all the physical, biological, and chemical characteristics which affect existing and designated beneficial uses. The State of Oregon is required to identify which beneficial uses a water body currently supports or could support in the future. Water quality standards are established to protect the beneficial uses of the State's waters. Beneficial uses of waters are identified in the Oregon Administrative Rules for specific waters. Beneficial uses in the planning area are public and private domestic water supplies, industrial water supply, irrigation, livestock watering, fish and aquatic life, wildlife and hunting, fishing, boating, water contact recreation, and aesthetic quality.

The State of Oregon is required by Section 303(d) of the Clean Water Act to identify waters which are water quality impaired because of failing to meet their designated beneficial uses. Section 303(d) requires that each state develop a list of water bodies that fail to meet water quality standards and delineate stream segments and listing criteria for all streams. The 303(d) list of impaired waters is updated biannually, and the State is required to develop a total maximum daily load allocation for each pollutant of concern.

Water quality is evaluated based on the ability of a water body to support beneficial uses of the water. Generally, key water qualities are those that support native fish and wildlife and support human uses such as agriculture, recreation, and domestic water supply.

The ODEQ monitors selected water bodies for water quality. The ODEQ has analyzed water quality across the state and lists streams by basin. The ODEQ is in the process of developing a new list from the 2010 data call. The Environmental Protection Agency (EPA) submitted over 800 additions to the draft list in the summer of 2012. The current 303(d) list dates back to 2006. Within the planning area, 7 lakes and 158 streams are listed on the 2006 303(d) list of impaired waters (Oregon/Washington BLM 2013). The water bodies are listed due to failing to meet water quality standards for the following criteria:

- Temperature, Dissolved Oxygen, Turbidity, Weeds, or Algae for the lakes
- Temperature, Dissolved Oxygen, Fecal Coliform, Heavy Metals, or Herbicides for most of the streams

The major water quality concern for streams in the planning area has been water temperature, sediment, flow, and habitat modification. Of the 1,495 segments of 303(d) listed streams in the Core Area habitat, these are the top reasons for the ODEQ listing (Oregon/Washington BLM 2013). These water temperature concerns generally correlate to the beneficial use of fish spawning and rearing habitat. Conditions that affect stream temperature can be summarized as amount of near-stream vegetation, channel shape, and hydrologic flow regime. Many of these conditions are interrelated and many vary considerably across the landscape. For example, channel width measurements can change greatly over even small distances along a stream. Some conditions vary daily and/or seasonally. Stream orientation from a north-south to an east-west can change solar heating considerably when stream width and vegetation type remain the same.

Removal of riparian vegetation and the shade it provides contributes to elevated stream temperatures (Rishel et al. 1982; Beschta 1997). Channel widening can similarly increase solar loading. The principal source of heat energy delivered to the water column is solar energy striking the stream surface directly (Brown 1969). Exposure to solar radiation can cause an increase in stream temperature. The ability of riparian vegetation to shade the stream throughout the day depends on aspect and vegetation height, width, density, and positions relative to the stream, as well as aspect the stream flows (streamside vegetation provides less shade on a north or south flowing stream than on an east or west flowing stream).

There are natural and human-induced causes of stream degradation due to removal of riparian vegetation and destabilization of streambanks. Bank erosion from high water volume and velocity during intense precipitation events can alter the bed and banks. The land uses most commonly associated with stream degradation in the planning area is improper livestock grazing as it is most prevalent. Other land uses associated with degraded streams may include road location, construction and use, trails, water withdrawal, mining activities, reservoir storage and release, altered physical characteristics of the stream, and wetlands alteration.

Groundwater

Groundwater is used for irrigation, domestic use, and livestock use. The quality of the groundwater is a function of the chemical makeup of the underground formation containing the water. Most of the planning area contains good quality water, but the water is usually hard and contains moderate amounts of dissolved minerals.

Springs and seeps occur in areas where water from aquifers reaches the surface. Many springs begin in stream channels; others flow into small ponds or marshy areas that drain into channels. Some springs and seep areas form their own channels that reach flowing streams, but other springs lose their surface expression and recharge alluvial fill material or permeable stratum.

Springs and seeps are important to aquatic habitats because of the perennial baseflow they provide to a stream. The outflow from springs in summer usually helps to maintain lower water temperatures. In winter, especially in small streams, baseflow helps to maintain an aquatic habitat in an otherwise frozen environment.

Springs can be disturbed either by management activities that have affected the volume of water available to the vegetation and soils where springs begin, or by activities that have affected the vegetation and soils directly. Activities, such as livestock or wild horse grazing and watering, recreation use, mining, road construction, and vegetation management, can affect spring systems. Activities such as well drilling or blasting can affect springs by reducing the amount of water in their aquifers or by affecting subsurface flow patterns.

Water Quantity

The peak flow times are connected with the spring runoff and snow melt with a decrease to near base flow during the month of June or July, depending on winter accumulations of snow. Seasons and years of low water yield are particularly crucial periods for most of the beneficial uses of water in the planning area. During the summer drought experience in 2012, many streams went completely dry, and groundwater needed to be accessed through pumping for the first time in at least a decade.

Water Rights

The State of Oregon recognizes instream water rights for the public benefit to maintain sufficient flows to protect recreation, fish, wildlife, and other river-related resources. Instream water rights are applied for by the BLM, the ODEQ, the Department of Parks and Recreation, and the Department of Fish and Wildlife to the State's Water Resource Commission. The priority date for instream water rights is the date the application is submitted to the Oregon Water Resources Department. These rights are subject to senior water rights. The Oregon Water Resources Department has identified desired flow levels to protect recreation, fish, and wildlife. These flow levels are not water rights; rather, the Oregon Water Resources Department uses them in its calculations of water availability. There are approximately 5,971 water storage impoundments, pipeline systems, groundwater wells, and irrigation diversions on BLM-administered land in the planning area, where applications have been made or have state-approved water rights (Oregon/Washington BLM 2013).

Federal reserved water rights may be applied to certain springs and waterholes pursuant to Public Water Reserve No. 107, Executive Order of April 17, 1926. Public Water Reserve 107 reserves the amount necessary to accomplish the primary purpose of the reservation. There was no intent to reserve the entire yield of each public spring or waterhole withdrawn by the executive order. The purposes for which these waters were reserved are limited to domestic human consumption and livestock watering on BLM-administered lands. This reservation is limited to springs and waterholes on lands within the public domain prior to April 17, 1926. Also, federal reserved water rights for WSRs are found in the creation of water rights in section 1284(c), of the Wild and Scenic Rivers Act of 1968.

Livestock operators' contributions to constructing and maintaining range improvements have benefited management of BLM-administered lands. In many areas, water developments are providing water for wildlife and have improved livestock distribution and benefited grazing management.

There are a variety of tools, authorities, and strategies available to the BLM to achieve instream flow levels. These tools include leasing (in the short term) and transferring existing BLM consumptive use rights to instream uses (in the long term) and entering cooperative agreements with the State of Oregon and other agencies for the purchase of water rights from willing sellers for transfer to instream uses.

3.17.2 Trends

There are numerous examples of measurable changes in stream and riparian-habitat qualities that indicate degraded conditions in the Malheur, Owyhee, and John Day river basins of eastern Oregon. Major habitat changes include the loss of riparian vegetation and increased canopy opening widths adjacent to stream channels; loss of riparian vegetation and decline of large woody debris in stream channels; increases in water temperatures from minimal shading by riparian canopies and shallow-sediment and debris-laden stream channels; accumulation of fine sediments and loss of gravel and pool attributes in stream channels because of land-uses that alter streamflow regimes and sediment budgets; and loss of water in stream channels and riparian areas because of water diversion practices (Wissmar et al. 1994).

Even so, functional riparian plant communities can usually be reestablished and restored, often over relatively short periods of time. Recovery of riparian vegetation can also provide a parallel improvement in stream temperatures, overall water quality, and instream habitats for a variety of fish and aquatic organisms. Improving riparian vegetation and channel conditions may also beneficially affect moisture regimes of meadow systems and increase forage productivity. There are major opportunities for improving water temperatures and aquatic habitats for many streams in eastern Oregon and the upper Columbia River Basin. Increased levels of shading for water quality limited streams would greatly improve summertime stream temperatures in most situations, which improves water quality. Many land management practices have changed to include providing summertime shade in riparian areas. It may even be possible to reduce maximum temperatures so they no longer exceed state water quality standards. However, it is clear that achieving improved levels of riparian shade and decreased summertime temperatures will require landowners to continue to change those management practices that have contributed to current conditions. It is also clear, that without such changes, fish and other aquatic organisms will continue to feel the heat (Beschta 1997).

Demands on water resources have increased in Oregon over the past few decades. Although most early water rights were established for irrigation and mining, today's demand includes municipal water supplies, commercial and industrial supplies, and maintenance of adequate streamflows for fish, recreation, and water quality.

The availability of water in much of the planning area is limited and may hamper additional developments that depend on water. Future water development for wildlife, recreation, and livestock would require a State of Oregon water right before project implementation could occur.

General Technical Report RMRS-GTR-285 recently released in August 2012 reviews existing climate models that predict species and vegetation changes in the western United States, and it synthesizes knowledge about climate change impacts on the native fauna and flora of grasslands, shrub lands and deserts of the interior American West. In summary, the report predicts less water and water availability, a difference in timing of delivery, and increased stress on vegetation. In particular, the report predicts longer and more severe droughts, changes in precipitation runoff and potential for changes in flooding patterns, changes in the relationships among plants, water, nutrients, and soils on grazed lands, and increased susceptibility of ecosystems to invasion of nonnative species (Finch 2012).

The type of burning conditions experienced in the summer of 2012 are expected to occur more frequently as the climate continues to change (very high temperatures and very low relative humidity for prolonged periods in combination with very dry conditions). These conditions are expected to be the trend in the tri-state region of Oregon, Idaho, and Nevada until climate change takes a new path.

3.18 Lands with Wilderness Characteristics

The purpose and need of 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. Other program management direction (e.g., land tenure) may generally affect wilderness characteristics (e.g., exclusion areas would benefit lands with wilderness characteristics but would not guarantee protection because the purpose of and need for the exclusion area in that management direction is not specifically tied to wilderness characteristics).

As part of the original FLPMA Section 603-mandated inventories, inventories were conducted during past RMP revisions and amendments efforts, and through other various lands with wilderness characteristics inventory updates that have recently taken place. Inventories for wilderness characteristics were updated over the past decade to reflect the most up-to-date lands with wilderness characteristics baseline information for this planning area. These inventories were based on draft guidance that led to the development of BLM IM 2011-154, Requirement to Conduct and Maintain Inventory Information for Wilderness Characteristics and to Consider Lands with Wilderness Characteristics in Land Use Plans. For inventories that were conducted after 2011, findings were documented following guidance in BLM IM 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 (BLM 2012j) and 6320 (BLM 2012k). Lands with wilderness characteristics inventories will be updated for any site-specific NEPA analyses that are conducted in the planning area to determine if a project will have impacts on lands with wilderness characteristics identified through previous or updated inventory efforts.

3.18.1 Existing Conditions

Conditions of BLM-Administered Lands

There are approximately 102 lands with wilderness characteristics units in the planning area encompassing over 1.3 million acres. Of these lands with wilderness characteristics units, approximately 697,900 acres include PPH, approximately 576,200 acres include PGH, and approximately 96,700 acres contain neither PPH nor PGH (**Table 3-53**, Lands with Wilderness Characteristics). There are approximately 1.2 million acres in the planning area

Table 3-53
Lands with Wilderness Characteristics

District	Acres			
	Non- Habitat	**PGH**	**PPH**	**Total**
Burns	103	1,722	15,211	17,036
Lakeview	8,885	10,386	13,210	32,481
Prineville	2,194	39,980	24,950	67,124
Vale	85,565	524,088	644,522	1,254,176
Total	**96,747**	**576,176**	**697,893**	**1,370,817**

Source: Oregon/Washington BLM 2013

on which updated lands with wilderness characteristics inventories have not been completed. These lands could potentially contain wilderness character.

No available statewide GIS data track how lands with wilderness characteristics are being managed, and there is no statewide GIS database available for GIS-supported analysis. As such, all lands with wilderness characteristics in this analysis are treated as if their wilderness characteristics are not protected.

3.18.2 Trends

As the BLM completes its inventories of wilderness characteristics, it anticipates that more units might be determined to contain wilderness characteristics. Until an inventory can be completed for all lands in the decision area, lands not yet inventoried for wilderness characteristics will be evaluated when any surface-disturbing activity is proposed. Any lands with wilderness characteristics found in this inventory update will be considered in alternative formulation, and impacts of the proposal on their wilderness characteristics will be analyzed and disclosed in individual NEPA analyses. Absent specific management direction protecting wilderness characteristics, is the BLM anticipates that some characteristics may degrade over time depending upon on BLM-administered activities, which will be subject to project-level NEPA.

3.19 Climate Change

Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. Climate change includes both historic and predicted climate shifts that are beyond normal weather variations. Greenhouse gas emissions from human activities have been identified as a major factor in climate change (IPCC 2007). In December 2012, the Department of the Interior issued manual direction concerning climate change (523 DM 1) directing its agencies to consider the effects of climate change on BLM-administered resources and to consider the greenhouse gas emissions and carbon storage implications of BLM activities during land use and project planning. The BLM National Office is in the process of developing implementation direction for these manual requirements.

3.19.1 Existing Conditions

Conditions of the Planning Area and BLM-administered Lands

Climate change is defined by the Intergovernmental Panel on Climate Change as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and persist for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity" (IPCC 2007). Climate change is generally described on a global, national, or regional scale (state or multi-state), while greenhouse gas emissions in the US are generally reported on a national or statewide scale.

USFWS identified certain aspects of climate change of particular concern for sage-grouse. These include increased potential for further expansion of invasive plant species and conifers into sage-grouse habitat; changes in fire frequency, size, and severity; and potential for expansion of West Nile Virus into areas that are currently too cold for the vector. All these factors are influenced by changes in temperature, precipitation, and snowpack. In addition, expansion of invasive plant species and conifers is influenced by atmospheric carbon dioxide (CO_2) concentrations. Climate change also has implications on the ability of sagebrush and other native vegetation to persist within the planning area.

The climate within the planning area is considered to be continental, although there are some maritime climatic influences in winter, especially within the Upper Deschutes RMP area. The precipitation regime is winter-spring dominant, but high interannual variability in precipitation amount is a key characteristic of the planning area, ranging from less than 10 inches to over 20 inches. Winter precipitation is typically rain-dominated within much of the Southeastern Oregon RMP area and equally likely to be rain or snow-dominated in the remainder of the planning area, depending on the type of year. Snow-dominant winter precipitation is restricted to the higher elevations around Steens Mountain, Hart Mountain, the Trout Creek and Pueblo Mountains, and in much of the Upper Deschutes RMP area. Summers are typically very dry. Frost can occur nearly any month of the year on most of Burns and Lakeview Districts.

<u>Invasive Plant Species</u>. Although there are several invasive plant species of concern, scientifically, the most is known about cheatgrass. Cheatgrass is typically limited by precipitation at the lower elevations and temperature at the higher elevations (Chambers et al. 2007) and tends to be most problematic where the soil moisture regime is xeric and the soil temperature regime is mesic. Medusahead can displace cheatgrass, especially on soils with high clay content (Mangla et al. 2011). Little is known about the autecology of other invasive plant species, such as ventenata, but populations of all such grasses tend to be higher where conditions are warmer. The current winter-spring precipitation regime also favors cheatgrass and other invasive plant species (Bradford and Laurenroth 2006). A few studies suggest that increasing

atmospheric carbon dioxide concentrations has favored more rapid spread of cheatgrass in recent years by increasing its flammability and drought tolerance (Ziska et al. 2005; Blank et al. 2006) such that cheatgrass is becoming more problematic where the soil moisture regime is more arid. While no similar studies have been conducted on other invasive plant species, there are enough ecological similarities between these species that they may also be favored by increasing atmospheric carbon dioxide concentrations. Summer (June to September) precipitation is one of the better predictors of cheatgrass distribution; as summer precipitation increases, cheatgrass tends to decrease (Bradley 2009).

Western Juniper. Western juniper also tends to be limited by precipitation at lower elevations and temperature at higher elevations (Miller and Wigand 1994; Miller et al. 2005; Romme et al. 2009). It is most common where the soil temperature regime is frigid and the soil moisture regime is mesic. Western juniper expansion within the planning area coincided with both Euro-American settlement and the resulting land use changes, and increased winter precipitation, which favors expansion of woody plants (Romme et al. 2009). Juniper expansion has continued under conditions normally associated with the beginning of range contractions, leading to the current theory that increased atmospheric carbon dioxide concentrations favor continued expansion and rapid growth of juniper trees (Miller and Wigand 1994; Soulé et al. 2004) and may be allowing juniper to expand into some areas where the soil moisture regime is arid.

Sagebrush. Few studies have examined how climate change may affect big and low sagebrush and native perennial grasses, while no studies have examined native forbs. Mountain big sagebrush typically dominates where annual precipitation averages 13 to 18 inches, Wyoming big sagebrush dominates in the 7- to 12-inch precipitation range, and low sagebrush dominates on shallow soils in the 8- to 16-inch precipitation range (Miller et al. 2011b). Bradley (2010) also reported that sagebrush species were typically found where precipitation exceeded 7 inches but was less than 20 inches. June precipitation and maximum temperature, and August precipitation and annual precipitation are predictors of sagebrush persistence (Bradley 2010).

3.19.2 Trends

Observed Trends

In general, annual average temperatures and seasonal temperatures are increasing across the planning area, with the single exception of a slight decline in fall temperatures in the center of the planning area. Minimum temperatures in all seasons and annually and temperatures in winter have increased the most. Annual precipitation has increased across the planning area as well, with the greatest increases in spring and summer. Precipitation has declined in fall in the eastern and western thirds of the planning area, with a greater decrease in the western third near the Cascade Mountains. The observed changes in temperature are largely consistent with observed national and regional trends (IPCC 2007; Karl et al. 2009; Mote et al. 2013). The overall increase in precipitation is also consistent with observed national trends, but the seasonal changes are not. Nationally, precipitation has increased in winter and declined in summer (IPCC 2007; Karl et al. 2009). Regionally, seasonal changes in precipitation have been more variable, but consistently increased in spring (Mote et al. 2013).

April 1 snow water equivalent has decreased at most Snotel stations, with two stations gaining April 1 snow water equivalent. One station, Fish Creek on Steens Mountain, is located just above 7,100 feet, such that warming temperatures may have resulted in an increase in the moisture content of the snow. The South Mountain station in Idaho is harder to understand, particularly since it is located at a lower elevation than the Silvies station on Steens Mountain, which is losing April 1 snow water equivalent. In general, the observed April 1 snow water equivalent trend is consistent with observed national and regional trends (IPCC 2007; Karl et al. 2009; Mote et al. 2013).

Conditions in the planning area are becoming warmer and effectively drier, although at different rates and with important seasonal differences. With decreasing precipitation in fall and little increase in winter precipitation, the eastern and western thirds of the planning area may be storing less water in the deep soil layers. The entire planning area may be shifting towards a spring-summer dominant precipitation regime. If the current trends continue, that shift in precipitation regime will eventually affect the ability of both basins to support woody vegetation. Juniper and sagebrush are typically dependent on the water stored in deeper soil layers during fall and winter.

Increasing minimum temperatures may have adverse implications for any plant species with a chilling requirement. Chilling requirements are an adaptation that reduces the probability of premature bud burst during a warm period in late winter or early spring. Species that do not meet their chilling requirement may experience delayed bud burst or reduced bud burst and, consequently, delayed growth and lower productivity. Whether any species important for sage-grouse food and cover has a chilling requirement is not known. Increasing minimum temperatures in spring and summer also have implications for the hatch timing and growth rates of insects that may be important foods for sage-grouse chicks since insect phenology is temperature dependent.

Projections

For the Pacific Northwest (Oregon, Washington, Idaho, and western Montana), the projections are somewhat different from the US as a whole (Mote and Salathé 2010). Most climate models tend to over-predict precipitation as compared to observed means in the Pacific Northwest, so must be corrected in any projections. In the Pacific Northwest, temperatures are expected to increase by about 1 to 3°F by the 2020s, 1.5 to 5°F by mid-century, and 3 to 10°F by the end of the century. The greatest warming is expected in summer, and least is expected in spring. Annual precipitation is expected to change little, but summers should become drier and all other seasons possibly wetter. As with the US as a whole and globally, the frequency of extreme precipitation events, heat waves, and droughts are expected to increase, and snowpack is expected to decrease.

While the observed and projected changes in temperature and precipitation are expected to increase the length of the fire season and daily burning periods, whether wildfire size and fire season severity will change and in what direction is not clear. Semi-arid ecosystems are fuel-limited, requiring one or more years of average to above-average grass production to create sufficient fuel quantity and continuity to carry fires. Even invasive plant species, which create continuous fuelbeds, do not necessarily produce enough fuel to readily carry a fire every year, although the threshold amount needed is not known. If current projections concerning drought frequency, severity, and duration are accurate, then the annual acres burned could decline as more years lack sufficient fuel to support fires. Conversely, these same droughts could also reduce the abundance of perennial grasses and promote the expansion of annual grasses, thereby increasing fuel continuity.

Uncertainty

Climate change is also a source of uncertainty concerning the expected effects of management activities. These uncertainties arise from several sources. One source is due to the climate models themselves. Each model makes somewhat different assumptions concerning climate dynamics and which factors are more important drivers than others. How greenhouse gas forcing will change is another source of uncertainty, such as the rate of increase, and whether unforeseen events might result in sudden increases or possibly decreases in atmospheric greenhouse gas concentrations. Thirdly, climate scientists have much lower confidence in precipitation projections (IPCC 2007), and many of the vegetation responses to both natural disturbances and management activities are dependent on the amount and timing of precipitation. A fourth source of uncertainty is the inability at present to downscale climate projections to a scale relevant for land management decisions. A fifth source of uncertainty arises from interannual and interdecadal climate variability, which means climate change is not linear, but proceeds in fits and starts. Lastly is that individual plant species and plant community dynamics are more sensitive to changes in climate variability than to changes in climate means, yet changes in means are what is reported.

3.20 Social and Economic Conditions (Including 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 Oregon sub-region that contain sage-grouse habitat and within which social and economic conditions might reasonably be expected to change based on alternative management actions. In addition, the BLM reviewed the need to include additional counties that may not contain habitat but are closely linked from an economic or social perspective to counties that do contain habitat. 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 the livestock grazing sector, 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.

The Socioeconomic Study Area contains seven counties in Oregon, which together form a contiguous region in the eastern and southeastern portion of the state: Baker, Crook, Grant, Harney, Lake, Malheur, and Union. Each of these counties contains sage-grouse habitat.

Table 3-54, BLM Plans, Management Units and Counties within the Socioeconomic Study Area, shows the planning documents that may be altered by the Oregon Sub-Regional EIS and the counties containing sage-grouse habitat within the area encompassed by those plans.

Table 3-54
BLM Plans, Management Units and Counties within the Socioeconomic Study Area

Plan or Document	Management Unit	Counties
Baker RMP and RMP Revision	Vale District	Baker, Union[1]
Brothers/LaPine RMP	Prineville District	Crook, Deschutes
Lakeview RMP and RMP Amendment	Lakeview District	Lake, Harney
Southeast Oregon RMP and RMP Amendment	Vale District	Malheur
Steens Mountain CMPA RMP; Andrews Management Unit RMP	Burns District	Harney[2]
Three Rivers RMP	Burns District	Harney, Lake
Upper Deschutes RMP	Prineville District	Deschutes, Crook[3]

CMPA Cooperative Management and Protection Area
EIS Environmental Impact Statement
RMP Resource Management Plan
[1] The Baker RMP planning area contains a very small part of Malheur County, but Malheur was not included in the social/economic study area for the Baker RMP EIS (BLM 2011c). The Baker RMP planning area also contains several other counties (Umatilla, Morrow, Wallowa, and Asotin, Washington), but these counties do not contain sage-grouse habitat.
[2] The socioeconomic analysis unit for the Steens Mountain CMPA/Andrews Management Unit Draft EIS included a small part of Malheur County, but Malheur was excluded from that analysis unit because the area in question was remote and sparsely populated (BLM 2004b).
[3] Deschutes County is included in the secondary study area for the reasons noted in the text. The Upper Deschutes RMP also covers small portions of Jefferson and Klamath Counties, but these counties contain no sage-grouse habitat and do not serve as service areas; therefore, they are not included in the Socioeconomic Study Area.

The BLM also considered Deschutes County, Oregon, as constituting a "secondary" Socioeconomic Study Area, because two cities in Deschutes County (Bend and Redmond) provide critical economic services for recreational uses across southeastern Oregon. Because any effects on Deschutes County would be indirect, this section contains limited data on conditions within Deschutes County, focusing on what is necessary to provide appropriate context for the impact analysis provided in Chapter 4. Data summaries provided throughout this chapter include data for the seven counties within the primary Socioeconomic Study Area and do not include data for Deschutes County.[1]

3.20.1 Existing Conditions and Trends

Social Conditions

Social conditions concern human communities, including towns, cities, and rural areas, and the custom, culture, and history of the area as it relates to human settlement, as well as current social values.

Population and Demographics

Table 3-55, Population Growth, 1990-2010, shows current and historic populations in the Socioeconomic Study Area.

Table 3-55
Population Growth, 1990-2010

Geographic Area	1990	2000	2010	Percent Change (1990-2010)
Baker County, OR	15,317	16,741	16,134	5.3
Crook County, OR	14,111	19,182	20,978	48.7
Grant County, OR	7,853	7,935	7,445	-5.2
Harney County, OR	7,060	7,609	7,422	5.1
Lake County, OR	7,186	7,422	7,895	9.9
Malheur County, OR	26,038	31,615	31,313	20.3
Union County, OR	23,598	24,530	25,748	9.1
Socioeconomic Study Area	101,162	115,034	116,935	15.6
Oregon	2,842,337	3,421,399	3,831,074	34.8
United States	248,790,925	281,421,906	308,745,538	24.1

Sources: US Census Bureau 1990, 2000, 2010a

Since 1990, the population in Oregon has increased by 34.8 percent, a change 10 percentage points larger than the United States as a whole. Oregon grew in both decades, but grew faster between 1990 and 2000 than between 2000 and

[1] The BLM considered including Payette County in the secondary Socioeconomic Study Area because 33 percent of Payette County residents work in Malheur County. However, according to local officials, much of the labor flow from Payette County to Malheur consists of individuals who work at the Snake River Correctional Institution. This labor flow would likely not change as a result of alternative management actions.

2010. When the Oregon economy was rapidly expanding during the 1990s and mid-2000s, net migration accounted for nearly three-fourths of the population growth (Oregon Department of Administrative Services 2011).

Population in the Socioeconomic Study Area as a whole increased by 15.6 percent from 1990 to 2010, a rate of growth almost ten percentage points lower than the United States as a whole. Only one of the seven counties in the Study Area grew faster than the nation as a whole: Crook County – although much of this growth was focused in the western portion of the county.

In general, the Socioeconomic Study Area is characterized by a low population density, with much of the lands being state or federally owned (Hanus 2011).

With a population of 13,082 people, La Grande is the county seat of Union County and the most populous city in the county (US Census Bureau 2010a). The town of Lakeview, which is the county seat and primary economic center of Lake County, is the location of many federal, State, and local government offices.

The "Communities of Place" section, below, provides more information about additional cities and towns in the Socioeconomic Study Area, as well as the character and history of the counties. **Table 3-56**, 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 3-56
Demographic Characteristics, Share in Total Population (percent), 2010

Geographic Area	Women	Under 20 Years of Age	20 to 39 Years of Age	40 to 64 Years of Age	65 Years of Age or Older
Baker County, OR	49.5	22.3	18.3	37.4	22.0
Crook County, OR	50.4	24.0	19.8	36.3	20.0
Grant County, OR	50.3	21.1	17.1	38.1	23.6
Harney County, OR	49.1	24.8	19.6	36.8	18.9
Lake County, OR	47.3	20.9	19.3	39.4	20.4
Malheur County, OR	45.9	28.7	26.0	30.4	15.0
Union County, OR	50.8	26.1	24.0	33.3	16.7
Socioeconomic Study Area	48.9	25.1	22.0	34.5	18.4
Oregon	50.5	25.4	26.9	33.9	13.9
United States	50.8	26.9	26.8	33.2	13.0

Source: US Census Bureau 2010b

The demographic characteristics of both Oregon and the Socioeconomic Study Area generally follow the same trends as the country as a whole. Approximately

50 percent of the population is female, and approximately 60 percent of the population is between the ages of 20 and 64. The most substantial distinction between national trends and the trends of the Socioeconomic Study Area is the percentage of the population within the Socioeconomic Study Area that is 65 years of age or older, 18.4 percent, which is 5.4 percentage points higher than the national percentage. The proportion of the population over 65 years of age is at least 7 percentage points higher than the national percentage in four counties (Grant, Baker, Crook, and Lake) within the Socioeconomic Study Area. Additionally, a meaningful distinction exists between national trends and the percentage of the population within the Socioeconomic Study Area that is between the ages of 20 and 39. Twenty-two percent of the population in the Socioeconomic Study area is between the ages of 20 and 39, which is 4.8 percentage points lower than the national percentage. The proportion of the population between 20 and 39 years of age is at least 7 percentage points lower than the national percentage in five counties (Grant, Baker, Lake, Harney, and Crook) within the Socioeconomic Study Area.

Environmental Justice provides information on minority, low-income, and tribal populations.

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 measure concepts such as sustainable use and 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. Interest groups within the Socioeconomic Study Area include the following: federal agencies, state agencies, county agencies, local agencies, congressional representatives, local representatives, academic institutions, civic organizations, local chambers of commerce, environmental groups, land conservation groups, outdoors groups, ATV/motorcycle/4x4 clubs, equestrian clubs, local school boards, farm associations, and various business groups. Specific types of business interest groups include the following: real estate, tourism, renewable energy developers (e.g., wind, solar, and geothermal developers), farms and ranches, textile manufacturers, livestock growers, and news media.

Stakeholder groups currently benefitting from BLM-administered lands within the Socioeconomic Study Area include rockhounds, grazing permittees, timber companies and workers, mining companies and workers, local governments, and subsistence users. Stakeholder groups also include recreational users such as hunters, fishermen, OHV users, Wilderness Study Area visitors, sightseers using motorized vehicles, hikers, horseback riders, campers, wildlife viewers, boaters and rafters, eco-tourists, and historical tourists. Commercial businesses that hold special recreation permits are also stakeholders (BLM 2001).

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 majority of the communities within the Socioeconomic Study Area are characterized as rural and have strong connections with the outdoors and recreational activities (BLM 2004c). During public scoping, comments emphasized the preservation of open space, wildlife habitat, and dispersed recreation as being important to individual quality of life (BLM and Forest Service 2012; BLM 2012k). Outdoor recreation activities in the Socioeconomic Study Area include fishing, hunting, and wildlife viewing, among others (Hanus 2011).

Most of the communities in the Socioeconomic Study Area, both currently and historically, have a strong economic reliance on the BLM-administered lands in central Oregon, primarily for livestock grazing and forest products (BLM 2004c). In fact, much of the land in the Socioeconomic Study Area is publicly owned, including over 75 percent in Harney, Lake, and Malheur Counties (Hanus 2011). During public scoping, some commenters noted that livestock grazing activities on BLM-administered lands provided substantial economic benefits to communities across the state. These commenters cited the combined use of private and BLM-administered lands by livestock grazing operations in the Great Basin region as important to the continued sustainability of many ranch operations and the rural communities where these ranches are located (BLM and Forest Service 2012).

Over the last 20 to 30 years, however, many of these counties have seen a decline in the timber and forest products industry on BLM-administered lands, decreasing the overall contribution of this industry to the economies in the study area (BLM 2004b; BLM 2012k). Few timber handling facilities and jobs remain in some counties in the study area (Headwaters Economics 2013). A report on the socioeconomic conditions in areas in Oregon with sage-grouse habitat noted that a shift in public land management since the 1990s has affected these timber-related industries, along with other industries dependent on natural resources, such as livestock grazing (Hanus 2011).

<u>Baker and Union Counties.</u> Baker and Union Counties have outdoor-oriented communities with populations that have been fairly stable over the last 20 years (increasing by 5.3 percent and 9.1 percent respectively). As with many rural areas in Oregon, economic activity has shifted in recent years from the timber and forest products industry and, especially in Baker County, the gold mining industry to industries dominated by agriculture, recreation and tourism, and services (Baker County 2012). Baker County, and to a lesser extent Union County, is a "bedroom community" for workers who live in the area but work elsewhere. BLM-administered lands cover around half of land area in Baker and Union Counties (approximately 52 percent and 47 percent, respectively), and these lands play an important part in the continuation of current and historically important economic activities and the ability of county residents to maintain

their way of life (Baker County 2012; Union County Commissioners 2012). For example, the Baker County Commissioners have expressed an interest in speeding up the approval of mining plans of operations on BLM-administered lands, particularly gold mines, as a way to stimulate economic growth (Baker County 2012).

Crook County. Historically, the economy of Crook County was based on agriculture, livestock grazing, and the timber industry (Crook County 2012). In Crook County, historic economic drivers were strongly connected to BLM-administered lands, which cover approximately 50 percent of Crook County land area. While agriculture and livestock grazing and the timber industry remain important for Crook County, recreation and lifestyle relocation has recently played an increasing role in driving the economy and subsequent rapid population growth (BLM 2004c). Centrally located Crook County is also experiencing rapid population growth, with an increase of approximately 49 percent in the past 20 years (Crook County 2012). Crook County's county seat, Prineville, has a population of 10,370 and is located within an hour's drive from Bend. Even though Crook County has experienced rapid growth, its "wide open spaces" and natural resource-based economy remains important to residents (BLM 2004c). While some community members report increased cultural and retail opportunities as beneficial impacts of expansion in Crook County, others note that changes to historically rural ways of life and the development of towns as "bedroom communities" for those working in the increasingly urban portions of the county may be seen as negative impacts (BLM 2004c).

Grant County. Grant County has a small, rural population that, like all counties in the Socioeconomic Study Area, has historically made their living off of livestock grazing, mining (particularly gold and placer mining), and later forest products. However, unlike the other counties discussed above, Grant County has seen its population shrink by five percent in the past 20 years because of outmigration and an aging population (US Census Bureau 1990, 2000, 2010a; BLM 2012k). Although they have declined in economic importance, traditional economic activities that make use of BLM-administered lands (e.g., livestock grazing, mineral development and forest product sales), which make up over 60 percent of the county, still contribute to the county's social setting and remain culturally important to residents (BLM 2012k). Recreational activities, such as hunting, have contributed to the area's economy in recent years (BLM 2012k). The county seat is Canyon City, but the City of John Day is the main economic center and has the largest population in Grant County (Grant County Chamber of Commerce 2012).

Harney County. Harney County is a rural county with one of the lowest population densities in the state. The county's early development was primarily a result of the cattle industry and homesteading in the 1860s (Grasty 2012). The county cites growth and developments in the grazing and forest products industries as the reason for the area's more recent growth (Harney County Planning Department 2009). Over the past several decades the role of non-service-related sectors (including farming, mining, manufacturing, construction, and the combination of agricultural services, forestry, fishing and related sectors) in supporting jobs has declined compared to service-related sectors and government (US Department of Commerce 2012a). Harney County officials are actively pursuing the attraction of new businesses to enhance and diversify the economy; much of the county's economic strategic plan focuses on job creation related to the sustainable use of natural resources. According to county officials, cattle and hay production represent primary industries in the county. Ranches on private lands range in size from a few acres with only a few cattle to private holdings with hundreds or occasionally thousands of acres with hundreds of animals, irrigated hay land and necessary grazing permits on BLM-administered lands (Grasty 2012). Due to its rural nature, the social character of Harney County has evolved primarily around the cowboy culture and traditional outdoor activities, including hunting and fishing (Grasty 2012). The annual Harney County Fair, Rodeo and Race Meet, which dates back to 1888, is a significant community event and is intimately tied to the ranching community (Harney County 2012; Grasty 2012). Some local residents view private lands within the county as "islands in a sea of public lands" and, as in other parts of the country, some local officials feel that regulation of BLM-administered lands threatens local control and social culture (Grasty 2012).

<u>Lake County.</u> Lake County has a strong historic and current social connection to public land, with a history of agriculture and homesteading activities. In the early 1900s, there was an employment boom in the Fort Rock and Christmas Valley portions of the county, and nearly all the available land within these areas was homesteaded. The contemporary economy is driven by agriculture, timber, livestock activities, and mining (BLM 2003a; Lake County 2012). In addition, the county bills itself as a destination for outdoor recreation. Motorized recreation is popular, and the Christmas Valley Sand Dunes, the largest dunes in Oregon and or the Pacific Northwest, are located within Lake County. An abundance of lakes and rivers provide opportunities for fishing and water recreation, and excellent "thermals" provide opportunities for hang-gliding that have earned the town of Lakeview the title "the Hang Gliding Capitol of the West" (Lake County 2012; Lake County Chamber of Commerce 2012). Lake County officials also note the importance of ranching to the social fabric of the county, including contributions to county fairs, rodeos, and 4-H clubs (Kestner 2012).

<u>Malheur County.</u> Malheur County, Oregon's second largest county by area, is primarily rural, and BLM-administered lands comprise approximately 73 percent of the total land area (BLM 2001; Malheur County 2012). The largest town, Ontario, lies on the Snake River, and the border with Idaho and has strong social and economic ties with several towns across the state line, including Payette and Fruitland; for example, some shoppers in these towns travel from Idaho to Oregon in part to take advantage of Oregon's lack of sales tax. The

county cultivates a large amount of produce, including russet potatoes, and a Heinz (formerly Ore-Ida) processing facility is among the larger employers. The rural, "small-town" atmosphere of Malheur County is valued by current residents and is a characteristic attracting newcomers (BLM 2001). Population grown 20 percent in the county over the last 20 years. Malheur County is primarily open rangeland, with irrigated agriculture in the Western Treasure Valley area of the county serving as the center for farming (BLM 2001). Comments received during scoping noted the importance of these economic activities to local residents, particularly related to the ranching community in Malheur County and mining projects, such as the Calico Grassy Mountain Project mine. Communities in Malheur County tend to have high agricultural, mining, and government specializations, indicating the importance of these activities to their local economies (BLM 2001). Vale is the county seat, but Ontario is the main population and business center, with a population exceeding 11,000 (Malheur County Economic Development 2012).

Land Use Plans

BLM-administered and other federal land in the Socioeconomic Study Area is intermingled with state and private lands. County governments have land use planning responsibility for the private lands located within their jurisdictions. County-level LUPs were identified for all seven counties within the Socioeconomic Study Area (Baker County 1991; Crook County Planning Department 2003; Grant County Planning Department 1996; Harney County Planning Department 2009; Lake County Board of Commissioners 1982; Lynn P. Steiger & Associates 1979; Malheur County 1982). All seven counties with identified LUPs 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. Trends are provided based on data from 2000 to 2010. This data set was selected to provide an acceptable baseline from which to present impacts, which are described in Chapter 4. It also identifies and describes major economic sectors in the Socioeconomic Study Area that can be affected by management actions. Most likely affected would be those economic activities that rely or could rely on BLM-administered lands, such as recreation and livestock grazing.

Economic Sectors, Employment and Personal Income

The distribution of employment and income by industry sector within the Socioeconomic Study Area is summarized in **Table 3-57**, Employment by Sector within the Socioeconomic Study Area, and **Table 3-58**, Labor Income by Sector and Non-Labor Income within the Socioeconomic Study Area (2010 dollars), below. See **Appendix P**, Detailed Employment and Earnings Data, for equivalent data by county.

Table 3-57
Employment by Sector within the Socioeconomic Study Area

Socioeconomic Study Area	Absolute			Percentage of Total		Percent Change 2001-2010
	2001	2010	Change 2001-2010	2001	2010	
Total Employment (number of jobs)	**63,487**	**62,234**	**-1,253**	**100.0%**	**100.0%**	**-2.00%**
Non-services related	**17,708**	**14,931**	**-2,777**	**27.90%**	**24.00%**	**-15.70%**
Farm	7,684	6,769	-915	12.10%	10.90%	-11.90%
Forestry, fishing, & related activities	1,155	990	-165	1.80%	1.60%	-14.30%
Mining (including oil and gas)	207	271	64	0.30%	0.40%	30.70%
Construction	2,815	2,607	-208	4.40%	4.20%	-7.40%
Manufacturing	5,847	4,294	-1,553	9.2%	6.9%	-26.6%
Services related	**31,157**	**32,740**	**1,583**	**49.1%**	**52.6%**	**5.1%**
Utilities	178	166	-12	0.3%	0.3%	-6.9%
Wholesale trade	1,552	2,084	532	2.4%	3.3%	34.3%
Retail trade	8,181	7,048	-1,133	12.9%	11.3%	-13.8%
Transportation and warehousing	1,463	1,442	-21	2.3%	2.3%	-1.4%
Information	651	563	-88	1.0%	0.9%	-13.6%
Finance and insurance	1,502	1,703	201	2.4%	2.7%	13.4%
Real estate and rental and leasing	1,701	2,083	382	2.7%	3.3%	22.5%
Professional and technical services	1,663	1,807	144	2.6%	2.9%	8.7%
Management of companies and enterprises	82	222	140	0.1%	0.4%	170.8%
Administrative and waste services	1,522	1,286	-236	2.4%	2.1%	-15.5%
Educational services	202	369	166	0.3%	0.6%	82.3%
Health care and social assistance	4,868	5,892	1,024	7.7%	9.5%	21.0%
Arts, entertainment, and recreation	732	801	68	1.2%	1.3%	9.3%
Accommodation and food services	3,793	4,060	267	6.0%	6.5%	7.0%
Other services, except public administration	3,067	3,217	150	4.8%	5.2%	4.9%
Government	**12,060**	**11,790**	**-270**	**19.0%**	**18.9%**	**-2.2%**
Federal	2,329	2,255	-74	3.7%	3.6%	-3.2%
State	2,984	3,229	245	4.7%	5.2%	8.2%

Table 3-57
Employment by Sector within the Socioeconomic Study Area

Socioeconomic Study Area	Absolute			Percentage of Total		Percent Change 2001-2010
	2001	2010	Change 2001-2010	2001	2010	
Local	6,747	6,306	-441	10.6%	10.1%	-6.5%

Source: US Department of Commerce 2012a

Table 3-58
Labor Income by 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]	**$2,015.5**	**$1,997.2**	**-$18.3**	**100.0%**	**100.0%**	**-0.9%**
Non-services related	**$494.8**	**$415.8**	**-$79.1**	**24.6%**	**20.8%**	**-16.0%**
Farm	$70.0	$69.9	-$0.1	3.5%	3.5%	-0.2%
Forestry, fishing, & related activities	$60.8	$28.8	-$31.9	3.0%	1.4%	-52.5%
Mining (including oil and gas)	$35.4	$53.3	$17.9	1.8%	2.7%	50.6%
Construction	$92.3	$82.2	-$10.2	4.6%	4.1%	-11.0%
Manufacturing	$236.3	$181.5	-$54.8	11.7%	9.1%	-23.2%
Services related	**$826.4**	**$897.4**	**$71.0**	**41.0%**	**44.9%**	**8.6%**
Utilities	$13.0	$12.5	-$0.5	0.6%	0.6%	-3.5%
Wholesale trade	$53.6	$106.7	$53.1	2.7%	5.3%	99.0%
Retail trade	$215.0	$169.6	-$45.3	10.7%	8.5%	-21.1%
Transportation and warehousing	$57.6	$58.1	$0.5	2.9%	2.9%	0.9%
Information	$23.2	$19.2	-$4.0	1.2%	1.0%	-17.1%
Finance and insurance	$45.2	$41.8	-$3.5	2.2%	2.1%	-7.6%
Real estate and rental and leasing	$26.7	$29.1	$2.5	1.3%	1.5%	9.2%
Professional and technical services	$42.3	$51.2	$8.9	2.1%	2.6%	21.1%
Management of companies and enterprises	$3.4	$8.8	$5.3	0.2%	0.4%	154.9%
Administrative and waste services	$26.0	$23.4	-$2.6	1.3%	1.2%	-10.0%

Table 3-58
Labor Income by Sector and Non-Labor Income within the Socioeconomic Study Area (2010 dollars)

Socioeconomic Study Area	Absolute (millions) 2001	Absolute (millions) 2010	Absolute (millions) Change 2001-2010	Percentage of total[1] 2001	Percentage of total[1] 2010	Percent Change 2001-2010
Educational services	$5.5	$5.2	-$0.3	0.3%	0.3%	-5.8%
Health care and social assistance	$164.9	$213.2	$48.3	8.2%	10.7%	29.3%
Arts, entertainment, and recreation	$9.0	$6.7	-$2.3	0.4%	0.3%	-25.4%
Accommodation and food services	$61.7	$66.5	$4.8	3.1%	3.3%	7.7%
Other services, except public administration	$79.2	$85.3	$6.1	3.9%	4.3%	7.7%
Government	**$615.5**	**$633.9**	**$18.4**	**30.5%**	**31.7%**	**3.0%**
Federal	$163.1	$174.3	$11.2	8.1%	8.7%	6.9%
State	$166.0	$179.3	$13.3	8.2%	9.0%	8.0%
Local	$286.3	$280.3	-$6.0	14.2%	14.0%	-2.1%
Non-labor Income[3]	**$1,398.7**	**$1,698.9**	**$300.2**	**45.6%**	**51.0%**	**21.5%**
Dividends, interest, and rent	$728.8	$691.7	-$37.1	23.8%	20.8%	-5.1%
Personal current transfer receipts[4]	$670.0	$1,007.2	$337.2	21.8%	30.2%	50.3%
Contributions to government social insurance[5]	**$248.1**	**$268.8**	**$20.7**	**8.1%**	**8.1%**	**8.3%**
Total Personal Income[6]	**$3,068.4**	**$3,331.5**	**$263.1**	**100.0%**	**$3,332**	**8.6%**

Sources: US Department of Commerce 2012a. Values reported in 2001 dollars were converted to 2010 dollars using the Consumer Price Index (BLS 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]Nonlabor 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.

The largest industry sector is the services related sector, which comprised 52.6 percent of total employment as of 2010. This reflects a growth rate of 5.1 percent from 2001 (compared to an overall employment growth rate of -2.0 percent from 2001). Compared to the services related sector, the non-services related sector and the government sector represented lower levels of employment, 24.0 percent and 18.9 percent, respectively. Retail trade (11.3 percent), farming (10.9 percent), and local government (10.1 percent) accounted for the largest shares of employment in 2010, followed by healthcare and social assistance (9.5 percent). The industries that demonstrated the largest growth between 2001 and 2010 were management of companies and enterprises, with an increase of 170.8 percent; educational services, with an increase of 82.3 percent; and wholesale trade, with an increase of 34.3 percent.

Appendix P, Detailed Employment and Earnings Data, provides county-level employment figures. The greatest difference in industry sector proportion between counties in 2010 was in the farm industry, which contributes 7.1 percent of total employment in Union County but a larger percentage in the other counties (up to about 15 percent in Lake and nearly 18 percent of employment in Harney). Despite its history as a critical economic driver, mining contributes relatively little employment in any county today, accounting for as little as 0.3 percent of jobs in Harney County, up to about 1.5 percent of jobs in Grant County (note that the data source does not release employment in four of the counties to protect business confidentiality). There is no clear correspondence between the sectors provided and recreation-related economic activity, but retail trade, accommodation, food services and arts, entertainment, and recreation sectors are relatively consistent contributors across all counties (note that these sectors are influenced by recreation but also by many other industries).

With respect to personal earnings, the services related sector accounted for the largest share (44.9 percent) of labor income in the Socioeconomic Study Area in 2010, followed by the government sector (31.7 percent) and the non-services related sector (20.8 percent). In 2010, the individual industries that generated the largest shares of personal earnings included the local government industry (14.0 percent); the healthcare and social services industry (10.7 percent); and the manufacturing industry (9.1 percent). Management of companies and enterprises, along with wholesale trade, showed a strong trend of growth since 2001 (a percent change of 154.9 percent and 99.0 percent, respectively); these were the two highest growth rates between 2001 and 2010. During the same time period, the forestry, fishing, and related activities industry experienced a 52.5 percent decline, the greatest decline of all the industry sectors.

Appendix P, Detailed Employment and Earnings Data, provides county-level labor earnings figures. The county-by-county patterns are similar to those for employment, with relatively more variation in farm-related income; farming contributes the most to earnings in Lake and Malheur Counties at 10.6 and 6.8

percent, respectively. Earnings from the mining sector are left undisclosed in all but one county due to confidentiality requirements. Only Crook County reports earnings data for the mining industry and its figure is small (0.2 percent). Retail trade, accommodation and food services, and the "arts, entertainment and recreation" sectors, which are influenced in part by recreation and travel, are relatively consistent contributors across all counties.

Supplementing the data on industry shares of labor earnings is another metric – residence adjustment. 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. Grant County's residence adjustment represented 1.5 percent of its total personal income, the highest share of all counties in the Socioeconomic Study Area. Baker County had the second highest share (1.4 percent). Residence adjustment accounted for the lowest share of total personal income in Malheur County (negative 15 percent, presumably in large part because of the Snake River Correctional Institution), followed by Lake County (negative 0.5 percent). See **Appendix P**, Detailed Employment and Earnings Data, for detailed county data.

In addition to the seven counties of the primary Socioeconomic Study Area, **Appendix P**, Detailed Employment and Earnings Data, provides employment and earnings data for Deschutes County, which constitutes a secondary analysis area as documented in the introduction. Overall employment and earnings in Deschutes County are approximately 1.5 times that of the 7 counties in the primary Study Area. The economy of Deschutes County is broadly diversified, although with a significant contribution from the healthcare and social assistance and retail trade industries. The impact analysis in the next chapter will document potential effects on Deschutes County's economy, as well as for the seven counties of the primary Socioeconomic Study Area.

Table 3-59, Unemployment, 2007 - 2012, presents the unemployment rates for each county in the Socioeconomic Study Area, as well as the rates for the seven counties aggregated and the State of Oregon. The data show that the Socioeconomic Study Area has experienced higher rates of unemployment than the State for each of the years listed. In September 2012 (the most recent date for which data are available as of this writing), the Study Area recorded an unemployment rate of 8.7 percent, compared to the State rate of 7.6 percent. At the county level, the unemployment rate ranged from a low of 7.5 percent in Union County to a high of 11.3 percent in Crook County. Unemployment in these counties could be more significant than these numbers suggest because many workers employed in part-time, seasonal, or transitional employment (Hanus 2011).

Table 3-59
Unemployment, 2007 - 2012

Geographic Area	2007	2008	2009	2010	2011	September 2012
Baker County, OR	5.8%	7.1%	10.2%	10.0%	10.4%	7.8%
Crook County, OR	6.2%	9.9%	17.8%	16.9%	14.8%	11.3%
Grant County, OR	8.1%	10.5%	13.4%	13.4%	13.4%	9.8%
Harney County, OR	7.3%	9.5%	16.0%	15.5%	14.4%	9.6%
Lake County, OR	7.3%	8.6%	12.4%	13.5%	12.9%	9.8%
Malheur County, OR	5.6%	7.5%	10.7%	10.5%	10.1%	7.8%
Union County, OR	5.5%	8.0%	11.4%	10.4%	9.8%	7.5%
Socioeconomic Study Area	6.1%	8.4%	12.7%	12.2%	11.5%	8.7%
Oregon	5.2%	6.5%	11.1%	10.7%	9.5%	7.6%

Source: BLS 2012b

During approximately the same period (2007-2011), per capita income in the Socioeconomic Study Area was somewhat below that of the State of Oregon, ranging from $27.5 thousand (2007) to $30.3 thousand (2011) for the Socioeconomic Study Area as a whole. This compared to between $35.6 thousand to $37.7 thousand for the State of Oregon. Per capita income was lowest in Malheur County and highest in Baker County, but in all counties in the Socioeconomic Study Area, it was lower than that of the State of Oregon (U.S. Department of Commerce 2012a).

Recreation

Approximately 4,806 jobs (17.6 percent of all private sector jobs in 2010) 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 includes industrial sectors that, at least in part, provide goods and services to visitors to the local economy and to the local population. It includes both full- and part-time jobs. Most of these jobs are concentrated in the "accommodation and food services" and "retail trade" sectors. The Socioeconomic Study Area's proportion of travel and tourism-related jobs was 2.5 percentage points higher than the national average of 15.1 percent in 2010. Jobs related to travel and tourism are more likely to be seasonal or part-time and more likely to have lower average annual earnings than jobs in non-travel and tourism-related sectors. The average annual wage per travel or tourism related job was $13,277 (2010 dollars) in the Socioeconomic Study Area in 2011, compared to $28,214 for private sector jobs not related to travel and tourism (Headwaters Economics 2012). [2]

Although much of the recreation use on BLM-administered lands is dispersed, and far from counting devices such as trail registers, fee stations, or vehicle

[2] All dollar values were converted to 2010 dollars using the Consumer Price Index (BLS 2012a).

traffic counters, approximations of the number of visitors to BLM-administered lands can be obtained from the BLM Recreation Management Information System (RMIS) database, in which BLM recreation specialists provide estimated total visits and visitor days to various sites within their resource area's boundaries.[3] **Table 3-60**, Visits by Resource Area, FY 2011, summarizes BLM visitation data in each resource area for fiscal year (FY) 2011 (i.e., the year ending September 30, 2011).

Table 3-60
Visits by Resource Area, FY 2011

Resource Area	Number of Visits
Andrews	74,107
Baker	257,210
Central Oregon	103,744
Jordan	241,613
Lakeview	188,900
Malheur	153,440
Steens Mountain CMPA	239,740
Three Rivers	170,758
Total	2,062,201

Source: BLM 2012p
CMPA Cooperative Management and Protection Area

Visitor expenditures can be approximated by using the RMIS data in conjunction with data from Forest Service, 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 non-local visitors, and "non-primary" visits (i.e., incidental visits where the primary purpose of the trip was other than visiting the National Forest being surveyed). **Table 3-61**, Visitor Spending from Recreation on BLM-Administered Land in Socioeconomic Study Area, FY 2011, summarizes individual and party visits and expenditures by trip type and estimated direct expenditure.

As the table shows, the estimated total visitor spending on BLM-administered lands in the Socioeconomic Study Area was about $144 million in FY11. It is important to note that this includes expenditures from local residents and

[3] In RMIS, 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. RMIS defines a *visitor day* as equivalent to twelve visitor hours.

Table 3-61
Visitor Spending from Recreation on BLM-Administered Land in Socioeconomic Study Area, FY 2011

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)
Non-local Day Trips	10	206,220	2.5	82,488	$63.68	$5.25
Non-local Overnight on Public Lands	9	185,598	2.6	71,384	$237.27	$16.94
Non-local Overnight off Public Lands	14	288,708	2.6	111,042	$522.63	$58.03
Local Day Trips	49	1,010,478	2.1	481,180	$33.56	$16.15
Local Overnight on Public Lands	4	82,488	2.6	31,726	$165.14	$5.24
Local Overnight off Public Lands	1	20,622	2.4	8,593	$216.48	$1.86
Non Primary Visits	13	268,086	2.5	107,234	$376.62	$40.39
Total	100	2,062,201	NA	893,647	NA	$144

Sources: White and Gooding 2012; BLS 2012a; BLM 2012n
NA: Not Applicable
1. National average for all National Forests, from White and Goodding (2012). Party spending per visit is converted from 2009 to 2010 dollars using the Consumer Price Index (BLS 2012a).

visitors whose use of public lands was incidental to some other primary purpose. The greatest portion of visitor spending came from overnight visits off of public land by non-local visitors ($58.03 million). The second largest portion of visitor spending came from non-primary visits ($40.39 million). Overnight visits off of BLM-administered land by local visitors made up the smallest portion of visitor spending ($1.86 million).

Grazing

Ranches in the study area include large corporate ranches and family ranches. Family ranches include both corporate and non-corporate operations, with the distinction referring to the fact that some families have legally incorporated to facilitate passage of the operations to their heirs. Farming employed approximately 6,769 people in the Socioeconomic Study Area in 2010, accounting for 10.9 percent of total employment. The average annual wage for a farm job in the Study Area was $23,562 in 2011. This was slightly lower than the average annual wage for a non-farm job ($25,021; Headwaters Economics 2012).[4]

Table 3-62, 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 Oregon as a whole.

Table 3-62
Farm Earnings Detail, 2010 (2010 dollars)

Geographic Area	Farm Earnings as Share of All Earnings	Agriculture and Forestry Support Activities Earnings as Share of All Earnings[1]	Farm Cash Receipts (Millions)	Share of Farm Cash Receipts from Livestock	Share of Farm Cash Receipts from Crops
Baker County, OR	0.8%	0.8%	$57.4	57.4%	42.6%
Crook County, OR	-2.5%	1.2%	$30.1	60.5%	39.5%
Grant County, OR	-0.1%	(D)[2]	$16.6	83.6%	16.4%
Harney County, OR	5.3%	(D)	$50.5	60.0%	40.0%
Lake County, OR	10.6%	(D)	$75.9	45.9%	54.1%
Malheur County, OR	6.8%	2.6%	$307.7	56.5%	43.5%
Union County, OR	3.4%	1.6%	$60.3	24.9%	75.1%
Socioeconomic Study Area	3.5%	1.4%	$598.5	53.3%	46.7%
Oregon	1.2%	0.4%	$4,039.1	33.3%	66.7%

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 shown to avoid disclosure of confidential information.

The table shows that, as noted earlier in this section, the relative contribution of farm earnings varies substantially across the counties, forming the largest share in Lake, Malheur, and Harney Counties. Agricultural services is an important contribution in several counties, although in some counties the data

[4] All dollar values were converted to 2010 dollars using the Consumer Price Index (BLS 2012a).

are not released for confidentiality reasons. Both livestock and crops provide substantial cash receipts, with some variations across the counties (e.g., livestock contributes 84 percent of receipts in Grant County while crops contribute 75 percent in Union County). Compared with the state as a whole, the share of farm cash receipts originating from livestock in the Socioeconomic Study Area was 20 percentage points higher.

Table 3-63, Active and Billed Animal Unit Months (AUMs) on BLM-Administered Land, presents information on active and billed AUMs in the Socioeconomic Study Area, on BLM-administered land within each Resource Area. The estimated expenditure data in the table are calculated from data from the US Department of Agriculture Economic Research Service (ERS), which publishes annual budgets for cow-calf operations for different production regions across the country (USDA ERS 2012). The BLM calculated a ten-year inflation-adjusted average expenditure per cow-calf operation from the ERS 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, the BLM estimates that the 10-year average expenditure in southeast Oregon is $50.24 per AUM, which is reflected in **Table 3-63**.

Table 3-63
Active and Billed Animal Unit Months on BLM-Administered Land

Resource Area	Active (2011)	% Billed (2011)	Billed (2011)	Cattle (%)	Sheep (%)	Other (%)	Allot-ments	Acres per AUM	Estimated direct expenditures (millions)
Andrews	66,237	65%	43,076	100%	0%	0%	43	17.4	$3.3
Baker	47,316	89%	42,133	99%	1%	0%	355	8.4	$2.4
Central Oregon	61,655	69%	42,685	98%	2%	0%	281	14.3	$3.1
Deschutes	55,465	50%	27,991	99%	0%	1%	170	12.5	$2.8
Jordan	187,016	84%	157,095	100%	0%	0%	50	13.6	$9.4
Lakeview	163,969	67%	109,159	100%	0%	0%	116	17.9	$8.2
Malheur	233,566	81%	189,316	98%	2%	0%	119	8.9	$11.7
Steens Mountain CMPA	29,682	64%	19,004	100%	0%	0%	21	11.6	$1.5
Three Rivers	154,013	74%	114,421	100%	0%	0%	186	10.9	$7.7
Total	998,919	75%	744,880	99%	1%	0%	1,341	12.7	$50.8

Sources: BLM 2012o; USDA ERS 2012; Workman 1986
CMPA Cooperative Management and Protection Area

The data in the table help to demonstrate the importance of livestock grazing, and especially cattle ranching, within the Socioeconomic Study Area, particularly in the Malheur, Jordan, Lakeview, and Three Rivers Resource Areas. 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.

Forestry and Wood Products

Timber-related industries in the Socioeconomic Study Area employed approximately 1,600 people in 2010, approximately 5.9 percent of total private sector employment, according to the US Census Bureau County Business Patterns. The proportion of employment associated with timber-related industries varied by county, with a low of 0 percent in Malheur County and a high of 17 percent in Crook County. These estimates include both full- and part-time jobs and reflect three timber-related industries: growing and harvesting, sawmills and paper mills, and wood products manufacturing. The share of timber-related jobs in the Socioeconomic Study Area, though historically low for the region, remains over eight times the national average of 0.7 percent (Headwaters Economics 2012).

Average annual earnings for timber-related jobs tend to be higher than for non-timber jobs. The average annual wage per job in this sector was $33,777 (2010 dollars) in the Socioeconomic Study Area in 2011, compared to $24,484 for non-timber private sector jobs.[5]

Renewable Energy Resources

Wind and geothermal energy are the focus of renewable energy development on BLM-administered lands in Oregon. There is one active wind farm on BLM lands in Oregon, located in the Baker Resource Area of the Vale District (BLM 2009a). The Baker Field Office also has one pending wind development project applications, five pending wind energy testing and monitoring applications, and one authorized ROW for wind testing and monitoring, as of 2011 (BLM 2011c, BLM 2013e).

The Andrews Management Unit and the Steens Mountain Cooperative Management and Protection Area (Andrews-Steens Planning Area) of the Burns District also have moderate wind energy resource potential (BLM 2004b). Wind developers have conducted testing and have found that there is enough wind to make projects viable in the area. Harney County has approved a wind farm on private land in the Steens area and BLM approved a powerline ROW to the private land. This action is currently under litigation. In the past BLM Burns District had as many as seven potentially viable wind sites. All but two of these sites have been relinquished. Three of the five relinquished sites had sage-grouse as a major conflict. On the two remaining sites, one developer has submitted an application for development. On the other site, the developer has submitted

[5] All dollar values were converted to 2010 dollars using the Consumer Price Index (BLS 2012a).

notice to BLM that they intend to move forward to development (BLM 2013e). There are four potential testing sites on non-BLM lands in the area.

The Lakeview Resource Area of the Lakeview District also has areas with potential for wind farm development (e.g., Christmas Valley, Coyote and Rabbit Hills, South Warner Rim; BLM 2003a). Two authorizations for wind testing have been approved (BLM 2013e).

Prineville District has one authorization in the testing phase (BLM 2013e).

As discussed in **Section 3.11**, Mineral Resources, the 2008 Geothermal Programmatic EIS identifies all of the socioeconomic study area as having potential for geothermal resources. The Malheur and Jordan Resource Areas of the Vale District have a large geothermal resource base, which includes the Vale Known Geothermal Resource Area (BLM 2001). However, according to the Office of Natural Resources Revenue, there has been no production of federal geothermal resources since at least 2007 (ONRR 2012).

Although wind and geothermal energy are the primary types of renewable energy development in Oregon, the potential for solar energy development also exists. The Lakeview Resource Area receives moderate to moderately-high solar radiation (BLM 2003a).

There is growing interest in biomass as a renewable energy source in the Socioeconomic Study Area (ODOE 2012). Where demand for woody biomass exists, local economies benefit from removing and utilizing woody biomass byproducts. These byproducts result from treatments such as those to restore sage-grouse habitat. Because the communities and businesses surrounding the juniper manufacturing economy are small, utilization projects can have considerable impacts on employment even at a small scale.

The Oregon Governor recently endorsed a new Oregon State Biomass Utilization Strategy that specifically identifies the need to increase juniper utilization in eastern Oregon. Additionally, the Governor designated an Oregon Solutions project called the Western Juniper Utilization Group that is currently addressing the gap between restoration treatments ongoing and planned in eastern Oregon and how to build a woody biomass-based restoration economy around this theme. This group is working with the Sagegrouse Conservation Partnership Group (SAGECON) so their outcomes can be aligned (Oregon State Government 2012).

Mining and Minerals

Mineral production is a relatively minor contributor to the economy of the Socioeconomic Study Area. Within the 7 counties, mining industries employed 103 people in 2010, or approximately 0.4 percent of total private sector employment (Headwaters Economics 2012). These estimates are based on data from the US Census Bureau County Business Patterns, which includes both full-and part-time jobs. Mining industries include "oil and gas extraction," "coal mining," "metals mining," "nonmetallic minerals mining," and "mining related" industries. The share of mining jobs in the Socioeconomic Study Area (0.4 percent) was slightly lower than the national average of 0.5 percent. However, the average annual earnings per mining-related job are approximately equal to non-mining private sector jobs. The average annual wage per job in this sector was $27,801 (2010 dollars) in the Socioeconomic Study Area in 2011, compared to $27,775 for non-mining private sector jobs (Headwaters Economics 2012).

There is currently no oil, gas, or coal production in the study area. Locatable minerals of commercial interest include diatomaceous earth, limestone, perlite, sunstone, bentonite, and gold. Table 3-46 of Section 3.11, Mineral Resources, shows claims, plans of operations and notices for locatable minerals in the planning area. Salable minerals are potentially present throughout the study area and include clay, cinders, sand and gravel, crushable rock, and common variety facing stone (Section 3.11, Mineral Resources).

Other Values

BLM-administered 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 BLM-administered 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 sage-grouse. This section and the related appendix describe the use and non-use non-market economic values associated with recreation, populations of sage-grouse, and land that is currently used for livestock grazing and ranch operations. The sections that follow discuss each of these values in turn. **Appendix Q**, Non-Market Valuation Methods, 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 lands. Those indicators describe the effects on the region but do not represent net economic value and cannot be added to the non-market values discussed here. Additional discussion is provided in **Appendix Q**, Non-Market Valuation Methods.

Values associated with recreation

Actions that promote the conservation of sage-grouse 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 BLM-administered lands, including sage-grouse. The Environmental Consequences analysis (Chapter 4) addresses this issue for each of the management alternatives. This section documents baseline non-market values visitors 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 Q**, Non-Market Valuation Methods, 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. Conducting original travel cost method studies can be time-consuming and expensive; for this project BLM 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 Q**, Non-Market Valuation Methods, visitors to natural areas, such as BLM-administered lands, gain values (in excess of their direct trip cost) ranging from approximately $26 per day for picnicking, to about $90 per day for hunting.

To calculate the aggregate "consumer surplus" value of recreation in the study area, the 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 (RMIS) database for the resource areas within the study area.

Accounting for the value per day and the number of days, the total non-market value of recreation on BLM-administered lands in the study area was estimated to be about $144 million per year. 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 camping, hunting, fishing, and the use of OHVs. These categories omit downhill skiing, because there is little or no overlap between sage-grouse habitat and lands used for downhill skiing.

Values associated with populations of sage-grouse

The existence and perseverance of the Endangered Species Act 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 Q**, Non-Market Valuation Methods, 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 Q**, Non-Market Valuation Methods, 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, the BLM reviewed existing literature to determine if there were existing non-use value studies for sage-grouse. No existing studies on valuation specific to the sage-grouse were found. However, there are several studies published in peer-reviewed scientific journals for bird species that the BLM judged to have characteristics similar to sage-grouse, 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 Q**, Non-Market Valuation Methods, 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 sage-grouse 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 the BLM 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 Q,** Non-Market Valuation Methods, provides more information about this method, as well as additional information to address potential non-market values associated with grazing.

Fiscal

Oregon has no state sales or use tax; the state government is funded primarily through personal and corporate income taxes, as well as other sources such as a state lodging tax. Local governments and special districts such as school districts rely primarily on property taxes; some local governments also charge lodging taxes (Oregon Department of Revenue 2010, 2012a, 2012b).

A 2012 audit report by the Oregon Secretary of State reviewed the financial condition of Oregon's 36 counties. Several counties in the state were facing financial hardship following the recent recession, given declines in important local revenues since 2008, such as property taxes and intergovernmental transfers. The report identified eight counties in particular risk of distress, none of them being in the Socioeconomic Study Area for this EIS. Counties at higher risk were often those more dependent on federal timber payments, scheduled to end, and not a major source of revenues for the counties in the Socioeconomic Study Area (Oregon Secretary of State 2012).

The primary local government revenues that are directly linked to BLM-administered lands are Payments in Lieu of Taxes (PILT), which are federal government payments based on the presence of all federal lands (not just BLM-administered lands) within each county. **Table 3-64**, Payments in Lieu of Taxes (PILT) Received in the Socioeconomic Study Area by County, 2010, shows the PILT payments each county received in 2010. The non-taxable status of federal lands is of interest to local governments, which must provide public safety and other services to county residents. The BLM revenue-sharing programs provide resources to local governments in lieu of property taxes because local governments cannot tax federally administered lands the way they would if the land were privately owned. Among counties in the Socioeconomic Study Area, PILT tends to be largest in Malheur County, where it was 12.5 percent of total revenues in FY2012 (Malheur County 2012).

Other revenues linked to public lands include timber receipts, livestock grazing fees, rent for mineral and geothermal leases, rents for ROW grants, and fees for

Table 3-64
Payments in Lieu of Taxes (PILT) Received in the Socioeconomic Study Area by County, 2010

Geographic Area	PILT (thousands)
Baker County	$700
Crook County	$310
Grant County	$578
Harney County	$995
Lake County	$995
Malheur County	$2,315
Union County	$822
Socioeconomic Study Area	$6,715

Source: DOI 2012
Includes payments received from BLM, Forest Service, Bureau of Reclamation, National Park Service, and Fish and Wildlife Service.

recreation permits. Some of these revenues collected by the federal government are returned to the state of origin.

BLM Expenditures and Employment

BLM offices provide a direct contribution to the economy of the local and surrounding area. BLM operations and management make direct contributions to area economic activity by employing people who reside within the area and by spending 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 3-65**, BLM Employment and Related Expenditures in the Socioeconomic Study Area, FY2011, provides available information on the number of employees at each District office. It also presents the contributions to the local economy, in terms of labor income, resulting from BLM operations and management expenditures.

Table 3-65
BLM Employment and Related Expenditures in the Socioeconomic Study Area, FY2011

Agency	District Office	Management Unit[1]	BLM Expenditures (FY2011 labor income, $thousand)	Number of Staff (in FY2011 FTEs)
BLM	Burns	Andrews Three Rivers	$1,627 $6,499	115
BLM	Lakeview	Lakeview	$6,373	96.5
BLM	Prineville	Central Oregon	$1,519	81.3
BLM	Vale	Baker Malheur-Jordan	$2,428 $9,457	169

Sources: BLM 2012r
[1] Including Burns, Prineville and Vale District Offices, the Steens Mountain Cooperative Management and Protection Area, the Vale National Historic Oregon Trail and the Vale Snake River Program.

Environmental Justice

Environmental justice pertains to the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the adverse environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies (BLM 2005d). The BLM incorporates environmental justice into its planning process, both as a consideration in the environmental effects analysis and by ensuring a meaningful role in the decision-making process for minority and low-income populations.

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 2005d) reiterates the 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.

According to the Council on Environmental Quality Environmental Justice Guidance Under the NEPA (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 same 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 3-66, 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 Oregon and the United States as a whole.

Table 3-66
Population Race and Ethnicity, 2010

Geographic Area	Total Population	Percentage 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]
Baker County, OR	16,134	94.6	0.4	1.1	0.5	0.1	1.0	2.4	3.3	7.4
Crook County, OR	20,978	92.7	0.2	1.4	0.5	0.1	3.2	2.0	7.0	10.6
Grant County, OR	7,445	95.0	0.2	1.2	0.3	0.1	0.9	2.3	2.8	6.6
Harney County, OR	7,422	91.9	0.3	3.1	0.5	0.0	1.3	3.0	4.0	10.4
Lake County, OR	7,895	90.3	0.5	2.1	0.7	0.1	3.1	3.3	6.9	13.0
Malheur County, OR	31,313	77.5	1.2	1.2	1.7	0.1	15.5	2.9	31.5	36.4
Union County, OR	25,748	93.1	0.5	1.1	0.8	0.9	1.3	2.3	3.9	9.0
Socioeconomic Study Area	116,935	88.9	0.6	1.4	0.9	0.3	5.5	2.5	11.9	16.6
Oregon	3,831,074	83.6	1.8	1.4	3.7	0.3	5.3	3.8	11.7	21.3
United States	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.

With the exception of Malheur County, all counties within the Socioeconomic Study Area have a lower minority population by percentage than Oregon or the United States as a whole. The dominant minority group in Malheur County is the Hispanic/Latino population, which makes up approximately 32 percent of the county's population. Also of note, Harney County has an Alaska Native or American Indian population that makes up approximately 3 percent of the county's population, which is two times as large as the percentage across Oregon as a whole.

Low-income Populations

Table 3-67, Low-Income Populations, 2006-2010 Average, summarizes the percentage of the population below poverty level in each county of the Socioeconomic Study Area and in Oregon and the United States as a whole.

Table 3-67
Low-Income Populations, 2006-2010 Average

Geographic Area	Percent Population Below Poverty Level
Baker County	19.9
Crook County	14.0
Grant County	14.4
Harney County	18.5
Lake County	17.5
Malheur County	22.7
Union County	16.1
Socioeconomic Study Area	18.2
Oregon	14.0
United States	13.8

Source: US Census Bureau 2010c

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 2012).

Of the 7 counties in the Socioeconomic Study Area, all but 1 have a greater percentage of residents below the poverty level than the overall Oregon percentage (14 percent). Crook County (14 percent) has the same percentage of residents below the poverty level as Oregon as a whole. Malheur County (22.7 percent) has the highest percentage of residents below the poverty level. The percentage of Baker County (19.9 percent) and Harney County (18.5 percent) residents below the poverty level are also substantially higher than Oregon as a whole.

To ascertain whether there are disproportionate effects of the alternatives on low-income populations, data on effects by each alternative will be reviewed and reported in Chapter 4.

Tribal Populations

There are 10 federally recognized Indian tribes in the State of Oregon: Burns Paiute Tribe; Confederated Tribes of the Warm Springs Reservation; Confederated Tribes of Coos, Lower Umpqua, and Siuslaw; Confederated Tribes of Grand Ronde; Confederated Tribes of Siletz; Confederated Tribes of Umatilla; Coquille Indian Tribe; Cow Creek Band of Umpqua Indians; Klamath Tribes; and Fort McDermitt Paiute and Shoshone Tribes of the Fort McDermitt

Indian Reservation (NCSL 2013). The Burns Paiute Reservation is located in Harney County (Burns Paiute Tribe 2012) and the Fort McDermitt Indian Reservation is located in the south of Malheur County (and Nevada). Tribes with traditional interests that lack ratified treaties within the Socioeconomic Study Area include the Confederated Tribes of the Warm Springs Reservation (BLM 2011c) and the Klamath Tribes (BLM 2003a). Traditional interests include fishing for resident and anadromous fish species, hunting large and small game, and gathering natural resources for subsistence and cultural purposes. Potential environmental justice impacts on the two tribes present in the Socioeconomic Study Area (Burns Paiute and Fort McDemitt Paiute and Shoshone) and the two tribes with traditional interests in the Socioeconomic Study Area (Confederate Tribes of the Warm Spings Reservation and Klamath Tribes) will be assessed in Chapter 4.

3.21 Cultural Resources and Tribal Interests

Cultural resources consist of the locations of human activity, occupation or use. The term "cultural resources" has been adopted and widely used to refer to a number of diverse site types, structures, objects and places created and used by people. The term includes "historic properties," which are places of traditional cultural and/or religious importance to Indian tribes as defined in the National Historic Preservation Act of 1966, "archaeological resources" as defined in the Archaeological Resources Protection Act of 1979, and other sites, structures, objects and places created and/or used by human cultural groups but addressed in other statutes/regulations such as the Antiquities Act of 1906, the FLPMA, the NEPA, and the National Trails System Act of 1968.

Cultural resources represent the full temporal range of human occupation and use from the continent's first peoples' arrival and settlement in Oregon over 14,000 years ago and subsequent tribal groups expansion and use throughout all of the Oregon sub-region and other parts of the west to more recent fur trappers, homesteaders, miners and ranchers of the last 200 years. Cultural resources can include buried artifacts and cultural features made and left by human cultures in archaeological sites; items built by past cultures (e.g., houses/house remains and activity areas); and places associated with traditional cultural uses (e.g., collection of native plant foods). More specific information on the types and characteristics of cultural resources in the Oregon sub-region can be found in the following sections.

Cultural resources are identified through field inventory, historic documentation, oral evidence or a combination of these methods. Where there is federal agency involvement, cultural resources are most frequently identified through compliance with Section 106 of the National Historic Preservation Act and related consultation with Indian tribes, the Oregon State Historic Preservation Office and other Section 106 parties. Section 106 requires that federally funded, approved, authorized, licensed, permitted, or assisted actions consider potential effects to historic properties that could occur due to the proposed actions.

Prior to initiating proposed actions for protection and enhancement of sage-grouse and sage-grouse habitat, the responsible field manager shall determine the area of potential effect; review existing information on known/anticipated historic properties that could be affected; seek information (in accordance with environmental review and land use planning processes) from Native American tribes and other parties likely to have knowledge of or concern with historic properties (including places of traditional cultural or religious significance); determine the need for field surveys or other actions to identify historic properties; make a good faith effort to identify and evaluate historic properties; assess and determine effects to historic properties; and identify measures to avoid, lessen or mitigate adverse effects to historic properties.

As proposed future actions related to sage-grouse protection and sage-grouse habitat improvements are identified on a site specific basis, these projects will require compliance and consultation with the revised national Programmatic Agreement (including BLM's 8100 Manual procedures) and the Oregon BLM-Oregon State Historic Preservation Office protocol.

3.21.1 Existing Conditions

Conditions of the Planning Area

Prineville District manages lands along two major rivers (Deschutes and John Day) that are a part of the central Columbia River Basin. Burns District, though mostly in the Great Basin, manages lands in the Malheur River Basin that are connected to the Snake River Basin. The presence of such rivers in these districts afforded the prehistoric (and some modern) indigenous people anadromous fish, a significant resource.

The BLM districts contain forested lands from just east of the Cascade Mountains in the west to the wide-ranging Blue Mountains north and east. Not only did forests provide specific resources to indigenous people, but they also attracted Euro-American settlers to engage in logging and lumber milling operations.

Another aspect of this region in Oregon is the concentration of economically important edible plants in various areas on each district. Many were primary sources of sustenance to the prehistoric inhabitants of the region and are still visited today for the same cultural uses.

In summary, Prineville and Burns Districts have many resources in common to varying degrees and in specific locales. This unity is apparent in the archaeological record. However, the degree to which each of the resources is common on the two districts also makes the intra-regional archaeological record somewhat diverse.

A number of different cultural areas are subsumed in this region. It contains a large component of Desert Culture geography but also is concentrated along rivers in the Columbia Plateau cultural area. These cultural areas roughly correspond to distinctly different indigenous groups with different languages and moderately different resource-based economic systems and social structures. In each district there are living descendants of each of the indigenous groups that have organized themselves into modern Indian tribes such as the Klamath, Modoc, Warm Springs, Paiute, and Shoshone.

Conditions on BLM-Administered Lands

The area contains populations of economically important plant resources with certain species dominating the rest depending on the region and the particular preferences of Indian tribes or individuals. Many rocky upland flats are likely to support populations of plants such as bitterroot, biscuitroot, Indian carrot, and other important root plants. Modern traditional food plant gathering focuses almost entirely on root crops and wild fruits especially if they are found near the various reservations. Other types of cultural food plants such as seeds are not collected today to the degree they were collected in former times. Cultural plants for weaving appear to be collected wherever they are found. Medicinal cultural plants are undoubtedly collected today, but practitioners of indigenous healing arts may not share plant location information as readily as those collecting plants for sustenance and weaving.

Geographic high places, locations with panoramic views or specific geological formations on BLM-administrated lands, may have spiritual connotations to the various Native American tribes. These places were the location of specific ritual practices or the landforms themselves play a part in indigenous mythology and storytelling. Some examples include Placidia Butte and Iron Mountain on Burns District are specific landform types that are clearly demarked from the surrounding geography and speak to indigenous mythology and storytelling; Glass Buttes and Little Glass Butte and associated obsidian sources comprise a large area and are considered by the Klamath Tribes as sacred. These types of traditional sites can be the most difficult to describe and quantify because they are uses that may span thousands of years and be associated with geographic locations where the BLM intends to pursue other resource management practices.

Buried open sites are defined as archaeological deposits that demonstrate the presence of buried, intact stratigraphic layers. They can range in complexity from small campsites devoted to a few days occupation over a span of many years to small pithouse hamlets and large village-like aggregations such as Skull Creek Dunes on Burns District and pit house villages on the Deschutes and John Day Rivers of Prineville District encompassing tens of acres or more. Obviously, not all buried sites are equal but each because of its stratigraphic integrity has something to add to archaeological record because chronological information is preserved. Buried open sites are limited in the classes of artifact that can be found within their deposits. Because they are subjected to annual wetting and drying, only artifacts made of stone and bone survive.

Buried open sites are likely to have received various destructive forces over the millennia. Natural geomorphic forces usually due to fluctuations in the climate regime have eroded some sites and buried others deeper over time. Other natural (and possibly cultural) phenomena such as wildfires periodically burned over these sites, exposing their surfaces to wind and water erosion before new vegetation could protect them. Modern activities such as road building, OHV, chaining and crested wheat grass seedings, juniper cutting and burning, logging, illegal artifact collection and looting, livestock and wild horse grazing, livestock reservoir construction, and spring developments have negatively impacted these sites to some degree. Any buried open sites within a few hundred yards of livestock congregation areas such as an open riparian area, spring development or playa lake waterhole is almost guaranteed to have been damaged and continue to be unless some mitigation measure is implemented to remove livestock from the site areas.

The most common site in the region is the prehistoric, shallowly buried or surface site. This site type accounts for 70 percent of the total number of sites. Shallowly buried sites are defined as those sites buried less than 40 centimeters deep. They can be as simple as a surface scatter of lithic debris from flint knapping to as complex as a seasonal camp with a diversity of artifact types. Many surface scatters are a mixture of different ages of materials eroded into one layer. As such, many mixed surface sites have limited information potential unless a researcher is willing to go to the effort and expense to unravel the chronological record. This unraveling can be done with aid of obsidian sourcing and hydration studies but will only be successful with an assemblage made of obsidian. Even if successful, the hydration data will only provide a relative chronology of the site, an inferior substitute for radiocarbon dating.

Shallowly buried sites are defined as those sites buried less than 40 centimeters deep. These sites rarely have obvious or intact stratigraphy mainly due to the winter conditions in the region. Many sites have a sediment matrix of with large proportions of clay particles. Any clay rich matrix swells and contracts with wetting and drying. In addition, moisture laden fine sediments expand when frozen and can be heaved vertically during the coldest part of the winter. These forces can destroy any intact stratigraphy and mix cultural materials in the upper 40 centimeters of the sediment matrix. The data found in multicomponent shallowly buried sites can then be well mixed and have limited data potential. Again, obsidian studies can unravel some of the damage caused by mixing but not without effort and expense probably not commensurate with the data retrieved. And again, the effort to unravel mixed cultural materials is limited to obsidian artifacts and debitage. As mentioned above, much of the region is rich in obsidian sources and the sites there are dominated by obsidian. Parts of the region (Columbia Plateau) not rich in obsidian are dominated by other lithic materials such as cryptocrystalline silicates and basalt. Neither of these two stone types can be successfully dated either in a relative or absolute sense.

Juniper structures, wickiup-like residential structures constructed of juniper poles supported by juniper trees and limbs and covered in juniper bark, have been recorded in Prineville District. First discovered in the late 1960s using a notation in 19th century Government Land Office surveyor notes, they may be associated with late prehistoric and early historic refuges where indigenous people escaped from conflict with Euro-American settlers. Other than initial recording of these small hamlets, they have received little notice from researchers. They possibly contain information important to a period of rapid culture change. These structures have not been found in the juniper forests of Burns District.

Juniper structures are high priority for preservation and research due their fragile nature and their potential to yield information about culture change in the early to mid-19th century. They are often in areas where juniper management is a high priority. Close interval (20 meters) inventory is recommended for juniper control projects in the vicinity of known juniper structures in order to locate and protect this site type.

The region contains many different historic structures, most located on homestead claims that either were not proved up or restored to the Government Land Office after a number of years. Remnants of small mining camps or small farmsteads containing a cabin, out building(s) and possibly a corral for livestock are the most common type of historic structures. In many cases they are in poor condition and have low integrity. If integrity is low and structures are in ruin, their significance is low. However, if integrity is high their significance can be much greater if they are associated with important people, events or representative of an architectural style. In addition, they can be stabilized or restored to original condition in consultation with historic architects. Their National Register significance should be established prior to stabilization or restoration efforts. Historic structures with moderate to high integrity are high priority for stabilization and restoration (protection) if they are considered eligible for nomination to the National Register of Historic Places or they can contribute to heritage tourism or interpretation efforts.

Historic linear features include rock fences, trails, wagon roads, old highways and communication lines such as telegraph or old phone lines. These features, especially trails, wagon roads and old telegraph/phone lines, are liable to be associated with important people and events in history. Historic trails and wagon roads can be chronological extensions of previous travel routes used by indigenous people in ancient times. Old highways can be representative of early transportation systems funded and built under the supervision of the various counties and State of Oregon. Old telegraph and telephone lines were used to connect fire watch towers and ranger stations within the National Forest

System lands as well as to connect isolated settlements to one another. Some of these sites signify the pioneering attempts in the region to improve communication. Rock fences are generally some of the first fences built by early ranchers in the region. Though arduous to build, raw materials for their construction were close at hand and plentiful and they required very little maintenance. Later wire fences were more expensive to build but did not require the high level of labor to construct.

All of these features can be significant if associated with important events or people in history. However, most of their importance is due to their geographic location. Some linear sites such as trails and wagon roads can contain other features that make them suitable for preservation for heritage tourism and interpretation. These examples are high priority for preservation, protection and interpretation.

3.21.2 Trends

Trends related to cultural resources measure the rate of change to cultural resources over time. Essentially, trends track impacts that are effectively altering the integrity or physical condition of cultural resources, both beneficially and adversely. Although an important level-of-effect indicator, it is often difficult to estimate. Rate of change is normally assessed during or following project construction.

New cultural resource discoveries have a progressive trend towards more sites being recorded and logged into the Oregon State Historic Preservation Office's cultural resource database due to increases in actions permitted by federal agencies. In general, the higher frequency of federal undertakings done in an area leads to a higher number of cultural resources being found. This is a direct result of several federal laws requiring project proponents to inventory their project areas and avoid damaging eligible or National Register of Historic Places listed sites.

The trend generally seen for cultural resource condition in Oregon sage-grouse habitats is regressive, moving from a stable or preserved state to damage or destruction due to numerous reasons, including weathering, visitor exposure which could increase the likelihood of vandalism, and general "wear and tear." However, preservation measures are viewed as mitigation to this downward trend, allowing proponents to avoid (the ideal mitigation) or reduce impacts.

Over the past 100 years, annual temperature and precipitation have increased, and climate models predict that they will continue to increase through the 21st century (NCSL 2008). Climate changes that result in warmer temperatures and lower levels of precipitation. This facilitates the invasion of non-native species, could lead to increased erosion, and loss of vegetation cover. All of these factors can contribute to more threats to cultural resources including increased erosion rates, less protective vegetation cover, and intense, bigger, and more frequent wild fires. Based on the trend it is anticipated that as the effects of climate change continue and increase, then the threat to cultural resources from climate change will also increase.

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CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

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**, Proposed Action and Alternatives. **Chapter 5**, Cumulative Impacts, presents the cumulative impacts. 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 RMPA, if any, to adopt.

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

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

Each resource section in this chapter discusses impacts on the resource in question from proposed management actions within each alternative. The proposed management actions within each alternative are presented in Chapter 2. Existing resource conditions within in the planning area are described in **Chapter 3**.

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 over the life of the plan, the analysis focuses on impacts that could eventually result in on-the-ground changes. No implementation-level decisions are part of this RMPA.

Some BLM 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.

Resource and resource uses that were not carried forward for detailed review and the reasons they were not carried through are included in **Table 4-1**, Resources and Resource Uses Not Carried Forward for Detailed Analysis.

Table 4-1
Resources and Resource Uses Not Carried Forward for Detailed Analysis

Resource/Resource Use	Rationale for Not Analyzing Resource or Resource Use in Detail
Air Quality and Climate Change	Implementing management for the protection of Greater Sage-Grouse (also referred to as sage-grouse or GRSG) generally involves reducing or otherwise restricting land uses and activities that generate air pollutants and greenhouse gases. Livestock grazing, travel, mineral extraction, wildland fires, and construction activities within ROW grants have all been identified as actions that generate emissions that affect air quality. Protecting areas from these activities for the purpose of protecting GRSG would also protect air quality from an increase in particulates, decreased visibility, and increased deposition and would reduce the amount of emissions generated in the area that contribute to climate change.
Fish and Wildlife (Fisheries and Aquatic Wildlife)	Implementation of GRSG conservation measures would generally have a beneficial effect on wildlife species. Specific effects would depend on location, scale, and timing of projects. These elements of a project are identified during the design and planning of specific projects. Thus, any effect on wildlife would be identified at the project design and implementation phase.
Cultural and Tribal Resources	The RMPA decision does not authorize ground-disturbing activities, so there are no anticipated effects on cultural resources from identifying conservation actions for GRSG protection.

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

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

- The BLM planning team's knowledge of resources and the project area
- Reviews of existing literature
- Information provided by experts in the BLM, 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 RMPA/EIS process. At times, impacts are described using ranges of potential impacts or in qualitative terms.

4.1.1 Analytical Assumptions

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

The following general assumptions apply to all resource categories. Any resource-specific or resource use-specific assumptions are provided in the methods of analysis section for that resource or resource use.

- Sufficient funding and personnel would be available for implementing the final decision.
- Implementing actions from any of the RMPA alternatives would be in compliance with all valid existing rights, federal regulations, agency policies, and other requirements.
- Implementation-level actions necessary to execute the RMP-level decisions in this RMPA would be subject to further environmental review, including that under NEPA, as appropriate.
- Direct and indirect impacts of implementing the RMPA would primarily occur on the public lands administered by the BLM 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, tools for predicting climate changes in a management area may improve and changes in climate may affect resources and necessitate changes in how resources are managed. Because of this, the BLM may be required to reevaluate decisions made as part of this planning process and to adjust management accordingly.

- The BLM 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 lands and federal mineral estate. There are approximately 15 million acres of BLM-administered lands in the decision area.
- GIS data have been used to develop acreage calculations and to generate the figures. Calculations depend on the quality and availability of data. Acreages and other numbers are approximate projections, for comparison and analysis 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 they were described qualitatively, when appropriate.
- New information may lead to changes in delineated GRSG habitat. Habitat areas found to have been incorrectly mapped (e.g., non-habitat inside PPMA or PGMA), or newly discovered leks and habitat areas that were missed in the most recent mapping efforts, may be identified. This adjustment would typically result in small changes to areas requiring the stipulations or management actions stated in this RMPA. Modifications to GRSG habitat would be updated in the existing data inventory through RMP maintenance.
- A reasonably foreseeable development (RFD) scenario serves as a basis for analyzing environmental impacts from future leasing and development of mineral resources within a decision area. A variety of factors (e.g., economic, social, and political) are beyond the control of the BLM and will influence the demand for mineral resources. Therefore, an RFD scenario is a best professional estimate of what may occur if public lands are leased. It is not intended to be a "maximum-development" scenario; however, it is biased toward the higher end of expected development and shows where the potential development might occur. Leasing and development of geothermal resources in the Oregon Sub-region are based on the RFD scenario in **Section 2.5**, Reasonably Foreseeable Development Scenario, of the Final Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States (BLM and Forest Service 2008). The RFD scenario was

created for a different analysis and not this RMPA/EIS. Additional information on the Final Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States is provided on the BLM Web site at http://www.blm.gov/wo/st/en/prog/energy/geothermal/geothermal_nationwide/Documents/Final_PEIS.html. RFD scenarios or supporting mineral potential reports were not completed for locatable minerals, salable minerals, conventional leasable minerals, or nonenergy leasable minerals.

4.1.2 General Method 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 as beneficial or adverse 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 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 Oregon; 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 RMPA.

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, analysis shown under Alternative A may be referenced in other alternatives with such statements as "impacts are the same as, or similar to, Alternative A" or "impacts are the same as Alternative A, except for…," as applicable.

4.1.3 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. Knowledge and information is, and will always be, incomplete, particularly with infinitely complex ecosystems considered at various scales.

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

Under FLPMA, the inventory of public land resources is ongoing and continuously updated. However, certain information was unavailable for use in developing the RMPA because inventories either have not been conducted or are incomplete. Examples of the major types of data that are incomplete or unavailable are GIS data used for disturbance calculations on private lands, site-specific surveys of cultural and paleontological resources, updating all of the lands with wilderness characteristics inventories, and mineral RFD scenarios and mineral potential reports.

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 RMP-level guidance. In addition, the BLM and other agencies in the planning area continue to update and refine information used to implement this plan.

4.2 Greater Sage-Grouse and Sage Grouse Habitat

This section discusses impacts on GRSG from proposed management actions within each alternative. Existing conditions concerning GRSG are described in **Section 3.2**.

4.2.1 Methods and Assumptions

Indicators

This analysis is organized by threats to GRSG as categorized in the USFWS's *12-Month Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered* (USFWS 2010a).

Greater Sage-Grouse (GRSG)

Indicators of impacts on GRSG are as follows:

- Acres of sagebrush habitat
- Habitat degradation or restoration
- Habitat fragmentation or connectivity
- Population loss
- Direct disturbance to GRSG
- Understory of sagebrush

Assumptions

Three general categories of disturbance to habitats or disruption are the most influential on GRSG and their habitat: 1) disturbance and disruption from casual use; 2) disturbance and disruption from permitted activity; and 3) changes in habitat condition, such as from fire or weed invasion. The assumptions listed below are intended for large-scale planning-level analysis; project-level assumptions for NEPA may differ:

The analysis includes the following assumptions:

- GRSG habitat designations (e.g., PPH and PGH; **Table 4-2**, Acres of Designated Sage-Grouse Habitat Types by Alternative) are assumed to represent habitat adequate to maintain GRSG populations in the subregion. For Oregon, GRSG habitat designations were derived from modeling efforts based on 75 percent Breeding Bird Density and 75 percent lek connectivity models as well as known winter habitat, connectivity considerations, and other factors.

Table 4-2
Acres of Designated Sage-Grouse Habitat Types by Alternative

Sage-Grouse Habitat Type	Alt A (No Action)	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
Preliminary Priority Habitat (PPH)	4,547,043	0	0	0	0	0
Preliminary General Habitat (PGH)	5,662,632	0	0	0	0	0
Core Areas	0	0	0	0	4,547,043	0
Low Density	0	0	0	0	3,923,539	0
Preliminary Priority Management Area (PPMA)	0	4,547,043	4,547,043	4,547,043	0	4,547,043
Preliminary General Management Area (PGMA)	0	5,662,632	5,662,632	5,662,632	0	5,662,632

Source: Oregon/Washington BLM 2013

- This analysis uses PPH and PGH categories for Alternative A only to facilitate comparison across the other alternatives. There are currently no BLM-administered lands formally designated as PPH or PGH within the sub-regional planning area.

- The Oregon sub-region RMPs being amended by this RMPA/EIS were not developed to directly manage PPH or PGH. This is because these habitat areas were not identified until after the RMPs were adopted. However, management actions and resource allocations in the RMPs can still affect PPH and PGH that happen to share the same area as a management action and resource allocation. In these instances, existing RMP management actions and resource allocations (which were adopted before the identification of PPH and PGH) influence these recently identified GRSG habitats and the species. Consequently, Alternative A identifies where resource allocations happen to coincide with PPH and PGH. Alternative A would neither result in the designation of PPH or PGH nor assign additional management actions to PPH or PGH.
- Habitat conditions and trends for each GRSG population area were determined by modeling vegetation dynamics such as wildfire, succession, insects and disease, habitat restoration projects (e.g., sagebrush seeding, grass seeding, and herbicide treatment of annual grass), prescribed fire, overgrazing, conifer encroachment and treatment, mechanical sagebrush treatment, and fuels reduction projects using the Vegetation Dynamics Development Tool (VDDT).
- Because GRSG are highly sensitive to habitat fragmentation, development, or changes in habitat conditions and require large, intact habitat patches to complete their annual life history, alternatives proposing to protect the most GRSG habitat from disturbance are considered of greatest positive impact. These impacts can be described both qualitatively and quantitatively.
- Seasonal ranges of migratory and non-migratory GRSG are largely encompassed within GRSG habitat designations but are not sufficiently mapped to provide an assessment of precise direct impacts.
- Impacts on GRSG accrue over distance depending on the type of development:
  - Impacts from transmission lines constructed before 2002 are likely fully manifested. Co-locating new lines would have no additional impacts if the direct and indirect habitat disturbance were not to exceed the width of the existing, directly disturbed ROW and additional structures are not required.
  - BMPs, RDFs, COAs, and standard operating procedures would be implemented for infrastructure to reduce impacts

on GRSG. These are subject to modification based on subsequent guidance and new science.

- Ground-disturbing activities could improve or degrade habitat or cause loss or gain of individuals, depending on the size of the area disturbed, the nature of the disturbance, the plant species affected, and the location of the disturbance; for example, juniper reduction treatments disturb the ground but could improve habitat in the long term.
- A 4.25-mile (6.9-kilometer) avian predator foraging distance is assumed to adequately encompass possible direct and indirect effects (Boarman and Heinrich 1999; Leu et al. 2008) in instances where increased predation from infrastructure (e.g. power lines, wind turbines, communication towers, agricultural and urban development) is a threat.
- Energy extraction such as oil and gas, geothermal, and plan of operation mining influence GRSG to 11.8 miles (19 kilometers) based on direct impacts of field development, including associated infrastructure, noise, lighting, and traffic (Johnson et al. 2011; Taylor et al. 2012).
- Interstate highways influence GRSG to 4.7 miles (7.5 kilometers) and paved roads and primary and secondary routes at 1.9 miles (3 kilometers) based on indirect effects measured through road density studies (Connelly et al. 2004; Holloran 2005; Lyon 2000)
- Site-specific disturbances such as small-scale mining and mineral material sites at 1.6 miles (2.5 kilometers) based on indirect influence distance from estimated spread of exotic plants (Bradley and Mustard 2006)

- Short-term impacts would accrue over a timeframe of up to 10 years. Long-term impacts would accrue over timeframes exceeding 10 years.

4.2.2 Nature and Type of Effects

Factors related to the decline in GRSG distribution and abundance include habitat loss and degradation, disease and predation, chemicals, inadequate regulatory mechanisms and changes in land use (USFWS 2010a). Habitat loss and fragmentation reduces the land area available to support GRSG. It also increases opportunities for other types of disturbance, such as human traffic, wildfire, and spread of invasive plant species.

Loss and fragmentation of sagebrush habitats and inadequate regulatory mechanisms are the primary causes of the decline of GRSG, as cited as Factor A in the USFWS *12-Month Findings for Petitions to List the Greater Sage-Grouse*

(Centrocercus urophasianus*) as Threatened or Endangered* (USFWS 2010a). Factors in declining populations from habitat fragmentation are reductions in lek persistence and attendance, population recruitment, yearling and adult annual survival, female nest site selection, nest initiation, and complete loss of leks and winter habitat (USFWS 2010a). Threats posed by conversion to agriculture, infrastructure, wildfire, invasive plants, conifer encroachment, energy development, and improper grazing by livestock, wild horses, and burros are all associated with loss, fragmentation and degradation of habitat. This impacts section focuses on the threats identified in the COT Report for Oregon: fire, invasive plants, conifer encroachment, energy development and mining, livestock grazing, free-roaming horses and burros, recreation, infrastructure, conversion to agriculture, urbanization, sagebrush elimination, and isolation. The COT Report threats for Oregon differ from the USFWS listing because the COT analyzed conservation threats by management zone and population area analysis to highlight the substantial threats to GRSG populations in each region (USFWS 2013a).

COT Report Threat—Fire

Wildfires have burned over 800,000 acres of GRSG habitat in the past decade and are one of the largest threats to GRSG habitat in Oregon. As discussed in **Section 3.2**, the 2012 fire season was record-setting; two major fires burned over 500,000 acres in Vale District, and an estimated 225,000 acres in the Burns and Vale Districts. Sagebrush recovers slowly from fire; most species do not resprout but must be 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 five years, but a return to a full pre-burn community cover can take 50 to over 100 years (Baker 2011).

While wildfire likely played an important historical role in creating a mosaic of habitat for GRSG, current and historic land-use patterns have restricted the system's ability to support wildfire. In Oregon 19th and early 20th century grazing practices, along with introduction and spread of invasive plant species and the practice of fire suppression in the 20th century, have all contributed to fire suppression and to increasingly destructive wildfires.

Slow rates of regrowth and recovery of sagebrush after disturbance, coupled with high rates of disturbance and conversion to introduced plant cover, are largely responsible for the accumulating displacement and degradation of the sagebrush ecosystem (Manier et al. 2013).

Impacts from Wildland Fire Management

Fire suppression may be used to maintain habitat for GRSG (NTT 2011). Fire suppression may preserve the condition of some vegetation communities, as well as habitat connectivity. This is particularly important in areas where fire frequency has increased as a result of weed invasion, or where landscapes are highly fragmented. Fire also increases opportunities for invasive species, such as cheatgrass (*Bromus tectorum*), to expand (Balch et al. 2012); fire suppression may limit this expansion. In Oregon, spreading cheatgrass and other invasive plant species pose a considerable threat. Wildfire is one of the largest factors contributing to GRSG habitat loss in Oregon (Manier et al. 2013), and growing evidence suggests that fire suppression may be promoting larger and more severe fires by increasing fuel buildup.

Controlled burning may be prescribed to treat fuel buildup and can assist in the recovery of sagebrush habitat in some vegetation types, especially when conifer encroachment is also a threat. Controlled burning can increase landscape heterogeneity, thereby reducing the risks of severe wildfire in large, homogeneous vegetation communities. Use of prescribed fire should be avoided in areas with less than 12-inch precipitation (e.g., Wyoming big sagebrush or other xeric sagebrush species; Connelly et al. 2000a; Hagen et al. 2007; Beck et al. 2009) and where the risk of increasing the abundance of exotic species is significant.

Reseeding with native plants and long-term monitoring to encourage the production of GRSG cover and forage plants would assist vegetation recovery (NTT 2011). While reseeding is not necessary after all controlled burns, it is important to avoid controlled burns in areas prone to invasive plant establishment. Furthermore the COT Report recommends avoiding controlled burning in low elevation sagebrush communities and using it sparingly and with great caution in high elevation sagebrush communities. The specifics of where, when, and how to use prescribed fire in GRSG habitat should be addressed in site-specific project planning in order to best fit management actions with desired outcomes.

Indicators of potential impacts on GRSG from wildfire under the proposed alternatives are acres of sagebrush habitat, habitat fragmentation and population loss.

COT Report Threat—Invasive Plant Species

Nonnative invasive plants are one of the most important factors causing loss of sagebrush habitat in Oregon (Hagen 2011). Invasive plants are thought to alter plant community structure and composition, productivity, nutrient cycling, hydrology and competitively exclude native plants. In particular, invasive plants can reduce and eliminate vegetation that GRSG use for food and cover, resulting in habitat loss and fragmentation, and may also increase the risk of wildfire. An assortment of nonnative annuals and perennials are currently invading sagebrush ecosystems.

Impacts from Vegetation Management

Landscapes with large, intact patches of sagebrush are preferred to avoid edge effects (degradation of habitat quality and disturbance to birds near habitat edges); in addition, GRSG require such habitats as a diversity of herbaceous species and healthy native grasses, making management for high quality habitat important (Knick et al. 2011). The distribution of sagebrush is limited and the cost of habitat restoration is high; because of this, management plans that protect intact sagebrush and restore impacted areas strategically to enhance existing habitats—that is, 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). Sagebrush-promoting vegetation treatments would increase the amount and quality of GRSG habitat.

Management and control of invasive weed species in GRSG habitat would decrease the spread of weeds. Weeds directly compete for resources (water) with native plants and indirectly increase the risk of fire (in the case of cheatgrass and medusahead) impacts on sagebrush. To reduce the likelihood of invasive weed spread and the extent of current infestations, the BLM uses integrated weed management techniques through weed control cooperative range improvement agreements (BLM 1992b). To reduce weed infestations, the BLM implements mechanical, chemical, and manual vegetation treatments and prescribed burning. Implementation of BMPs may also help reduce the likelihood that invasive plants become established in GRSG habitat. These conservation efforts would reduce the impacts of weeds on sagebrush and increase the availability of GRSG habitat.

Impacts from Wildland Fire Management

In addition, fuels management actions, as described above, can also reduce weeds and create fire breaks. Current treatments and active vegetation management typically focus on vegetation composition and structure for fuels management, habitat management, and productivity manipulation. All these techniques are used for improving the habitat and forage conditions for ungulates and other grazers, and for stabilizing surface soil in order to manipulate vegetation composition, increase productivity, or remove invasive plants (Knick et al. 2011). Distribution of these treatments can affect the distribution of GRSG and sagebrush habitats locally and across a region. Grazing reduces herbaceous cover and thus can limit fuel continuity and loads if applied annually before the grasses have cured (Connelly et al. 2004).

Indicators of potential impacts on GRSG from invasive plants under the proposed alternatives are acres of sagebrush habitat, understory of sagebrush, habitat degradation, and habitat fragmentation.

COT Report Threat—Conifer Expansion

The third most significant cause of loss of sagebrush habitat in Oregon is conifer expansion (Hagen 2011). Expansion of conifer woodlands, especially juniper (*Juniperus* spp.), while native to Oregon, threaten GRSG because they do not provide suitable habitat and mature trees displace shrubs, grasses, and forbs required for GRSG through competition for resources. Juniper expansion is also associated with increased bare ground and potential for erosion. Also, it offers additional perch sites for raptors; thus, woodland expansion may also represent expansion of raptor predation threat, which is similar to perches on power lines and other structures (Connelly et al. 2004). GRSG have been found to avoid habitats with increased predator perch sites (Freese 2009).

Impacts from Vegetation Management

To reduce the extent of conifer expansion, the BLM implements mechanical, chemical, manual vegetation treatments and prescribed burning. These conservation efforts are aimed at reducing the impacts of conifers on sagebrush and may increase the availability of GRSG habitat in the long term if treatment results are maintained.

Impacts from Wildland Fire Management

In addition, fuels management actions, as described above, can also reduce conifers and create fire breaks, though they may also contribute to habitat fragmentation.

Indicators of potential impacts on GRSG from conifer expansion under the proposed alternatives are disturbance to birds, population loss, acres of sagebrush habitat, habitat degradation, and habitat fragmentation.

COT Report Threat—Grazing and Wild Horse and Burro Management

Impacts from Livestock Grazing and Range Management

Livestock grazing has diffuse effects across the landscape. It influences vegetation dominance over time due to chronic selective pressure that affects perennial plant condition, interspecific competition, and composition (Connelly et al. 2004). The overall impact of livestock grazing on GRSG depends on site-specific management (USFWS 2010a). Grazing practices can be used to reduce fuel load (Davies et al. 2011), to protect intact sagebrush habitat, and to increase habitat extent and continuity (Connelly et al. 2004). Grazing can reduce the spread of invasive grasses, if applied annually before the grasses have cured. Light to moderate grazing does not appear to affect cover of perennial grasses important to nest cover (Strand and Launchbaugh 2013; Reisner et al. 2013). However, Reisner et al. (2013) also found that grazing can reduce density of native perennial bunchgrasses, and thus facilitate cheatgrass invasion.

Grazing at inappropriate intensity, season, or location may degrade sagebrush ecosystems over the long term, including changes in plant communities and soils. These impacts can lead to the following conditions:

- Loss of vegetation cover
- Reduced water infiltration rates and nutrient cycling
- Decreased plant litter on the soil surface
- Increased bare ground
- Decreased water quality

- Increased soil erosion, resulting in reduced overall habitat quality for GRSG (Knick et al. 2011)

Low grass height can reduce the suitability of nesting and brood-rearing habitat; grazing reduces the grass height of grazed or trampled plants. It may negatively impact GRSG nesting success (Beck and Mitchell 2000) by removing cover, increasing exposure to predators.

Livestock may occasionally trample birds or nests or may disturb and temporarily displace lekking or nesting GRSG during movement or trailing(Coates 2007), may directly compete with GRSG for available resources, and also may indirectly reduce invertebrates that are important for GRSG by reducing herbaceous vegetation,

Grazing infrastructure, such as water features and pipelines for livestock, can attract livestock to previously undisturbed habitat areas. This would artificially concentrate livestock impacts, such as heavy grazing and vegetation trampling (Braun 1998). As more reliable water developments are constructed, the individual effects of livestock at any one water source would be lessened as the congregation effects are spread to more areas. Specific levels of utilization at each water source would be dependent upon several factors, including, but not limited to: available forage, other water sources, stocking rate, and period/length of use. Furthermore, providing drinking water troughs and stock ponds for livestock can create puddles that serve as breeding grounds for mosquitoes that carry West Nile virus (Walker and Naugle 2011). GRSG may also use free water, although they do not require it because they obtain their water needs from their food. Information on the extent of habitat influenced by produced water and the net effects on GRSG populations is unknown (USFWS 2010a).

The BLM may use a number of mechanisms to reduce impacts from grazing on GRSG, if necessary. At the planning level, the BLM can decide where areas would be open and closed to livestock grazing. Future negative impacts would be eliminated in areas closed to grazing, but some past impacts would likely persist for some time. Closing grazing may result in other harmful impacts, such as fine-fuel buildup and increased fencing.

Other more localized changes in management could occur at the implementation level during the permit renewal process. This generally occurs every ten years but could occur before 10 years. Permits may be renewed with or without changes depending on the conditions of the resources. For example, at the implementation level, the BLM can consider changes in grazing practices or systems to ensure allotments meet rangeland health standards, or it can restrict new grazing infrastructure in GRSG habitat areas. These changes could reduce grazing intensity or change the season of use. In addition, changes in grazing management within riparian and wet meadows can reduce impacts in these important seasonal habitats, depending on the specific situation. As discussed above, it is possible for light to moderate grazing to occur without degrading GRSG habitat.

Fences (especially woven-wire fences) represent potential movement barriers to GRSG, predator perches, and predator travel corridors, making them a potential cause of direct mortality to GRSG (Braun 1998). Fences also contribute to habitat fragmentation (USFWS 2010a). Adjustments in grazing management practices that meet habitat suitability requirements would enhance habitat for GRSG (e.g., changes in season of use, duration, and adjustment in numbers).

Impacts from Wild Horse and Burros Management

While not as widespread as livestock grazing, wild horse and burro management is still a major land use across portions of the sagebrush biome. A horse consumes 20 to 65 percent more forage than a cow of equivalent body mass, due to physiological differences (Connelly et al. 2004). While horse and burro-induced changes can reduce total vegetative cover, lower sagebrush canopy cover, increase fragmentation of shrub canopies, and lower species richness at GRSG sites (Beever and Aldridge 2011). Additionally, because horses can use higher elevations and steeper slopes, horse occupancy reduces the occurrence of ungrazed areas of sagebrush (Connelly et al. 2004). Effects of wild horses on habitats may also be more pronounced during periods of drought or vegetation stress (NTT 2011, p. 18).

Besides the impacts of fencing on GRSG, water must also be available year-round in HMAs and wild horse territories (Wild and Free-Roaming Horses and Burros Act of 1971). This can lead to riparian areas receiving yearlong use by wild horses or riparian areas being modified with additional fencing and troughs in order to accommodate yearlong horse use. The range improvements would result in increased potential perch sites for avian predators and less water naturally available, and could possibly limit flow to riparian habitat.

Indicators of potential impacts on GRSG from livestock and wild horse and burro grazing under the proposed alternatives are disturbance to birds, population loss, acres of sagebrush habitat, understory of sagebrush, habitat degradation, and habitat fragmentation.

COT Report Threats—Energy Development and Mining

Energy development and mining are not among the largest threats to GRSG in Oregon. However, energy development can lead to impacts such as direct habitat loss, fragmentation of important habitats by roads, pipelines, and power lines, noise, and other human disturbance. Energy development may also have indirect effects on GRSG behavior or demographics due to noise and other disturbances. The effects of energy development often add to the impacts from other sources and can result in GRSG population declines. These declines associated with energy development result from the abandonment of leks, decreased attendance at the leks that persist, lower nest initiation, poor nest success, decreased yearling survival, and important wintering habitat avoidance in areas where there is energy infrastructure (Holloran 2005; Aldridge and Boyce 2007).

Energy development impacts GRSG and sagebrush habitats through direct disturbance and habitat loss from well pads, access construction, roads, power lines, and pipeline corridors. Its indirect effects are from noise, changes in water availability 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). Little coal, oil, or gas potential exists in the planning area, but wind and geothermal energy development potential is high (Manier et al. 2013).

Renewable energy facilities, including wind and geothermal power, typically require many of the same features for construction and operation as do nonrenewable energy resources. Therefore, impacts from direct habitat loss, habitat fragmentation through roads and power lines, noise, and increased human presence are generally similar to those discussed for nonrenewable energy development (USFWS 2010a). In a Wyoming study (LeBeau 2012), the presence of wind turbines negatively impacted GRSG nest and brood survival but did not appear to affect female survival.

Surface and subsurface mining for such mineral resources as gold, uranium, copper, phosphate, diatomaceous earth and aggregate, results in direct loss of GRSG habitat, if it occurs in sagebrush habitats. The direct impact from surface mining is usually greater than it is from subsurface activity. In otherwise undisturbed sagebrush, habitat loss from both types of mining can be exacerbated by the storage of overburden (soil removed to reach subsurface resource). If infrastructure is necessary, additional direct loss of habitat could result from structures, staging areas, roads, and power lines.

GRSG and nests could be directly affected by trampling or vehicle collision on access roads. GRSG could be impacted indirectly from an increase in human presence, land use practices, ground shock, noise, dust, reduced air quality, degradation of water quality and quantity, and changes in vegetation and topography (Brown and Clayton 2004). All these impacts may be reduced by adherence to state and federal regulations as well as BMPs and COAs.

The presence of new structures on the landscape would also contribute to indirect effects from potential avoidance behavior by GRSG (Freese 2009). 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. The number of displaying GRSG on 2 leks within 1.25 miles of active mines in northern Colorado declined by approximately 94 percent over 5 years, following an increase in mining activity, though limited recovery occurred subsequently (Remington and Braun 1991; Braun 1998). Studies have consistently reported that breeding GRSG were negatively impacted at conventional well pad densities (8 pads/2.6 square kilometers, or 1 pad per 80 acres). Declines in lek attendance by male GRSG and associated with these well densities ranged from 13 to 79 percent. A recent summary of studies investigating GRSG response to natural gas development showed impacts on leks from energy development were most severe when infrastructure occurred near leks. It also showed that impacts remained discernible to distances of up to four miles (Naugle et al. 2011). A 21 percent decline in GRSG population growth between pre- and post-mine development in one study was primarily attributed to decreased nest success and adult female annual 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).

Indicators of potential impacts on GRSG from energy development and mining under the proposed alternatives are disturbance to birds, population loss, acres of sagebrush habitat, habitat degradation, and habitat fragmentation.

COT Report Threat—Infrastructure

Impacts from Lands and Realty Management

Transmission lines and major power lines are widespread throughout GRSG range. The species responds negatively to increased human infrastructure in sagebrush habitats, including roads, power lines, and communication towers (Knick and Connelly 2011; Johnson et al. 2011). Although transmission line and power line construction does not generally result in substantial direct habitat loss, it would temporarily disturb individual GRSG and habitat along the ROW.

Following construction, GRSG avoidance of vertical structures, likely due to raptors perching on the structures, may result in habitat exclusion via behavioral response. One study reported that the frequency of raptor/GRSG interactions during the breeding season increased 65 percent; golden eagle interactions alone increased 47 percent in an area where a transmission line had been constructed (Ellis 1984).

In addition, fences are often associated with power lines and communication towers. As discussed above under grazing, fences also pose a hazard to GRSG from collision as well as providing perches for predators and increasing fragmentation risk. Stevens (2011, p. 108) in a study of GRSG and fence interactions in Idaho found several factors contributing to collision risk. Fences within 2 kilometers (approximately 1.25 mile) of leks, fence densities exceeding 1 kilometer of fence (0.6 mile) per square km (0.4 square miles), and flat terrain posed greater risk.

GRSG have been observed avoiding brood-rearing habitats within three miles of power lines (LeBeau 2012). Higher densities of power lines within four miles of a lek negatively influence lek attendance (Walker et al. 2007). ROW exclusion areas would prohibit all development of ROWs; in ROW avoidance areas, ROWs would be considered on a case-by-case basis. This flexibility may be advantageous where federal and private landownership areas are mixed and where exclusion areas may result in more widespread development on private lands. The 3 percent disturbance cap under certain action alternatives would protect GRSG habitat from excessive disturbance in ROW avoidance areas.

Travel management impacts are discussed under Recreation in this section.

Indicators of potential impacts on GRSG from infrastructure under the proposed alternatives are disturbance to birds, population loss, acres of sagebrush habitat, habitat degradation, and habitat fragmentation.

COT Report Threat—Recreation, Including Travel Management

Impacts from Recreation Management

Recreational use of GRSG habitat is benign in most situations; however, excessive use may disturb birds or nesting sites, degrade sagebrush habitat, or increase poaching (NTT 2011). Such activities as camping, bicycling, OHV use, and hunting utilize the network of BLM roads and trails that may impact sagebrush and GRSG. The disturbance is due to noise and dust, invasive plant spread, and wildlife behavior alteration (Knick et al. 2011). In addition, road and trail use may directly cause GRSG mortality via collisions with vehicles. Closing or seasonally restricting roads used by recreationists in and around seasonal GRSG habitats may reduce the impacts on wildlife. Restricting permitted access to important habitat areas, based on seasonal use and coincident with GRSG activities, would also protect GRSG (Knick et al. 2011; NTT 2011).

Indicators of potential impacts on GRSG from recreation include acres of sagebrush habitat, disturbance to birds, and population loss.

Impacts from Travel Management

Ecological impacts of roads and motorized trails include mortality due to collisions, behavior modifications due to noise, activity and habitat loss, alteration of physical environment, leaching of nutrients, erosion, spread of invasive plants, increased use, and alteration by humans due to accessibility.

Johnson et al. (2011) found that lek counts increased at greater distance from highways. In the Northern Great Basin, lek counts appeared to increase with distance to roads of any type (Johnson et al. 2011). Literature suggests increased road length, traffic levels, and traffic activity during the early morning within approximately two miles of leks all negatively influence male lek attendance (Holloran 2005; LeBeau 2012; Forman and Alexander 1998 and Lyon and Anderson 2003, cited in Manier et al. 2013).

Closing and reclaiming unused, minimally used, or unnecessary roads in and around GRSG habitat will reduce disturbance there and will increase GRSG habitat when the roads are reclaimed (NTT 2011).

COT Report Threats—Sagebrush Removal, Agricultural Conversion and Urbanization, and Isolation

Over time, sagebrush habitats have been lost to agriculture and urban development. Habitat loss also decreases the connectivity between seasonal habitats, increasing population isolation and susceptibility to stochastic events, such as disease or drought. This then increases the probability for the loss of genetic diversity and extirpation of the population (Knick and Hanser 2011).

In addition to reducing the land area available to support GRSG, habitat loss and fragmentation also increases opportunities for other disturbances, such as human traffic, wildfire, and invasive plant spread. While habitat conversion for agriculture is not directly tied to BLM management, land tenure decisions, such as acquisitions and disposals, can indirectly affect the acreage available for agriculture and urbanization. For example, if the BLM were to dispose of a land parcel characterized as sagebrush-steppe, the land could be converted to farmland or subdivided into home sites at the third party's discretion. Sagebrush habitat may be zoned as "Zone 1" and thus would be retained in BLM management. These lands would not be converted for agriculture or urbanization.

Indicators of potential impacts on GRSG from the conversion of habitat for agriculture include acres of sagebrush habitat, connectivity of habitat patches, and population loss.

Impacts from Land Tenure Decisions

Land tenure adjustments or withdrawals made in GRSG habitat could reduce the habitat available to sustain GRSG populations. Land exchanges designed to decrease fragmentation of habitat would help GRSG populations (NTT 2011).

Impacts from Special Designations Management

Special designations (e.g., ACECs, Wilderness, and WSAs) and other conservation may be designated to provide protection from population loss and habitat loss, fragmentation, or disturbance of GRSG and their habitats. Existing ACECs may also protect GRSG though they were not established for this purpose. While GRSG is not a relevant or important value in these ACECs, and thus management is not tailored to protect GRSG, some incidental protection may be conferred by restrictions on resource uses in existing ACECs, by protecting from habitat fragmentation, loss and human disturbance.

Indicators of potential impacts on GRSG from conversion to agriculture and associated threats under the proposed alternatives are population loss, acres of sagebrush habitat, habitat degradation, and habitat fragmentation.

4.2.3 Impacts Common to All Alternatives

Impacts from Vegetation Management

Under all alternatives, the BLM would continue to follow Integrated Vegetation Management Handbook (H-1740-2) policies for vegetation management. Application of these policies would control spread of invasive weeds, limit conifer expansion, restore sagebrush, and other activities which improve vegetation management in sagebrush habitat.

Impacts from Lands and Realty

Under all alternatives BLM IM 2013-142 (Regional Mitigation) would mitigate for lost habitat from development of ROWs or transmission line features.

There are no other impacts common to all alternatives.

4.2.4 Alternative A

While GRSG may be protected under existing provisions of some LUPs, Alternative A relies on management guidance that does not reflect the most up-to-date science regarding GRSG. Some of the older LUPs lack a landscape-level approach to land planning.

There is no consistently applied GRSG vegetation management across all land use plans, though Oregon Standards for Rangeland Health incorporate objectives for maintaining, improving, or restoring vegetation communities, particularly sagebrush and riparian and wetland habitats. As a result, there is general direction to preserve and improve vegetation communities; however, discrete human disturbances, such as road construction and mineral and ROW development, would continue, which could result in impacts on GRSG as described in Nature and Type of Effects.

COT Report Threat—Fire

Impacts from Wildland Fire and Fuels Management

Under existing management, prescribed burning may be used in support of resource management objectives, such as restoring grassland or shrubland, reducing conifer encroachment, and increasing age-class variety. The intention of prescribed burning is to improve wildlife habitat and vegetation production. Sagebrush treatments are designed to maintain sagebrush within the canopy at 15 to 50 percent and to increase succulent forbs in order to improve forage for GRSG and increase population stability.

Older LUPs are often less specific but are generally consistent in allowing use of fire to meet land management objectives, including enhancement or maintenance of healthy sagebrush ecosystems, though they often lack clear descriptions of desired conditions to guide use of fire. The guidance in newer plans is generally more specific with regard to desired conditions.

Under Alternative A, chemical weed treatments may also be applied following prescribed burns to limit the expansion of weeds or invasive species in the burned area. Rest periods following wildfire or controlled burn are determined on a site-specific basis. Intensive wildfire suppression would be applied to high-value areas, such as sagebrush, fire-sensitive woody riparian areas, and commercial forests.

Continuation of this management approach would protect sagebrush acreage, but could also contribute to fuels buildup, which directly threatens sagebrush ecosystems.

COT Report Threat—Invasive Plant Species

Impacts from Vegetation Management

Under Alternative A, current vegetation management would continue. Grazing methods, land treatments, and other improvements would be designed and monitored to accomplish objectives, including wildlife habitat needs. Noxious weed control would be the responsibility of the affected permittee or lessee under existing weed control cooperative range improvement agreements. Permittees and lessees would submit records and maps of treatment areas to the BLM annually. Current management programs designed to reduce weeds also benefit GRSG habitat.

Vegetation dynamics development tool (VDDT) modeling was completed to describe vegetative changes across all the alternatives for the short term (10 years) and the long term (50 years). **Table 4-3**, Projected Percentage of Sage-Grouse Habitat in Preferred Condition in the Oregon Sub-region After 10 Years, and **Table 4-4**, Projected Percentage of Sage-Grouse Habitat in Preferred Condition in the Oregon Sub-region After 50 Years, display these comparisons. No alternative approaches or reaches goal of 70 percent of the area with sagebrush cover of 10 to 30 percent after 10 years or after 50 years at a 1-percent treatment rate. In the absence of any treatment, habitat trend is downward for all populations, largely due to expansion of annual grass at approximately 0.1 percent per year.

While the Baker population was not modeled, the trends for Baker population are expected to be very similar to those modeled, likely sharing more similarities with trends in subpopulation 902 (subpopulation closest to Baker).

According to the VDDT model, for Alternative A, habitat trends are negative through year 50 for subpopulations 902 and 903, but up slightly by year 10 and generally stable through year 50 for subpopulations 904 and 906. For population P04, habitat trends are upward through year 50. Overall, habitat trend is slightly upward through year 10 and then declines back to current levels by year 50. None of the populations would reach the target of 70 percent cover of sagebrush in 10 or 50 years.

Table 4-3
Projected Percentage of Sage-Grouse Habitat in Preferred Condition in the Oregon Sub-region After 10 Years

Name of Population	Analysis Area[1]	Total Acres[2]	Current Habitat[3] (% of Area)	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
Northern Great Basin	902	3.219	43%	42%	43%	42%	42%	43%	43%
	904	5.600	56%	62%	63%	61%	62%	63%	63%
Western Great Basin	903	5.330	56%	54%	56%	55%	52%	54%	56%
	906	1.136	30%	35%	36%	35%	36%	36%	35%
Central Oregon	P04	2.905	44%	46%	47%	46%	45%	47%	47%
	All	18.190	50%	52%	53%	52%	51%	53%	53%

[1] Subpopulations 902 and 904 in Northern Great Basin population; subpopulations 903 and 906 in Western Great Basin population; subpopulation P04 is Central Oregon population; Baker population not modeled due to small area and BLM-managed lands (Connelly et al. 2004).
[2] Millions of acres, includes lands in adjoining states that are part of the subpopulation
[3] Habitat defined as sagebrush cover 10-30% with predominantly native species understory without juniper

Table 4-4
Projected Percentage of Sage-Grouse Habitat in Preferred Condition in the Oregon Sub-region After 50 Years

Name of Population	Analysis Area[1]	Total Acres[2]	Current Habitat[3] (% of Area)	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
Northern Great Basin	902	3.219	43%	40%	42%	37%	45%	41%	42%
	904	5.600	56%	62%	65%	59%	65%	65%	66%
Western Great Basin	903	5.330	56%	45%	52%	45%	48%	48%	52%
	906	1.136	30%	35%	38%	33%	43%	38%	37%
Central Oregon	P04	2.905	44%	50%	54%	48%	57%	53%	54%
	All	18.190	50%	50%	54%	48%	54%	52%	54%

[1] Subpopulation 902 and 904 in Northern Great Basin population; subpopulations 903 and 906 in Western Great Basin population; subpopulation P04 is Central Oregon population; Baker population not modeled due to small area and BLM-managed lands (Connelly et al. 2004).
[2] Millions of acres, includes lands in adjoining states that are part of the subpopulation
[3] Habitat defined as sagebrush cover 10-30% with predominantly native species understory without juniper

COT Report Threat—Conifer Expansion

Impacts from Vegetation Management

Under Alternative A, current vegetation management would continue. Older LUPs are not explicit about removing juniper to promote GRSG habitat, but all promote healthy sagebrush ecosystems. Newer plans include retention of pre-settlement trees and stands and provide approximate descriptors (e.g., trees older than 120 years in the Andrews and Steens RMPs). No plans necessarily target any one particular phase of juniper encroachment as phases had not been identified and described at the time the plans were prepared; however, costs and treatment success rates result in targeting primarily early phases of encroachment.

Grazing methods, land treatments, and other improvements under Alternative A would be designed and monitored to accomplish objectives, including wildlife habitat needs. Conifer removal projects would continue using mechanical means as well as controlled burns. These approaches would continue, subject to budget limitations, to have success in reducing juniper extent and cover.

COT Report Threat—Grazing and Free-Roaming Wild Horses and Burros

Impacts from Range Management

As shown in **Table 4-5**, Greater Sage-Grouse Habitat Open and Closed to Livestock Grazing by Alternative, currently, 12,126,923 acres in the planning area are open for livestock grazing and 345,848 acres are closed to livestock grazing. Within PPH, 4,492,467 acres are open to grazing, while 36,244 acres are closed. Within PGH, 5,501,821 acres are open to grazing, with 142,522 acres closed.

Table 4-5
Greater Sage-Grouse Habitat Open and Closed to Livestock Grazing by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
AUMs Available	924,617	924,617	0	915,624	924,617	350,208
Acres Open	12,126,923	12,126,923	0	11,982,637	12,121,617	7,495,716
Priority/Core	4,492,467	4,492,467	0	4,492,467	4,492,467	3,369,350
General/Low Density	5,501,821	5,501,821	0	5,438,898	3,824,263	4,126,365
Acres Closed	345,848	345,848	11,686,805	484,025	345,888	2,498,572
Priority/Core	36,244	36,244	4,528,711	101,652	36,244	1,123,116
General/Low Density	142,522	142,522	5,644,343	205,447	88,203	1,375,455

Source: Oregon/Washington BLM 2013

Livestock grazing would continue to be managed through existing grazing management plans unless monitoring and new information or assessments indicate a change is necessary in existing management. Methods and guidelines from the existing RMPs would be used to achieve land health standards, maintain ecological conditions, and enhance wildlife habitat during implementation of grazing regimens. Monitoring would be used to maintain the effectiveness of grazing management practices and integrated ranch planning used to plan allotments as single units.

For both livestock grazing allotments and wild horse and burro management, land health assessments and other management evaluations would support rangeland health standards, which would provide for the health of rangeland vegetation that also supports GRSG and other wildlife. Standards for Rangeland Health and Guidelines for Grazing Management require periodic assessments of range conditions and adjustments to grazing practices to improve ecosystem function, although the standards do not specifically address GRSG habitat needs.

Grazing management guidelines are less specific in older land management plans; however, Standards for Rangeland Health and Guidelines for Grazing Management will apply. Allowable grazing utilization levels can be adjusted during permit renewals and in annual operating plans to account for the current conditions. Newer plans often have some guidance related to drought, but IM 2013-094 provides detailed procedures for adjusting grazing during drought that apply to all LUPs. Application of permit modifications to limit vegetation loss would reduce the loss of sagebrush understory.

Range improvements under Alternative A would be designed to meet both wildlife and range objectives for livestock or wild horses and burros. Fences would be built or modified to permit passage of wildlife and to decrease GRSG risk of collision with fences. These modifications would reduce the risk of loss or disturbance of GRSG.

Where land health standards are not being met, livestock or wild horse and burro management will be modified to make progress towards achieving desired conditions and suitable habitat conditions for GRSG. Riparian habitats would be managed to achieve or make significant progress towards achieving proper functioning condition, to maintain desired plant community for wildlife habitat, to improve watershed conditions, and to protect riparian acreage from excessive livestock use. Restricting livestock or wild horse and burro use or changing timing and intensity of grazing in riparian areas would enhance riparian habitat for wildlife, including GRSG. These approaches would reduce the risk of habitat degradation or fragmentation from livestock or wild horse and burro grazing.

COT Report Threat—Energy Development and Mining

Impacts from Leasable Minerals Management

Energy development and mineral exploration and extraction directly disturb GRSG and their habitat, as described under **Section 4.2.2**, Nature and Type of Effects. Under Alternative A, fluid mineral leasing and development, including oil, gas and geothermal, would continue on previously leased lands, though not all leased areas will ultimately be developed. **Table 4-6**, Greater Sage-Grouse Habitat Open and Closed to Fluid Mineral Leasing, shows GRSG habitat open

Table 4-6
Greater Sage-Grouse Habitat Open and Closed to Fluid Mineral Leasing

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Acres Open	9,483,868	6,087,084	2,002,435	9,483,868	6,087,084	2,002,435
Priority/Core	3,396,784	0	0	3,396,784	0	0
General/Low Density	4,084,649	4,084,649	0	4,084,649	2,665,747	0
Acres Closed	3,134,159	6,530,944	10,615,593	3,134,159	6,530,944	10,615,593
Priority/Core	1,150,259	4,547,043	4,547,043	1,150,259	4,547,043	4,547,043
General/Low Density	1,577,983	1,577,983	5,662,632	1,577,983	1,263,044	5,662,632

Source: Oregon/Washington BLM GIS 2013.

and closed to fluid mineral leasing. **Table 4-7**, Percent of Populations Affected by Closure to Fluid Mineral Leasing – Alternative A, shows the percent of each population affected by closure under current management. Under some alternatives, areas would be open to leasing but stipulations would be applied to new leases. Less than 10 percent of each population within PPMA and less than 1 percent of each population within PGMA would be affected by closure to fluid mineral leasing under Alternative A. The greatest protections would occur in the Western Great Basin and Central Oregon populations within PPMA. Development in PPH and PGH would continue to cause impacts on GRSG as described under **Section 4.2.2**.

Table 4-7
Percent of Populations Affected by Closure to Fluid Mineral Leasing – Alternative A

Population	**Percent of Population Affected (based on acres of habitat affected)**	
	PPMA	**PGMA**
Baker	0.4%	0.02%
Northern Great Basin	1.5%	0.7%
Western Great Basin	9%	0.8%
Central Oregon	8%	0.4%
Total by PPMA and PGMA	*19%*	2%
Total	*21%*	

Note to all population tables: .Sage-Grouse Core Areas (PPMA) protect 90 percent of the sage-grouse population, representing over 550 lek sites in the Oregon sub-region across all land ownerships (ODFW 2012b; p. 84, Table 21). Approximately 67 percent of PPMA and 68 percent of Low Density habitat occur on BLM-administered lands (see Chapter 3, Table 3-1). Thus, the BLM extrapolates that 74 percent of the population (67% of 90%) would be affected by RMP allocations covering all of PPMA, and approximately 7 percent of the population (68% of 10%) would be affected by RMP allocations covering PGMA. Management applying to both PPMA and PGMA would affect approximately 81% of the population. Under this assumption, the BLM identified the percent of the GRSG population on BLM-administered lands in Oregon affected by the various BLM management allocations (closures, recommended withdrawals, etc.) in the tables.

Under existing regulations, permit stipulations such as NSO, CSU, or TL, on existing leases can be imposed only to the extent consistent with the rights of a mining claimant. Areas where TL stipulations are applied would be temporarily closed to exploration and development, surface-disturbing activities, and intensive human activity during identified timeframes. Some operations would be allowed at all times (e.g., vehicle travel and maintenance); however, construction, drilling, completions, and other operations considered to be intensive would not be allowed during the restricted timeframe.

Impacts from Mineral Materials (Salables), Nonenergy Leasable Minerals Management and Locatable Mineral Entry

Table 4-8, Greater Sage-Grouse Habitat Open and Closed to Nonenergy Leasable Mineral Leasing, shows acreage currently open and closed to nonenergy leasable mineral leasing; **Table 4-9**, Greater Sage-Grouse Habitat Open and Closed to Salable Minerals, shows acreage currently open and closed to salable mineral development. **Tables 4-10**, Percent of Populations Affected By Closure to Fluid Mineral Leasing – Alternative A, and **4-11**, Percent of Populations Affected By Closure to Salable Minerals – Alternative A, below show the percent of each population affected by closure and withdrawal under current management. Less than 10 percent of each population within PPMA and less than one percent of each population within PGMA would be affected by closure to salable mineral development under Alternative A. The greatest protections would occur in the Northern Great Basin and Western Great Basin populations in PPMA. Less than 1 percent of all populations would be affected by withdrawal from locatable mineral entry.

Table 4-8
Greater Sage-Grouse Habitat Open and Closed to Nonenergy Leasable Mineral Leasing

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Acres Closed (Priority/ Core and General/Low Density)	3,134,159	6,530,944	10,615,593	3,134,159	6,530,944	6,530,944
Acres Open Priority/ Core and General/ Low Density)	9,483,868	6,087,084	2,002,435	9,483,868	6,087,084	6,087,084

Source: Oregon/Washington BLM GIS 2013.

Table 4-9
Greater Sage-Grouse Habitat Open and Closed to Salable Minerals

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Acres Closed (Priority/ Core and General/ Low Density)	2,752,534	6,373,471	10,726,185	6,373,471	6,373,471	6,373,471
Acres Open Priority/ Core and General/ Low Density)	9,026,017	6,244,557	1,891,843	6,244,557	6,244,557	6,244,557

Source: Oregon/Washington BLM GIS 2013.

Table 4-10
Percent of Populations Affected By Closure to Fluid Mineral Leasing – Alternative A

Population	14.6%	Percent of Population Affected (based on acres of habitat affected)	
		PPMA	PGMA
Baker		0.4%	0.02%
Northern Great Basin		1.5%	0.7%
Western Great Basin		9%	0.8%
Central Oregon		8%	0.4%
Total by PPMA and PGMA		*19%*	*2%*
Total		*21%*	

Note to all population tables: .Sage-Grouse Core Areas (PPMA) protect 90 percent of the sage-grouse population, representing over 550 lek sites in the Oregon sub-region across all land ownerships (ODFW 2012b, p. 84, Table 21). Approximately 67 percent of PPMA and 68 percent of Low Density habitat occur on BLM-administered lands (Chapter 3, Table 3-1). Thus, BLM extrapolates that 74 percent of the population (67% of 90%) would be affected by RMP allocations covering all of PPMA, and approximately 7 percent of the population (68% of 10%) would be affected by RMP allocations covering PGMA. Management applying to both PPMA and PGMA would affect approximately 81% of the population. Under this assumption, the BLM identified the percent of the GRSG population on BLM-administered lands in Oregon affected by the various BLM management allocations (closures, recommended withdrawals, etc.) in the tables.

Table 4-11
Percent of Populations Affected By Closure to Salable Minerals – Alternative A

Population	Percent of Population Affected (based on acres of habitat affected)	
	PPMA	PGMA
Baker	<1%	<1 %
Northern Great Basin	7 %	<1 %
Western Great Basin	6 %	<1 %
Central Oregon	1 %	<1%
Total by PPMA and PGMA	15%	2%
Total	17%	

For locatable minerals, mitigation measures would continue to apply to the proposed plans of operation, as the law allows. Approximately 919,300 acres (four percent) of the total federal mineral estate are withdrawn from locatable mining claims; new mineral exploration or mining would be precluded on these lands under all alternatives. **Table 4-12**, Greater Sage-Grouse Habitat Recommended for Withdrawal from Locatable Mineral Entry, shows acreage recommended for withdrawal in GRSG habitat by alternative. The BLM would review plans of operation in withdrawn areas and would consider purchasing claims where activities threaten GRSG or their habitat. **Table 4-13**, Percent of Populations Affected by Withdrawal from Locatable Mineral Entry – Alternative A, shows the percent of each population affected by closure and withdrawal under current management.

Overall, under current management, GRSG could continue to be threatened by habitat loss, fragmentation, and degradation and disturbance as a result of energy development in habitat areas.

Table 4-12
Greater Sage-Grouse Habitat Recommended for Withdrawal from Locatable Mineral Entry

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Acres Withdrawn	996,760	996,760	996,760	996,760	996,760	996,760
Acres Recommended for Withdrawal	20,453	4,292,266	9,392,412	20,453	4,292,266	4,292,266
Acres Open	11,600,814	7,321,383	2,228,856	11,600,814	11,600,814	7,321,383

Source: Oregon/Washington BLM GIS 2013.

Table 4-13
Percent of Populations Currently Affected By Withdrawal from Locatable Mineral Entry – Alternative A

Population	Percent of Population Affected (based on acres of habitat affected)
Baker	<1%
Northern Great Basin	<1%
Western Great Basin	<1%
Central Oregon	<1%
Total	<1%

COT Report Threat—Infrastructure

Impacts from Lands and Realty

Under Alternative A, ROWs for utilities, pipelines, and other human purposes, including wind farms, are considered on a case-by-case basis outside of exclusion areas. ROW consideration includes an analysis of impacts on leks and other wildlife habitat, regardless of the planning designation on the area. To place a ROW in an avoidance area, a deeper analysis must be done to ensure compatibility with the reason for the avoidance area designation. To place a ROW in an exclusion area, a LUPA would have to be completed, requiring much more intensive analysis. The BLM's current management approach is to co-locate ROWs when possible, and existing infrastructure corridors were established in the most optimal location, considering wilderness, WSAs, and other factors. Existing ROW corridors also monitor and treat invasive plants under current management. Road policies are discussed below under Recreation.

There are currently 857,564 acres of exclusion areas within the planning area and 3,445,685 acres of avoidance areas. The collocation approach provides limited protection for GRSG habitat from ROW construction, which is a cause of fragmentation, degradation and disturbance to GRSG. **Table 4-14**, Greater Sage-Grouse within ROW Avoidance or Exclusion Areas, below shows ROW avoidance and exclusion areas under each alternative, and **Table 4-15**, Percent of GRSG Populations Affected by ROW Exclusion or Avoidance Areas-Alternative A, shows the percent of each population impacted. The Northern Great Basin and Western Great Basin populations have the greatest proportion within ROW avoidance and exclusion areas under Alternative A, with 10 to 14 percent of the populations affected. Current management already sites ROWs to minimize impacts on wildlife habitat, providing limited protection to GRSG from disturbance, habitat loss, and fragmentation.

Table 4-14
Greater Sage-Grouse Within ROW Avoidance or Exclusion Areas

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Exclusion	857,564	4,547,043	10,682,124	857,564	857,564	10,682,124
Priority/Core	257,154	4,547,043	4,547,043	257,154	4,547,043	4,547,043
General/Low Density	288,195	0	5,669,422	288,195	156,523	5,669,422
Avoidance	3,445,685	6,106,923	292,671	5,964,814	3,445,685	292,671
Priority/Core	1,336,146	0	0	4,289,889	1,336,146	0
General/Low Density	1,672,025	5,662,632	0	1,672,025	1,384,208	0

Source: Oregon/Washington BLM GIS 2013.

Table 4-15
Percent of GRSG Populations Affected by ROW Exclusion or Avoidance Areas-Alternative A

Population	Percent of Population Affected (based on acres of habitat affected)	
	Exclusion	Avoidance
Baker	<0.01%	<0.01%
Northern Great Basin	14%	10%
Western Great Basin	12 %	12%
Central Oregon	2 %	7%
Total	*28%*	*27%*

COT Report Threat—Recreation

Impacts from Recreation Management and Travel Management

Alternative A includes no specific recreation plan related to GRSG or their habitat. Recreation is one use of BLM roads. Under Alternative A, the BLM would continue to permit limited yearlong use for off-road vehicles, including aircraft landing, on the lands that it administers, which is a cause of disturbance to GRSG and degradation to their habitat. Currently, 5,123,070 acres are open to off-road motorized travel, 2,246,535 acres in PPH and 1,894,043 in PGH. Recreational use of wildlife habitat, especially OHV use, disturbs GRSG, potentially resulting in nest abandonment, and contributing to fragmentation of habitat. **Table 4-16**, Percent of the GRSG Affected by Travel Management Designation under Alternative A, shows the percent of the GRSG population within the decision area affected by travel management designations under current management. Nearly half of the GRSG population occurs in areas open to OHV use, with less than 2 percent in areas currently closed to OHV use.

Table 4-16
BLM-Administered Acres of PPMA and PGMA and Percent of GRSG Affected by Travel Management Designations under Alternative A

Allocation	PPMAs	PGMAs	% Population Affected
	(acres)		
Closed	48,450	143,637	1.7%
Limited	1,828,999	2,576,796	33%
Open	2,669,145	2,940,051	48%

Under Alternative A, road and trail development is minimized in crucial big game or upland bird habitat; roads would be closed to OHV traffic where substantial resource impacts occur, including harm to wildlife or habitat. These policies would help limit disturbance of GRSG habitat during the nesting season.

COT Report Threats—Sagebrush Removal, Agricultural Conversion, and Urban Development

Impacts from Land Tenure Decisions

Land tenure adjustments would be subject to current disposal, exchange, and acquisition criteria. These include retaining lands with threatened or endangered species, high quality riparian habitat, or plant and animal populations or natural communities of high interest. This would likely include retaining or protecting areas with GRSG, which would maintain occupied habitats. Thus, management under existing land tenure criteria would retain GRSG habitat and other lands with high value to wildlife.

Sagebrush removal, a threat listed in the COT Report, is equivalent to loss of habitat, which is one of the indicators for GRSG. Loss of sagebrush habitat is discussed as a possible outcome from many of the threats (fire, invasive plants, conifer expansion, grazing, energy development and mining, and infrastructure); management approaches to remedy these threats will also reduce sagebrush removal

Impacts from ACECs

No new ACECs to benefit GRSG would be designated under Alternative A. In PPH, 200,399 acres of existing ACECs would remain, along with 251,233 acres in PGH. While GRSG is not a relevant or important value in these ACECs, and thus management is not tailored to protect GRSG, some incidental protection may be conferred by restrictions on resource uses in existing ACECs.

Summary

Alternative A (current management) provides protection for GRSG through existing LUPs, which do not specifically protect GRSG habitat but protect important wildlife habitat and range quality. Newer land use plans would provide more specific protection to sagebrush than older plans, allowing for differing interpretations over time and creating uncertainty whether desired outcomes would be achieved. Alternative A has similar goals and objectives in many RMPs but puts few restrictions on energy or infrastructure development in habitat areas. Alternative A also maintains existing programs for land health assessment, control of invasive plants, and consideration of wildlife habitat.

4.2.5 Alternative B

Under Alternative B, the BLM would manage lands to conserve, enhance, and restore GRSG habitat. Restrictions on resource uses such as ROW and mineral development would reduce habitat loss and degradation for GRSG, and to minimize loss of habitat connectivity and disturbance to populations. PPMA and PGMA would be designated (**Table 4-2**) and the BLM would implement numerous conservation measures, as described under the resource headings below, to reduce impacts from human activities in PPMA, including a maximum three percent disturbance cap to human activities, not including fire, in PPMA.

The National Technical Team (2011) recommended managing priority GRSG habitats such that discrete anthropogenic disturbances cover less than three percent of the total GRSG habitat, regardless of ownership. GRSG have low tolerance to human disturbance, such as roads, oil and gas developments, and urban development, especially during the breeding season (Leu and Hanser 2011). Knick et al. (2013) reported 99 percent of leks (N = 3184) known to be active between 1998 and 2007 were in landscapes with less than 3 percent development, and all lands surrounding leks were less than 14 percent developed.

COT Report Threat—Fire

Impacts from Wildland Fire Management

Fire and fuels management actions proposed under Alternative B would protect mature sagebrush acreage from loss and GRSG from the disturbance associated with wildfire and prescribed burning. The management approach, however, could also lead to fuel buildup, which can result in more damaging fires over the long term. Fuels treatment would be designed and implemented with an emphasis on promoting sagebrush, after threats to life and property, reducing fire intensity for increased public and firefighter safety, protection of values at risk and promoting healthier, more resilient sagebrush landscapes. Sagebrush canopy would not be reduced below 15 percent unless fuels management objectives required it, and seasonal restrictions would be applied to fuels management. Rest periods would be required and invasive species controlled with native seeds used for treatment wherever possible. Grazing livestock would be considered as an option to reduce fuel load. Grazing can be used to reduce fine fuel loading of grasses and forbs; however, heavy grazing can lead to changes in composition favoring non-palatable invasive plant species, which can in time lead to additional fuel management problems.

Priorities for fire suppression in Alternative B are not explicit but are consistent with the intent of the Federal Wildland Fire Management Policy. Desired conditions for sagebrush are not stated clearly enough in the alternative to provide sufficient guidance for use of fire or other fuel treatments. Alternative B strongly discourages use of prescribed fire in the Warm-Dry Sagebrush group, which can lead to a homogenous fuel bed where large expanses of high sagebrush density exist. Such homogeneous fuel beds typically produce highly damaging fires.

The alternative relies on fuel breaks to manage wildfire risks in Warm-Dry Sagebrush Group, but fuel breaks are generally ineffective on the 2 percent of wildfires that severely degrade or destroy most GRSG habitat (Louisa Evers, personal communication). VDDT vegetation modeling (**Tables 4-3** and **4-4**) showed no effect on habitat trends from reducing the probability of fire by 50 percent in the Warm-Dry Sagebrush Group in Alternatives B, D, E, and F to account for fuel breaks.

The proposed actions under Alternative B would likely reduce the disturbance to GRSG, habitat loss and degradation impacts described in Section 4.2.2, and would increase the protection of sagebrush within PPMA and PGMA compared with Alternative A.

COT Report Threat—Invasive Plant Species

Impacts from Vegetation Management
Current management programs (Alternative A) are already designed to reduce weeds, which benefits GRSG habitat. Noxious weed control would be the same under Alternative B as Alternative A. The Standards for Rangeland Health and Guidelines for Grazing Management would still apply. In areas with older LUPs, there is higher uncertainty that desired outcomes would be achieved, since desired standards and targets for weed reduction were often not specified in these plans.

Habitat restoration and vegetation management actions under Alternative B would prioritize restoration to reduce GRSG habitat loss, degradation, and fragmentation. The restoration and management of vegetation actions under Alternative B would require the following:

- Using native seeds in most circumstances
- Designing post-restoration management to ensure the long-term persistence of restoration
- Considering changes in climate
- Monitoring and controlling invasive species

Native seeds and post-restoration monitoring may already be occurring under current management, but Alternative B would make consideration of these factors mandatory in GRSG habitat. However, the restoration levels for crested wheatgrass seedings and livestock utilization levels are not specified, increasing the uncertainty of achieving desired outcomes.

Alternative B habitat trends from VDDT vegetation modeling (**Tables 4-3** and **4-4**) are generally stable through year 10 then begin slow decline through year 50 for sub-populations 902 and 903. For sub-populations 904, 904 and P04, habitat trends are slowly upward through year 50 with P04 showing the greatest increase by year 50 (more than 10 percent). Overall habitat trend is upward through year 50 with greatest increase in the first 10 years. Reducing the probability of fire by 50 percent in the Warm-Dry Sagebrush Group in Alternatives B, D, E, and F to account for fuel breaks had no effect on habitat trends.

COT Report Threat—Conifer Expansion

Impacts from Vegetation Management

Current management programs (Alternative A) are already designed to reduce conifer spread, which benefits GRSG habitat. Habitat restoration and vegetation management under Alternative B also would prioritize restoration to benefit GRSG habitat. As a result, the restoration and management of vegetation actions would enhance GRSG habitat under Alternative B by requiring the following (which may already be occurring under current management):

- Using native seeds in most circumstances
- Designing post-restoration management to ensure the long-term persistence of restoration
- Monitoring and controlling invasive species.

COT Report Threat—Grazing and Free-Roaming Wild Horses and Burros

Impacts from Livestock Grazing and Range Management

Under Alternative B, acreage open for livestock grazing and available AUMs are the same as under Alternative A (**Table 4-5**). Impacts on GRSG habitat from grazing, as described under **Section 4.2.1**, would continue under Alternative B. However, AMPs, integrated ranch planning, and land health assessments in PPMA would be used to incorporate GRSG management objectives into grazing permit renewals for livestock or wild horses.

Because livestock grazing utilization levels are not specified under this alternative, management would default to existing plans. Standards for Rangeland Health and Guidelines for Grazing Management would continue to apply. Allowable utilization can be adjusted during permit renewals and in annual operating plans to account for the current conditions. Grazing infrastructure, such as water features and pipelines for livestock, would be concentrated away from wildlife habitat areas to minimize vegetation trampling. Standing water for livestock would not be placed in GRSG habitat to minimize spread of West Nile virus.

Fences in PPMA areas identified as detrimental to GRSG would be removed, modified, or marked to reduce collisions and mortality to birds.

Because guidance for livestock grazing management during drought is very general, priorities for assessments are not provided, no additional assessment other than what would occur under existing direction is described or required, and desired conditions are not clearly defined, this alternative is unlikely to improve livestock grazing management over Alternative A.

Impacts from Wild Horses and Burros Management

Incorporating GRSG habitat objectives and focusing land health assessments within HMAs would increase the potential that habitat issues are discovered and addressed sooner. The habitat assessments would incorporate recommendations from the HAF. Over time, this approach would improve sagebrush habitat quality and reduce habitat loss for GRSG caused by wild horse and burro grazing.

COT Report Threat—Energy Development and Mining

Under Alternative B, disturbance to GRSG from energy development and mining activities would be maximally avoided by closing all PPMA to unleased fluid minerals, nonenergy leasable minerals, and salable minerals. For locatable minerals, the BLM would recommend withdrawal of all PPMA from mineral entry. RDFs would avoid or minimize impacts in PPMA, to the extent the law allows.

By closing all PPMA to mineral development, it is possible that mineral activity would be pushed onto private lands where impacts would occur and would not need to be mitigated. Also, if the activity is pushed onto private lands, the BLM would have no control over reclamation requirements.

Impacts from Leasable Minerals Management

Geophysical exploration would be allowed within PPMA but only for obtaining information on fluid mineral resources, including geothermal, in adjacent areas outside of PPMA. Impacts on GRSG and their habitat would continue as a result of existing fluid mineral leases; however, RDFs and conservation measures would be applied to existing leases as COAs. In comparison to Alternative A, these measures would further reduce the impacts discussed under Section 4.2.1. **Table 4-17**, Percent of GRSG Populations Affected by Closures to Fluid Minerals - Alternative B, shows the percentage of each population impacted by closure to fluid mineral leasing under Alternative B. Approximately one-third of the Northern Great Basin and Western Great Basin populations would be

Table 4-17
Percent of GRSG Populations Affected by Closures to Fluid Minerals - Alternative B

Population	Percent of Population Affected (based on acres of habitat affected)	
	PPMA	PGMA
Baker	>2%	0.02%
Northern Great Basin	35%	0.7%
Western Great Basin	31%	0.8%
Central Oregon	6%	0.4%
Total by PPMA and PGMA	74%	2%
Total	76%	

protected by closure to fluid mineral leasing, while less than 10 percent of the Baker and Central Oregon populations would be affected.

Impacts from Mineral Materials (Salables) and Nonenergy Leasable Minerals Management

The policies proposed under Alternative B for mineral materials, nonenergy leasables, and locatable minerals are designed to protect sagebrush habitat from further degradation and fragmentation from these threats. In existing lease areas, surface facilities would be located outside PPMA or would be collocated in existing disturbed areas to the extent possible. In PGMA, surface disturbances would be minimized during activity level planning.

Table 4-18, Percent of the Populations Affected by Closures to Salable Minerals - Alternative B, shows the percentage of each population impacted by closure to salable minerals under Alternative B. Approximately one-third of the Northern Great Basin and Western Great Basin populations would be protected by closure to salable minerals, while less than 10 percent of the Baker and Central Oregon populations would be affected.

Table 4-18
Percent of the Populations Affected by Closures to Salable Minerals - Alternative B

Population	14.6%	Percent of Population Affected (based on acres of habitat affected)	
		PPMA	PGMA
Baker		>2%	<1 %
Northern Great Basin		35%	<1 %
Western Great Basin		31%	<1 %
Central Oregon		6%	<1%
Total by PPMA and PGMA		74%	2%
Total		76%	

In areas that cannot be completely closed to leasable mineral development or withdrawn from locatable mineral entry, the BLM could impose a NSO buffer around leks and/or a 3 percent surface disturbance threshold in PPMA to the extent allowed by law. Once the 3 percent disturbance cap is met, no new surface disturbance would be allowed in PPMA until restoration has occurred.

For locatable minerals, areas in PPMA would be recommended for withdrawal from mineral entry based on risk to GRSG habitat. Existing claims would be subject to validity examination or buyout. Validity examinations or buyouts are expensive and time-consuming operations; if claims are found to be valid the result could be loss of BLM land use controls. Buyouts would require a mineral appraisal, another resource-intensive task.

Table 4-19, Percent of the Populations Affected by Recommended Withdrawals from Locatable Mineral Entry - Alternative B, shows the percentage of each population impacted by recommended withdrawal of locatable mineral entry under Alternative B. Approximately one-third of the Northern Great Basin and Western Great Basin populations would be protected by recommended withdrawal of locatable mineral entry, while less than ten percent of the Baker and Central Oregon populations would be affected.

Table 4-19
Percent of the Populations Affected by Recommended Withdrawals from Locatable Mineral Entry - Alternative B

Population	Percent of Population Affected (based on acres of habitat affected)
Baker	>2%
Northern Great Basin	35%
Western Great Basin	31%
Central Oregon	6%
Total	74%

COT Report Threat—Infrastructure

Impacts from Lands and Realty Management
As shown in **Table 4-10**, PPMA would be managed as ROW exclusion areas (4,547,043 acres); PGMA would be managed as ROW avoidance areas (5,662,632 acres). ROW exclusion areas would protect GRSG habitat and reduce habitat fragmentation on BLM-administered lands as described under **Section 4.2.1**. ROW avoidance areas would also protect GRSG habitat but to a lesser degree than ROW exclusion areas.

The percentage of each population impacted by ROW exclusion or avoidance areas (including for wind) are shown in **Table 4-20**, Percent of GRSG Populations Affected by ROW Exclusion or Avoidance Areas – Alternative B.

Table 4-20
Percent of GRSG Populations Affected by ROW Exclusion or Avoidance Areas – Alternative B

Population	Percent of Population Affected (based on acres of habitat affected)	
	Exclusion	Avoidance
Baker	<2%	<1%
Northern Great Basin	35%	2%
Western Great Basin	31%	3%
Central Oregon	6%	2%
Total	*74%*	*7%*

Approximately one-third of the Northern Great Basin and Western Great Basin populations would be protected by ROW exclusion areas, while less than 10 percent of the Baker and Central Oregon populations would be affected. Less than 5 percent of all populations would be protected by ROW avoidance areas.

By not allowing ROWs on BLM-administered land within PPMA, all infrastructure in GRSG habitat areas would be forced onto private lands. This could cause increased fragmentation to private lands and may result in more widespread loss of GRSG habitat to infrastructure.

Alternative B also calls for relocation of designated infrastructure corridors outside habitat areas; however, this re-location is unlikely to be feasible because corridors were established in optimal locations and alternative locations are not available. Existing transmission corridors should be consolidated, and those in PPMA which cannot be re-located would be buried where feasible. New infrastructure would be avoided in key connectivity corridors. These corridors have been identified in Core Areas, but not outside such areas.

COT Report Threat—Recreation

Impacts from Recreation Management
SRPs would be issued in habitat areas only where the effects of recreation use were neutral or beneficial to GRSG habitat. OHVs would be limited to existing routes in PPMA.

Impacts from Travel Management
The BLM would limit motorized vehicles to existing roads and trails until travel management planning evaluates roads for permanent or seasonal closure. Route construction in PPMA would be limited to realignments or built to minimum standards necessary, and redundant roads would be rehabilitated. **Table 4-21**, BLM-Administered Acres of PPMA and PGMA and Percent of Oregon Populations within Travel Management Designations under Alternative B, shows

Table 4-21
BLM-Administered Acres of PPMA and PGMA and Percent of Oregon Populations within Travel Management Designations under Alternative B

Allocation	PPMAs	PGMAs	% Population Affected
	(acres)		
Closed (existing)	48,450	143,637	1.7%
Limited	4,498,590	2,576,796	76%
Open	0	2,938,846	3.5%

the percentage of GRSG populations within the decision area affected by travel management designations under Alternative B. While acres closed to OHV use would not change, designating PPMA as limited to OHV use would protect over 75 percent of GRSG within the decision area. Less than five percent of GRSG would occur in closed or open areas.

During breeding season, recreation permits would not be issued in the vicinity of leks to promote nesting success. These policies would protect GRSG by limiting disturbance of its habitat from activities associated with recreation traffic. This could improve population stability and recruitment by increasing the availability of suitable habitat. However, impacts from dispersed recreation, such as hiking, biking, or horseback riding, would continue to disturb vegetation and GRSG in areas where they occur.

COT Report Threat—Sagebrush Removal, Agricultural Expansion, and Urban Development

Impacts from Land Tenure Decisions

No lands in PPMA would be available for disposal under Alternative B. As discussed above, current disposal, exchange, and acquisition criteria include retaining lands with threatened or endangered species, high quality riparian habitat, or plant and animal populations or natural communities of high interest. Thus, sagebrush habitat under Alternative B would not be removed and would be protected from habitat conversion for agriculture or other uses. **Table 4-22**, Percent of the Populations Affected by Unavailability to Land Disposal (Zone 1) - Alternative B, shows the percentage of each population affected by unavailability to land disposal under Alternative B. Approximately one-third of the Northern Great Basin and Western Great Basin sub-populations would be protected by unavailability to land disposal, while less than 10 percent of the Baker and Central Oregon populations would be affected.

Impacts from ACECs

No additional ACECs would be designated under Alternative B; impacts on GRSG would be the same as under Alternative A.

Table 4-22
Percent of the Populations Affected by Unavailability to Land Disposal (Zone 1) - Alternative B

Population	Percent of Population Affected (based on acres of habitat affected)
Baker	>2%
Northern Great Basin	35%
Western Great Basin	31%
Central Oregon	6%
Total	74%

Summary

Alternative B follows the National Technical Team (NTT) recommendation for protection of GRSG habitat. It provides a greater level of protection for GRSG than Alternative A, by designating PPMA and PGMA in habitat areas and by restricting development of ROWs, use of OHVs, and mineral leasing in PPMA. Alternative B also requires a greater focus on protecting sagebrush habitats than provided under existing land use plans and applies a maximum 3 percent disturbance cap in PPMA. However, Alternative B provisions are not all feasible, and management approaches are not explicit, resulting in higher uncertainty that desired outcomes would be achieved over time.

4.2.6 Alternative C

Under Alternative C, the BLM would manage lands to conserve, enhance, and restore GRSG habitat. Management actions would be applied to all occupied GRSG habitats, both PPMA and PGMA (**Table 4-2**) and would apply a zero percent limit to surface disturbance in occupied habitat. Management would focus on removing livestock grazing from occupied habitats and passive approaches to restoration.

COT Report Threat—Fire

Impacts from Wildland Fire Management

The approach for fire suppression and emergency stabilization projects is essentially the same as that described under Alternative B. Alternative C does not clearly state desired conditions for sagebrush, nor is it explicit regarding fire suppression priorities. Like Alternative B, it relies on fuelbreaks to manage wildfire risks in the Warm-Dry Sagebrush Group, which may be ineffective.

Additional policies would be included under this alternative to ensure availability of native seed. These restrictions would minimize impacts described under **Section 4.2.1** for the sagebrush ecosystem in these areas. Fire suppression in sagebrush areas would be less effective since fine fuels would increase in the absence of livestock grazing.

COT Report Threat—Invasive Plant Species

Impacts from Vegetation Management

Impacts from habitat restoration and vegetation management approaches would be similar to those described under Alternative A. However, Alternative C has an increased focus on restoration and it applies to a larger area (PPMA and PGMA), thus providing restoration and habitat enhancement for GRSG in a larger area over the long term. However, removal of livestock grazing on BLM-administered land would eliminate weed control cooperative range improvement agreements with BLM permittees and lessees. Noxious weed control thus would be by BLM personnel, which could lead to reduced noxious weed control and increased weed patch size and distribution compared to the other alternatives, and which would maintain the permittee/lessee cooperative weed control agreements.

Eliminating grazing in habitat areas under Alternative C would increase the likelihood of undesired levels of bunchgrass mortality following fire, and thereby facilitating invasive plant species expansion. Only mowing of existing fuel breaks would be allowed, with no creation of new fuel breaks. Mowed fuel breaks are often the least effective type of fuel break, and can become dominated by invasive plant species, as repeated mowing adversely affects vigor of native bunchgrass populations.

In addition, juniper treatments using herbicide or prescribed fire would not be permitted, sustaining current encroachment rates and increasing likelihood of annual grass spread around trees and the likelihood of annual grass dominance following fire. Restrictions on herbicide use would decrease the effectiveness of invasive plant species control efforts and likely increase current expansion rates.

Alternative C habitat trends from VDDT vegetation modeling (**Tables 4-3** and **4-4**) are downward through year 50 for sub-populations 902 and 903. Habitat trends are upward through year 10 and then downward through year 50 for sub-populations 904 and 906. Habitat trends are upward through year 50 for sub-population P04 with the highest rate of change in the first 10 years. Overall, the habitat trend is upward through year 10 then downward through year 50, likely due to a 0.1 percent annual expansion in invasive grasses.

Overall, Alternative C is likely to be the least effective of all the alternatives in controlling invasive plant species, and could contribute to population loss, loss of habitat, and habitat degradation and fragmentation.

COT Report Threat—Conifer Expansion

Impacts from Vegetation Management

Impacts from habitat restoration and vegetation management approaches are similar to those described under Alternative A, but with an increased focus on restoration applied to a larger area (PPMA and PGMA).

Alternative C relies on passive management to limit juniper encroachment, which is less effective than active management using herbicide, mechanical means, or fire. Under Alternative C, juniper encroachment would be expected to continue at observed rates, reducing GRSG habitat quality and quantity over time, especially in the Cool-Moist Sagebrush Group, which is the most widely used habitat type for late brood-rearing. As discussed above, the approach under Alternative C could be ineffective and contribute to habitat loss, degradation, and fragmentation.

COT Report Threat—Grazing and Free-Roaming Wild Horses and Burros

Impacts from Range Management

Under Alternative C, 10,177,786 acres would be closed to livestock grazing within PPMA and PGMA (**Table 4-5**). Removal of permitted grazing uses in habitat areas would improve GRSG habitat by reducing impacts such as loss of herbaceous nesting cover, described under **Section 4.2.1**. Removal of grazing would also limit livestock damage to sensitive riparian areas used by GRSG and other wildlife, and reduce the need for standing water for livestock, which can contribute to the spread of West Nile Virus (Walker and Naugle 2011).

However, because livestock grazing would not be permitted in occupied GRSG habitat, fuel buildup in bunchgrass habitat would be more likely, leading to higher probability of bunchgrass mortality during wildfire and lower resistance to invasion or dominance by annual grasses post-fire (Balch et al. 2012). The loss of permittee/lessee weed control partnerships could further contribute to an increase in the spread of invasive annual grasses.

In the long term, the removal of livestock grazing permits on federal land may cause private ranches to be converted to agricultural use, resulting in a loss of GRSG habitat on adjacent private lands. Lands retained in BLM management would not be converted for agriculture. In addition, no-grazing areas on BLM-administered land could require additional miles of fencing to separate these areas from adjacent grazing lands. Additional fencing would increase the adverse effects of fencing on GRSG, such as raptor predation, potential collision, and habitat fragmentation discussed in **Section 4.2.1**.

Impacts from Wild Horses and Burros Management

Impacts from wild horses and burro management are same as those described for Alternative A. Overall, the approach under Alternative C would be ineffective in reducing impacts on GRSG from wild horse and burro grazing and, in the long-term, may decrease acres of sagebrush habitat and increase fragmentation and degradation, due to increased likelihood of destructive fires, and increased fencing, and potential loss of adjacent private rangeland.

COT Report Threat—Energy Development and Mining

Impacts from Leasable Minerals Management

Under Alternative C, closures to fluid mineral leasing and restrictive stipulations for oil, gas and geothermal development would be the same as under Alternative B. As described under Alternative B, RDFs and conservation measures would be applied as COAs to existing leases, and RDFs in PPMA would avoid or minimize impacts to the extent allowable by law. Alternative C would avoid leasing in occupied habitat (PPMA and PGMA) by closing it to new mineral leases or exploration permits. Existing leases would continue to impact GRSG and their habitat; however, RDFs and conservation measures would enhance protection of GRSG populations by minimizing the disturbances associated with approved fluid mineral development, discussed in **Section 4.2.1**, to the extent the law allows. **Table 4-23**, Percent of GRSG Populations Affected by Closures to Fluid Minerals - Alternative C, shows the percentage of each population affected by closures to fluid mineral leasing under Alternative C. Approximately one-third of the Northern Great Basin and Western Great Basin populations would be within areas closed to fluid mineral leasing, with over 10 percent of the Central Oregon population and 1 percent of the Baker population protected by these measures.

Table 4-23
Percent of GRSG Populations Affected by Closures to Fluid Minerals - Alternative C

Population	Percent of Population Affected (based on acres of habitat affected)	
	PPMA	PGMA
Baker	>2%	>1%
Northern Great Basin	35%	2%
Western Great Basin	31%	3%
Central Oregon	6%	2%
Total by PPMA and PGMA	*74%*	*7%*
Total	*81%*	

Impacts from Mineral Materials (Salables) and Nonenergy Leasable Minerals Management

Impacts are as described under Alternative B. **Table 4-24**, Percent of the Populations Affected by Closures to Salable Minerals - Alternative C, shows the percentage of each population affected by closure to salable mineral development under Alternative C. Approximately one-third of the Northern Great Basin and Western Great Basin populations would be within areas closed to salable mineral development, with over 10 percent of the Central Oregon population and 1 percent of the Baker population protected by these measures.

Table 4-24
Percent of the Populations Affected by Closures to Salable Minerals - Alternative C

Population	Percent of Population Affected (based on acres of habitat affected)	
	PPMA	**PGMA**
Baker	>2%	>1%
Northern Great Basin	35%	2%
Western Great Basin	31%	3%
Central Oregon	6%	2%
Total by PPMA and PGMA	74%	7%
Total	81%	

Table 4-25, Percent of the Populations Affected by Recommended Withdrawals from Locatable Mineral Entry - Alternative C, shows the percentage of each population affected by recommended withdrawal from locatable mineral entry under Alternative C. Approximately one-third of the Northern Great Basin and Western Great Basin populations would be within areas recommended for withdrawal from locatable mineral entry, with over 10 percent of the Central Oregon population and 1 percent of the Baker population protected by these measures.

Table 4-25
Percent of the Populations Affected by Recommended Withdrawals from Locatable Mineral Entry - Alternative C

Population	Percent of Population Affected (based on acres of habitat affected)
Baker	1%
Northern Great Basin	33%
Western Great Basin	34%
Central Oregon	13%
Total	81%

Under Alternative C, mineral development impacts would be avoided over largest amount of habitat by closing PPMA and PGMA to new fluid mineral and salable mineral materials leasing, and recommending withdrawal of all occupied habitat from locatable mineral entry. These approaches would minimize habitat loss, fragmentation and degradation and disturbance to GRSG from energy development and mining on BLM-administered land (discussed in **Section 4.2.1**), but could have the indirect effect of pushing energy development activity to adjacent private lands, where BLM land use controls cannot be implemented.

COT Report Threat—Infrastructure

Impacts from Lands and Realty Management

Under Alternative C, both PPMA and PGMA would be managed as ROW exclusion areas (10,682,124 acres), (**Table 4-14**) Establishing ROW exclusion areas would reduce fragmentation on BLM-administered land and would protect GRSG habitat, as described under **Section 4.2.1**. Under Alternative C, all corridors and tower-type ROWs are prohibited in GRSG habitat.

Re-locating infrastructure corridors outside habitat areas may not be feasible as these corridors were already established in areas intended to minimize impacts on wildlife, wilderness and WSAs. In addition, establishing ROW exclusion areas could result in pushing ROW impacts onto adjacent private lands, potentially over a larger area. Given the absence of land use controls and management, this alternative could increase GRSG habitat fragmentation overall. **Table 4-26**, Percent of GRSG Populations Affected by ROW Exclusion or Avoidance Areas – Alternative C, below shows the percent of each GRSG population affected by ROW exclusion and avoidance, including for wind power, under Alternative C. Approximately one-third of the Northern Great Basin and Western Great Basin populations would be within ROW exclusion areas, with over 10 percent of the Central Oregon population and 1 percent of the Baker population protected by these measures.

Table 4-26
Percent of GRSG Populations Affected by ROW Exclusion or Avoidance Areas under Alternative C

Population	Percent of Population Affected (based on acres of habitat affected)	
	Exclusion	Avoidance
Baker	1%	0
Northern Great Basin	33%	0
Western Great Basin	34%	0
Central Oregon	13%	0
Total	81%	0

COT Report Threat—Recreation

Impacts from Recreation Management

Alternative C includes no specific recreation plan related to GRSG or their habitat; thus, disturbance and habitat degradation associated with recreational use would continue, though most recreational uses in GRSG habitat are considered benign.

Impacts from Travel Management

Under Alternative C, roads in occupied habitat would be closed or limited in order to minimize collision risk and limit habitat fragmentation. This approach is the most protective of GRSG of all alternatives. **Table 4-27**, BLM-Administered Acres of PPMA and PGMA and Percent of Oregon Populations within Travel Management Designations under Alternative C, below shows the percent of GRSG within the decision area affected by travel management designations under Alternative C. While acres closed to OHV use would not change, most (80 percent) of GRSG would be in areas limited to existing routes under this alternative.

Table 4-27
BLM-Administered Acres of PPMA and PGMA and Percent of Oregon Populations within Travel Management Designations under Alternative C

Allocation	PPMAs (acres)	PGMAs	% Population Affected
Closed (existing)	48,450	143,637	1.7%
Limited	4,498,593	*5,518,995*	80%
Open	0	0	0%

COT Report Threat—Sagebrush Removal, Agricultural Expansion, and Urban Development

Impacts from Land Tenure Decisions

No lands in PPMA or PGMA would be available for disposal under Alternative C. As discussed above, current disposal, exchange, and acquisition criteria already include retaining lands with threatened or endangered species, high quality riparian habitat, plant and animal populations or natural communities of high interest. Private land may be acquired to enhance the conservation value of existing lands for GRSG and reduce habitat fragmentation. Although it is uncertain how much private land could be acquired under Alternative C, this management approach could increase the BLM acreage of enhanced sagebrush, compared to Alternatives A, B, and D, but could also contribute to GRSG habitat losses on private lands, as a result of eliminating grazing on BLM-administered lands. **Table 4-28**, Percent of the Populations Affected by Unavailability to Land Disposals - Alternative C, below shows the percentage of each population impacted by unavailability to land disposal under Alternative C. Approximately one-third of the Northern Great Basin and Western Great Basin populations would be within areas unavailable to land disposals, with over 10 percent of the Central Oregon population and 1 percent of the Baker population protected by these measures.

Table 4-28
Percent of the Populations Affected by Unavailability to Land Disposals - Alternative C

Population	Percent of Population Affected (based on acres of habitat affected)
Baker	1%
Northern Great Basin	33%
Western Great Basin	34%
Central Oregon	13%
Total	81%

Impacts from ACECs

ACECs to protect GRSG would be designated as sagebrush reserves in PPMA, consisting of blocks of BLM-administered land that exceed 4,000 acres, covering a total of 4,547,043 acres. In ACECs where GRSG is a relevant and important value, management prescriptions would be tailored to the threats to GRSG in the specific location and would be more likely to protect intact GRSG habitats or populations than under Alternative A.

Summary

Alternative C would protect the largest amount of GRSG habitat from energy development and infrastructure on BLM-administered land. Alternative C includes a zero percent surface disturbance limit in PPMA. It would also establish new ACECs to protect GRSG. Under Alternative C, livestock grazing would be removed from occupied habitats. This action would reduce impacts on GRSG from grazing on BLM-administered lands; however, it would entail other management changes, such as increased fencing and reduced weed control efforts, leading to fine-fuel buildup that may contribute to more damaging wildfires. These impacts may damage habitat more than moderate grazing in accordance with Range Health Standards. In addition, Alternative C relies on passive restoration for weed and conifer invasion, which is less effective in maintaining GRSG habitat. Because these represent the largest threats to GRSG in Oregon, Alternative C provisions may be counterproductive for GRSG habitat, and represent a less effective conservation approach than currently provided under Alternative A.

4.2.7 Alternative D

Under Alternative D, the BLM would manage lands to conserve, enhance, and restore GRSG habitat. Management and impacts would be similar to Alternative B, though Alternative D would incorporate more flexibility and adaptive management applied to resource uses to account for sub-regional conditions. PPMA and PGMA would be designated (**Table 4-2**). The BLM would require a cap of 3 percent disturbance in PPMA, from human disturbances not including fire, and would implement numerous conservation measures to reduce impacts from human activities in PPMA. This would reduce the likelihood for habitat loss, degradation, or fragmentation.

COT Report Threat—Fire

Impacts from Wildland Fire Management

Alternative D would manage wildland fire similarly to Alternatives B and C. Fire suppression would be prioritized in GRSG habitat, as described under Alternative B, though priorities for suppression of unwanted wildfires would differ somewhat. Alternative D also establishes objectives that would provide a quantifiable indication of progress, and includes fuel breaks as part of the overall approach of managing fuel continuity across landscapes. VDDT vegetation modeling (**Tables 4-3** and **4-4**) showed no effect on habitat trends from reducing the probability of fire by 50 percent in the Warm-Dry Sagebrush Group in Alternatives B, D, E, and F to account for fuel breaks.

Alternative D provides more explicit guidance for fire suppression policies. This provision would be more protective for areas governed by older plans than Alternative A and would do the most to reduce the threats of habitat loss, degradation and fragmentation from fire. Alternative D also provides clearer desired conditions for sagebrush to guide use of fire and other fuel treatments than older plans in Alternative A and the other action alternatives, but it lacks clear desired conditions for juniper and crested wheatgrass seedings to guide use of fire and other fuel treatments. Alternative D allows use of both planned and unplanned ignitions as appropriate to meet habitat objectives in all sagebrush types.

Additional management flexibility and guidance would be incorporated to tailor management for specific vegetation communities. Fuels treatment would be designed and implemented with seasonal restrictions as well as seasonal restrictions on treatments within winter range, as described under Alternative C. Fire suppression in sagebrush areas would protect mature sagebrush acreage and GRSG from the disturbance associated with wildfire. Post-burn restoration programs would help regrowth in measurable ways compared to Alternatives A, B, and C.

COT Report Threat—Invasive Plant Species

Impacts from Vegetation Management

Impacts from habitat restoration and vegetation management on GRSG under Alternative D would be similar to Alternative B. Management would also prioritize restoration projects and would use the most current science when implementing restoration projects. Alternative D provides additional guidance for invasive weed treatments and measures to incorporate weed prevention during wildfire response.

The guidance in Alternative D is more specific than in older LUPs and the other action alternatives, reducing likelihood of differing interpretations across administrative units and over time. However, because grazing utilization levels are not specified, management guidance from existing LUPs would continue to apply, which may be insufficiently protective of GRSG, though Standards for Rangeland Health and Guidelines for Grazing Management would still apply.

The habitat trend under Alternative D from VDDT vegetation modeling (**Tables 4-3** and **4-4**) is downward through year 10, then upward through year 50 for sub-population 902. Habitat trend is downward through year 50 for sub-population 903, and upward through year 50 for sub-populations 904, 906, and P04, with a 13 percent increase by year 50 in both 906 and P04. Overall, the habitat trend is upward through year 50 at a relatively steady rate.

Overall risk of invasive plant spread is similar across Alternatives B, D, E, and F, and would contribute to reducing threats of habitat loss, fragmentation and degradation from invasive plants, though the current management (Alternative A) approach to addressing these threats is similar.

COT Report Threat—Conifer Expansion

Impacts from Vegetation Management
Habitat restoration and vegetation management under Alternative D has essentially the same provisions as Alternative B though Alternative D provides specific guidance and the clearest priorities for juniper treatment to reduce disturbance to GRSG and loss of sagebrush or sagebrush understory vegetation. This guidance would improve the likelihood for successful sagebrush restoration and GRSG habitat enhancement over the long term, compared to current management or the other action alternatives.

COT Report Threat—Grazing and Free-Roaming Wild Horses and Burros

Impacts from Range Management
Under Alternative D, as shown in **Table 4-5**, there would be a small decrease in the available AUMs and acreage open for livestock grazing (67,349 fewer acres in PPMA and 67,173 acres in PGMA), compared with Alternatives A and B. Guidance concerning livestock grazing management with respect to GRSG habitat is more specific than in Alternative B, reducing the probability of varying interpretations and increasing the probability of more standard approaches to livestock grazing management to support GRSG habitat quality and reduce degradation and loss of understory vegetation.

In addition, the BLM would prioritize allotments for processing of livestock grazing permits and leases and would prioritize land health assessments based on the type of allotment and time since last assessment. This would increase the probability that problem areas would be identified and corrections applied, and slightly increase the likelihood that livestock grazing management would be adjusted to address GRSG habitat concerns over Alternative B.

Range management structures and water sources would be avoided in GRSG habitat where possible, and range management structures and water features would be designed to minimize West Nile virus and other harmful impacts on GRSG, as under Alternative B. As a result, livestock grazing management under Alternative D would enhance GRSG habitat quality and reduce disturbance to GRSG more than under Alternative A, and potentially more than the other action alternatives.

Impacts from Wild Horses and Burros Management
Alternative D impacts from wild horses and burros management are similar to those described for Alternative B. Alternative D also provides guidance for prioritizing land health evaluations, which would improve the efficiency and response time to improve GRSG habitat conditions.

COT Report Threat—Energy Development and Mining

Impacts from Leasable Minerals Management
Under Alternative D, acres closed to fluid mineral leasing in PPMA and PGMA would be similar to Alternative A (see **Table 4-4**). However, acreage subject to stipulations, such as NSO, would apply within 4 miles of a lek, an increase in protection relative to Alternative A. In addition, operational constraints would be applied to existing leases for oil, gas, or geothermal energy. RDFs would avoid or minimize impacts in PPMA to the extent the law allows. A 3 percent disturbance cap would apply in PPMA. **Table 4-29**, Percent of GRSG Populations Affected by Closures to Fluid Minerals - Alternative D, below shows the percentage of each GRSG population affected by closures to fluid minerals under Alternative D. Approximately one-third of the Northern Great Basin and Western Great Basin populations would be within areas closed to fluid mineral leasing, with less than 10 percent of the Central Oregon and Baker populations protected by these measures.

Table 4-29
Percent of GRSG Populations Affected by Closures to Fluid Minerals - Alternative D

Population	Percent of Population Affected (based on acres of habitat affected)	
	PPMA	PGMA
Baker	>2%	0.02%
Northern Great Basin	35%	0.7%
Western Great Basin	31%	0.8%
Central Oregon	6%	0.4%
Total by PPMA and PGMA	74%	2%
Total	76%	

These provisions would reduce the impacts of fluid mineral leasing and development on GRSG habitat loss, degradation, or fragmentation more than Alternative A, but less than Alternatives B or C.

Impacts from Mineral Materials (Salables) Management and Nonenergy Leasable Minerals Management

Under Alternative D, lands would be available to nonenergy leasable minerals subject to NSO stipulation. BMPs and restoration would be required on existing leases. PPMA would be closed to new salable mineral material site development. This would reduce impacts on GRSG habitat associated with nonenergy leasable and salable mineral development, though it could result in higher costs or air quality impacts from increased transport of materials. In addition, restrictions on salable mineral development on BLM-administered land could push development onto private lands, which are not subject to the 3 percent disturbance cap or other land use controls.

Table 4-30, Percent of the Populations Affected by Closures to Salable Minerals - Alternative D, below shows the percentage of each GRSG population affected by closures to salable minerals under Alternative D. Approximately one-third of the Northern Great Basin and Western Great Basin populations would be within areas closed to salable mineral development, with less than 10 percent of the Central Oregon and Baker populations protected by these measures.

Table 4-30
Percent of the Populations Affected by Closures to Salable Minerals - Alternative D

Population	Percent of Population Affected (based on acres of habitat affected)	
	PPMA	**PGMA**
Baker	>2%	<1 %
Northern Great Basin	35%	<1 %
Western Great Basin	31%	<1 %
Central Oregon	6%	<1%
Total by PPMA and PGMA	74%	2%
Total	76%	

Alternative D includes no recommendation to withdraw GRSG habitat beyond existing withdrawals and recommended withdrawals; thus, locatable minerals development would be managed as described under Alternative A. The percent of populations affected by withdrawal from locatable mineral entry would also be the same as under Alternative A. Prospecting for nonenergy leasable minerals would be permitted after appropriate environmental review. However, this alternative would seek to minimize habitat loss and other impacts from locatable mineral development in PPMA by limiting surface disturbance to 3 percent.

COT Report Threat—Infrastructure

Impacts from Lands and Realty Management

PPMA would be managed as ROW avoidance areas (4,289,889 acres); no ROW exclusion areas would be established for utilities, including wind power (**Table 4-9**). Exclusion areas already in place would remain in effect in PPMA, but all other areas in PPMA would be designated as avoidance areas (see **Table 4-14**). ROWs would be allowed in avoidance areas if the disturbance would be either under the three percent disturbance cap. In PGMA, the actions described under Alternative D would consider ROW authorization on a case-by-case basis with assessments to determine impacts on GRSG habitat and connectivity, and prioritize location outside PPMA when possible.

This approach would circumvent potential impacts of ROW exclusion areas, such as habitat fragmentation and increased predation, in areas with mixed public/private landownership, where exclusion areas would result in re-locating ROWs onto adjacent private lands lacking BLM land use controls. If ROWs were avoided in sensitive GRSG habitat, Alternative D would protect GRSG habitat from loss and fragmentation by avoiding ROW construction; at the same time, it would retain the management flexibility to locate ROWs in less sensitive areas in order to preserve connectivity of PPMA. **Table 4-31**, Percent of GRSG Populations Affected by ROW Exclusion or Avoidance Areas – Alternative D, shows the percentage of each GRSG population affected by ROW exclusion and avoidance, including wind power, under Alternative D. Approximately one-third of the Northern Great Basin and Western Great Basin populations would be within ROW avoidance areas, with less than 10 percent of the Central Oregon and Baker populations protected by these measures.

Table 4-31
Percent of GRSG Populations Affected by ROW Exclusion or Avoidance Areas – Alternative D

Population	Percent of Population Affected (based on acres of habitat affected)	
	Exclusion	Avoidance
Baker	0	>2%
Northern Great Basin	0	35%
Western Great Basin	0	31%
Central Oregon	0	6%
Total	0	74%

COT Report Threat—Recreation

Impacts from Recreation Management and Travel Management

Impacts from recreation management and travel planning under Alternative D are the same as Alternative B.

COT Report Threat—Sagebrush Removal, Agricultural Expansion, and Urban Development

Impacts from Land Tenure Decisions

No lands in PPMA would be available for disposal under Alternative D. Impacts from land tenure decisions are the same as Alternative B. **Table 4-32**, Percent of the Populations Affected by Unavailability to Land Disposals - Alternative D, shows the percentage of each GRSG population affected by unavailability to land disposal under Alternative D. Approximately one-third of the Northern Great Basin and Western Great Basin populations would be within areas unavailable to land disposals, with less than 10 percent of the Central Oregon and Baker populations protected by these measures.

Table 4-32
Percent of the Populations Affected by Unavailability to Land Disposals - Alternative D

Population	Percent of Population Affected (based on acres of habitat affected)
Baker	>2%
Northern Great Basin	35%
Western Great Basin	31%
Central Oregon	6%
Total	74%

Impacts from ACECs

No additional ACECs would be designated under Alternative D; impacts on GRSG would be the same as under Alternative A.

Summary

Alternative D uses flexibility in application of development restrictions in GRSG habitat, using ROW avoidance but not exclusion areas, up to an allowable disturbance cap of three percent maximum anthropogenic disturbance, not including fire. Less GRSG habitat would be protected from mineral development than under Alternatives B or C, but Alternative D does place lands under stipulations restricting use. Alternative D provides a more specific approach than in LUPs and compared with the other action alternatives, reducing the likelihood of differing interpretations across administrative units over time. The flexibility in Alternative D allows management to adapt to regional conditions and would provide the highest level of protection for GRSG habitat of the action alternatives.

4.2.8 Alternative E

Under Alternative E, the BLM would manage to maintain, conserve, enhance, and restore GRSG habitat. Core Area habitat and Low Density habitat would be designated (**Table 4-2**). In these habitat areas, the BLM would incorporate management flexibility to permit high value infrastructure with appropriate mitigation and best management practices tailored for the sub-region. A zero percent limit to human disturbance would apply in Core Area habitat. They will also assist resource managers in achieving the population and habitat objectives of the ODFW State Plan.

COT Report Threat—Fire

Impacts from Wildland Fire Management

Alternative E manages fire suppression using habitat designations of Core Area and Low Density habitats rather than PPMA or PGMA; Low Density habitat covers fewer acres than PGMA, thus providing protection to less GRSG habitat. Impacts from wildland fire management under Alternative E are similar to Alternative D, but differ in two aspects: Alternative E does not allow use of unplanned wildfires in Core Area habitat to meet habitat management objectives and it strongly discourages use of controlled burns in the Warm-Dry Sagebrush Group. Limits on use of fire, either planned or unplanned, in the Warm-Dry Sagebrush Group are likely to be counterproductive where large expanses of high sagebrush density exist, because homogeneous fuel beds typically produce highly damaging burn patterns and promote annual grass invasion. Limits on use of natural unplanned ignitions in Cool-Moist Sagebrush Group would reduce the probability of restoring fire as an ecosystem process and obstruct opportunities to use unplanned ignitions to control juniper.

These provisions could result in less effective fire management and more severe impacts on GRSG habitat from wildland fire compared with Alternative D, though all alternatives are relatively similar in their approach to fire management.

COT Report Threat—Invasive Plant Species

Impacts from Vegetation Management

Alternative E emphasizes controlling invasive plant species, avoiding conversion of sagebrush for livestock forage, and using the habitat monitoring techniques in the ODFW plan. Invasive plant species will be managed through the following:

- Systematic detection surveys
- Priorities for weed control
- Establishing weed protection areas
- Providing guidance for detection, control and containment, prevention, and restoration

The approach under Alternative E is similar to Alternative B and also lacks specific guidance regarding target weed control levels and crested wheatgrass restoration, increasing uncertainty that desired outcomes would be achieved.

However, Standards for Rangeland Health and Guidelines for Grazing Management would still apply and would provide limited protection to GRSG habitat from degradation.

The habitat trend under Alternative E from VDDT vegetation modeling (**Tables 4-3** and **4-4**) is upward through year 10 then downward through year 50 for sub-population 902. The habitat trend is downward through year 50 for sub-population 903, and upward through year 50 for sub-populations 904, 906, and P04. Overall, the habitat trend is upward through year 10, then slowly downward through year 50. Reducing the probability of fire by 50 percent in the Warm-Dry Sagebrush Group in Alternatives B, D, E, and F to account for fuel breaks had no effect on habitat trends.

Alternative E lacks the comprehensive approach to vegetation management that is presented in the other action alternatives. Overall, it is uncertain whether the risk of invasive plant spread under this alternative would differ from Alternative A, B, D, or F.

COT Report Threat—Conifer Expansion

Impacts from Vegetation Management

Alternative E is similar to Alternatives B and D, emphasizing use of habitat monitoring techniques to avoid habitat degradation, avoiding conversion of sagebrush for livestock forage, and controlling invasive plants. Alternative E places more restrictions on the use of fire to treat juniper, with the intent of preserving as much sagebrush habitat as possible. Alternative E limits broadcast burning of juniper stands to 160 acres, which increases costs, reduces the number of acres that can be treated with available funds, and is less likely to reduce the rate of juniper expansion. Limiting broadcast burning of stands to 160 acres can also be challenging logistically, such that some sites that would otherwise be treated might not be. Overall, Alternative E would have approximately the same GRSG habitat improvements as Alternatives B, D, and F, all of which would improve GRSG protection compared to Alternative A.

COT Report Threat—Grazing and Free-Roaming Wild Horses and Burros

Impacts from Range Management

Alternative E manages livestock grazing acreage in ways similar to Alternative A (see **Table 4-5**), using the terminology of Core and Low Density habitat rather than PPMA or PGMA. The same AUMs and acreage would be available for livestock grazing under Alternative E as under Alternative A. Guidance for grazing management provisions is more general than under Alternative D, but more specific than under Alternative B.

Fencing located near GRSG nesting areas and posing collision risk to GRSG would be marked, but not removed or modified. Structural range improvements would be located or relocated to maintain or enhance GRSG habitat quality. In addition, natural water sources that have been modified for livestock watering would be rehabilitated and off-site livestock watering facilities would be developed. Structural improvements would not be permitted within 0.6 mile of leks in order to minimize impacts on GRSG from West Nile virus, and limit habitat degradation from concentrated numbers of livestock or wild horses in watering areas.

Impacts from Wild Horses and Burros Management
Impacts from wild horse and burro management are same as under Alternative A.

The expected outcomes for GRSG habitat from grazing management would be very similar to Alternative D, although no priorities are established for conducting assessments, slightly decreasing the likelihood that livestock grazing management would be adapted as needed in allotments with very old or no assessments available.

COT Report Threat—Energy and Mining

Impacts from Leasable Minerals Management
Alternative E recommends no development in Core Areas if there is GRSG habitat and with evidence of occupancy, but does not close areas to leasing or apply stipulations. Alternative E also recommends avoidance of mineral development in Low Density/PGMA areas. **Table 4-33**, Percent of GRSG Populations Affected by Closures to Fluid Minerals - Alternative E, below shows the percentage of each GRSG population affected by closures to fluid mineral leasing under Alternative E. Approximately one-third of the Northern Great Basin and Western Great Basin populations would be within areas closed to fluid mineral leasing, with less than 10 percent of the Central Oregon and Baker populations protected by these measures.

Table 4-33
Percent of GRSG Populations Affected by Closures to Fluid Minerals - Alternative E

Population	**14.6%**	**Percent of Population Affected (based on acres of habitat affected)**	
		PPMA	**PGMA**
Baker		>2%	< 1%
Northern Great Basin		35%	< 1%
Western Great Basin		31%	< 1%
Central Oregon		6%	< 1%
Total by PPMA and PGMA		74%	2%
Total		76%	

Impacts from Mineral Materials (Salables) and Nonenergy Leasable Minerals Management

Impacts on GRSG from mineral materials and nonenergy leasable minerals management under Alternative E are the same as those described for Alternative B.

Alternative E contains no recommendation to withdraw GRSG habitat from locatable mineral entry beyond existing withdrawals and recommendations. The approach under Alternative E would be less effective because development of locatable minerals is a non-discretionary action; withdrawing lands from entry is the only way to achieve no development. As such, Alternative E would be more protective of GRSG habitat than current management but less effective than the other action alternatives. **Table 4-34**, Percent of the Populations Affected by Closures to Salable Minerals - Alternative E, shows the percentage of each GRSG sub-population affected by closures to salable mineral development under Alternative E. Approximately one-third of the Northern Great Basin and Western Great Basin sub-populations would be within areas closed to salable mineral development, with less than 10 percent of the Central Oregon and Baker sub-populations protected by these measures.

Table 4-34
Percent of the Populations Affected by Closures to Salable Minerals - Alternative E

Population	Percent of Population Affected (based on acres of habitat affected)	
	PPMA	PGMA
Baker	>2%	<1 %
Northern Great Basin	35%	<1 %
Western Great Basin	31%	<1 %
Central Oregon	6%	<1%
Total by PPMA and PGMA	74%	2%
Total	76%	

Table 4-35, Percent of the Populations Affected by Recommended Withdrawals from Locatable Mineral Entry - Alternative E, below shows the percentage of each GRSG population affected by recommended withdrawals from locatable mineral entry under Alternative E. Approximately one-third of the Northern Great Basin and Western Great Basin populations would be within areas recommended for withdrawal from locatable mineral entry, with less than 10 percent of the Central Oregon and Baker populations protected by these measures.

Table 4-35
Percent of the Populations Affected by Recommended Withdrawals from Locatable Mineral Entry - Alternative E

Population	Percent of Population Affected (based on acres of habitat affected)
Baker	>2%
Northern Great Basin	35%
Western Great Basin	31%
Central Oregon	6%
Total	74%

COT Report Threat—Infrastructure

Impacts from Lands and Realty Management

Impacts on GRSG habitat from lands and realty management under Alternative E are the same as those described for Alternative B. **Table 4-36**, Percent of GRSG Populations Affected by ROW Exclusion or Avoidance Areas – Alternative E, shows the percentage of each GRSG population affected by ROW exclusion and avoidance areas, including for wind, under Alternative E. Approximately one-third of the Northern Great Basin and Western Great Basin populations would be within ROW exclusion areas, with less than 10 percent of the Central Oregon and Baker populations protected by these measures.

Table 4-36
Percent of GRSG Populations Affected by ROW Exclusion or Avoidance Areas – Alternative E

Population	Percent of Population Affected (based on acres of habitat affected)	
	Exclusion	Avoidance
Baker	>2%	0
Northern Great Basin	35%	0
Western Great Basin	31%	0
Central Oregon	6%	0
Total	74%	0

COT Report Threat—Recreation

Impacts from Recreation Management and Travel Management

Alternative E includes no specific recreation plan related to GRSG or their habitat. However, cross-country motorized travel would be seasonally prohibited and limited to existing routes in Core Area and Low Density habitat. Thus, this alternative would reduce impacts of recreation and travel on GRSG relative to Alternatives A, B, D, and F. **Table 4-37**, BLM-Administered Acres of PPMA and PGMA and Percent of Oregon Populations within Travel Management Designations under Alternative E, shows the percentage of GRSG

Table 4-37
BLM-Administered Acres of PPMA and PGMA and Percent of Oregon Populations within Travel Management Designations under Alternative E

Allocation	Core Habitat	Low Density	% Population Affected
Closed (existing)	48,450	70,566	0.8%
Limited	4,498,590*	1,710,392	28%
Open	0	1, 610,288	25%

*with seasonal buffers

within the decision area affected by travel management designations under Alternative E. While acres closed to OHV use would not change, over half of GRSG occur in either limited areas (28 percent of GRSG) or open areas (25 percent of GRSG) under this alternative.

COT Report Threat—Sagebrush Removal, Agricultural Expansion, and Urban Development

Impacts from Land Tenure Decisions

No lands in Core Area habitat would be available for disposal under Alternative E. Impacts from land tenure decisions are the same as Alternative B. **Table 4-38**, Percent of the Populations Affected by Unavailability to Land Disposals - Alternative E, shows the percentage of each GRSG population affected by unavailability to land disposal under Alternative E. Approximately one-third of the Northern Great Basin and Western Great Basin populations would be within areas unavailable to land disposals, with less than 10 percent of the Central Oregon and Baker populations protected by these measures.

Table 4-38
Percent of the Populations Affected by Unavailability to Land Disposals - Alternative E

Population	Percent of Population Affected (based on acres of habitat affected)
Baker	>2%
Northern Great Basin	35%
Western Great Basin	31%
Central Oregon	6%
Total	74%

Impacts from ACECs

No additional ACECs would be designated under Alternative E; impacts on GRSG would be the same as under Alternative A.

Summary

Alternative E uses habitat designations of Low Density instead of PGMA, and Core Area rather than PPMA. Management of Core Area habitat would be similar to PPMA; Low Density would cover fewer acres than PGMA and thus would provide less protection than Alternative B. Alternative E includes a zero percent maximum surface disturbance limit for anthropogenic disturbance in Core Area habitat. Impacts from Alternative E are similar to Alternatives B, D, and F, for control of invasive plants and conifers, recreation, infrastructure, land tenure, and fire management. Grazing impacts would be similar to Alternative A, with the same acreage open to grazing, but restrictions on structural range improvements and fence marking would benefit GRSG. Alternative E has weaker restrictions on mineral leasing on BLM-administered land than other action alternatives. Overall, Alternative E is more protective of GRSG and their habitat than Alternatives A or C, but less protective than the other action alternatives.

4.2.9 Alternative F

Management under Alternative F would be largely similar to that described for Alternative B, though with more stringent guidance and restrictive management in sagebrush ecosystems. PPMA and PGMA would be designated (**Table 4-2**). A maximum 3 percent disturbance cap would be applied to human disturbances in PPMA, similar to Alternatives B and D, but under Alternative F the cap would also include acreage impacted from fire under the 3 percent limit.

COT Report Threat—Fire

Impacts from Wildland Fire Management

Under Alternative F, impacts from wildland fire management are the same as those described for Alternative B.

COT Report Threat—Invasive Plant Species

Impacts from Vegetation Management

Impacts on GRSG habitat from vegetation management for invasive plants under Alternative F are the same as under Alternative B. Targets for restoration of crested wheatgrass seedings, increasing sagebrush heterogeneity, and livestock utilization levels are not specified, increasing uncertainty of achieving desired outcomes. Overall, the guidance regarding weed control targets is more specific that in older plans, but less specific than in newer plans, increasing likelihood of differing interpretations across administrative units over time.

For Alternative F, the habitat trend from VDDT vegetation modeling (**Tables 4-3** and **4-4**) is upward through year 10 then downward through year 50 for sub-populations 902 and 903. The habitat trend is upward through year 50 for sub-populations 904, 906, and P04, with a higher rate of increase in the first 10 years and the greatest change for sub-population P04 (more than 10 percent). Overall habitat trend is upward through year 50 with greatest increase in first

10 years. Reducing the probability of overgrazing by 50 percent under Alternative F had no effect on habitat trends. Reducing the probability of fire by 50 percent in the Warm-Dry Sagebrush Group in Alternatives B, D, E, and F to account for fuel breaks had no effect on habitat trends.

The risk of habitat loss and degradation from invasive plant species spread in GRSG habitat under Alternative F would be similar to under Alternatives A, B, D, or E.

COT Report Threat—Conifer Expansion

Impacts from Vegetation Management
Impacts on GRSG habitat from vegetation management for conifer encroachment under Alternative F would be the same as under Alternative B.

COT Report Threat—Grazing and Free-Roaming Wild Horses and Burros

Impacts from Range Management
Under Alternative F, livestock grazing acreage in PPMA and PGMA would be reduced to 75 percent of current levels (**Table 4-5**), reducing available AUMs by approximately 60 percent. Other provisions would be the same as under Alternative B. As under Alternative B, range management structures, fences, and water features would be designed to minimize impacts on GRSG. The reduction in grazing levels is intended to reduce the impacts of livestock grazing on GRSG and their habitat, as described in **Section 4.2.1**. Reducing levels of grazing could decrease disturbance to nesting GRSG and reduce loss of sagebrush understory vegetation.

Reducing rather than eliminating grazing, as under Alternative C, would avoid an increased need for fencing, which can harm GRSG and fragment habitat. Habitat quality and acres of sagebrush habitat could increase in areas where livestock was a causal factor for habitat degradation. Alternative F's approach of reducing grazing could limit the loss of understory vegetation for GRSG nesting, while maintaining the range benefits provided by livestock grazing, and may lead to improved sagebrush habitat quality. However, as shown in **Tables 4-3** and **4-4**, VDDT modeling suggests the grazing reduction under Alternative F does not increase the percentage of GRSG habitat in preferred condition.

Impacts from Wild Horses and Burros Management
Impacts on GRSG habitat from wild horses and burro management under Alternative F are the same as under Alternative B.

COT Report Threat—Energy Development and Mining

Impacts from Leasable Minerals Management
Impacts on GRSG from leasable minerals management under Alternative F are the same as those described for Alternative C, and the percentage of each

population affected by these decisions would be the same as described for Alternative C. This alternative would also avoid leasing PPMA by closing it to new mineral leases or exploration permits, as under Alternatives B and C. For existing leases, RDFs would avoid or minimize impacts in existing leases in PPMA to the extent the law allows.

Impacts from Mineral Materials (Salables) and Nonenergy Leasable Minerals Management

Impacts on GRSG from salable and locatable minerals management under Alternative F would be the same as those described for Alternative C, and the percentage of each population affected by these decisions would be the same as described for Alternative C.

Under Alternative F, as under Alternative C, energy development and mining impacts would be avoided over the largest amount of BLM-administered habitat by recommending withdrawing all occupied habitat proposed from mineral entry and closing to salable minerals materials. However, these restrictions could have the effect of pushing energy development impacts onto adjacent private lands lacking BLM land use controls, potentially decreasing available habitat for GRSG overall.

COT Report Threat—Infrastructure

Impacts from Lands and Realty Management

Impacts on GRSG habitat from lands and realty and travel management under Alternative F are the same as those described for Alternative B, and the percentage of each population affected by these decisions would be the same as described for Alternative B.

COT Report Threat—Recreation

Impacts from Recreation Management and Travel Management

Impacts from recreation management and travel under Alternative F are the same as Alternative B, and the percentage of each population affected by these decisions would be the same as described for Alternative B.

COT Report Threat—Sagebrush Removal, Agricultural Expansion, and Urban Development

Impacts from Land Tenure Decisions

No lands in PPMA would be available for disposal under Alternative F. Impacts from land tenure decisions are the same as Alternative B, and the percentage of each population affected by these decisions would be the same as described for Alternative B.

Impacts from ACECs
Under Alternative F, 1,241,600 acres of PGMA and 2,560,400 acres of PGMA would be designated as new ACECs. In ACECs where GRSG is a relevant and important value, management prescriptions would be tailored to the threats to GRSG in the specific location and would be more likely to protect intact GRSG habitats or populations than under Alternative A.

Summary
Alternative F would apply many of the same provisions of Alternatives B, D, and E for control of invasive plant species and conifers, recreation, land tenure, and fire suppression. Alternative F would restrict surface disturbance to 3 percent in PPMA from all anthropogenic disturbances, including fire. In addition, it would reduce, rather than eliminate, grazing in GRSG habitat. Alternative F would restrict mineral leasing over all occupied habitat, and would establish new ACECs for GRSG, similar to Alternative C. Reducing rather than eliminating grazing could avoid the need for additional fencing that would be required under Alternative C, and may lead to improved sagebrush habitat quality or understory vegetation. Alternative F's approach of reducing grazing could limit the loss of herbaceous understory vegetation for GRSG nesting without losing the range benefits provided by livestock grazing. However, VDDT modeling does not indicate an improvement in preferred habitat condition under this alternative.

Alternative F would place the greatest restrictions on development, but would reduce BLM management flexibility to address threats to GRSG habitat, and could result in development being pushed onto private lands lacking BLM land use controls. Overall, Alternative F would provide approximately the same level of protection as Alternative B, be more protective of GRSG than Alternatives A, C, or E, but ultimately less protective than Alternative D because of its lack of management flexibility,

4.2.10 Summary

Fire
For fire, Federal Wildland Fire Management Policy applies under all alternatives. The purpose of wildfire response is to support attainment of applicable land use plan goals and objectives, one of which is to restore fire as an ecosystem process. Several COT recommendations are contradictory; for example, the recommendation to restore characteristic fire regimes, but subsequent recommendations greatly limiting use of fire as a management tool. Ultimately, there is little effective difference among the alternatives for fire suppression priorities. Although the wording is different, intent of all alternatives is to protect breeding and wintering habitat for GRSG. The primary difference is in fire management direction in the less than 12-inch precipitation zone (Warm-Dry and Shallow-Dry Sagebrush Groups, predominantly); in Oregon, there is a high degree of overlap between these two habitat types.

Alternatives B, C, and F do not address fuel homogeneity. Homogeneous fuel beds typically produce the homogeneous burn patterns and result in invasive plant issues considered adverse for sage-grouse habitat quality and quantity. Post-fire seeding success rates are generally very low in the less than 12-inch precipitation zone.

Alternative D is most likely to reduce fire risks since the widest range of techniques allowed and the use of unplanned fire to meet habitat objectives is explicitly permitted. However, Alternative D still carries a risk of unfavorable outcomes, since treatment efficacy has not been established and it is unclear if treatment rates will be sufficient. Alternative E is more likely to be effective than Alternatives B, C, or F since it does allow for treating sagebrush to create mosaics, but its approach is generally more cautious than under Alternative D.

Alternative A is similar to Alternative D in probable outcomes but the lack of clear desired conditions under A allows for a wider range of interpretations to guide use of fire and fuels management for sagebrush-steppe restoration.

Invasive Plants

For treatment of invasive plant species under the existing management approach, BLM's Integrated Vegetation Management Handbook (H-1740-2) includes BMPs for limiting the spread of invasive plant species during any ground-disturbing activity, which includes construction projects within or adjacent to sagebrush habitats. In addition, Federal Wildland Fire Management Policy requires wildfire responses support attainment of applicable land management objectives, including protection of habitat values, and BLM's Burned Area Emergency Stabilization and Rehabilitation Handbook (H-1742-1) stipulates monitoring for 3 years post-treatment to prevent establishment of invasive weeds. Reclamation is also required post-mining, under BLM's Planning for Fluid Mineral Resources Handbook H-1624-1 (leasable minerals), Mineral Materials Disposal Handbook H-3600-1 (salable minerals), and Surface Management Handbook H-3809-1 (locatable minerals).

Most COT Report recommendations for invasive species do not require a LUP decision to implement; exceptions include limiting OHV use to existing routes, limiting allowable stocking levels and utilization levels for grazing, setting surface occupancy limitations for mining, and restricting the locations of new infrastructure. Overall, there is little evidence available that collective actions will have significant effect on invasive plant species spread rates. However, in the absence of any vegetation treatment, habitat trend is downward for all populations, largely due to expansion of annual grass at approximately 0.1 percent per year.

Thus, the alternatives would have a small impact on vegetation management. The area with sagebrush cover would differ by alternative between zero to 7 percent over a 50 year timeframe at a 1-percent treatment rate (**Tables 4-3** and **4-4**). Alternative C may actually be counterproductive, increasing the probability of invasive plant spread, because of its focus on passive management to restore sagebrush-steppe.

Conifer Expansion

For conifers, the existing Standards for Rangeland Health promote the development of healthy rangeland ecosystems with characteristic plant community types and species compositions, and juniper encroachment into sagebrush-steppe is considered undesirable. Treatment of juniper encroachment generally has a high success rate, although at the present time it is not possible to establish whether sagebrush-steppe response is adequate.

Alternatives A, B, D, and F are very similar with respect to conifer encroachment, with the clearest treatment priorities under Alternative D by identifying Restoration Opportunity Areas as key location for restoration projects and providing subsequent criteria for conifer removal. Whether these alternatives would treat at an adequate rate to maintain existing GRSG habitat would depend on funding.

Alternative C, with its focus on passive restoration, could be counterproductive, resulting in an increase in juniper extent over time, and reducing GRSG habitat availability, especially in late brood-rearing habitat. Alternative E places strict limits on the ability to treat juniper and thus is also likely to result in failure to treat juniper at its rate of expansion, resulting in a reduction in GRSG habitat availability, although at a slower rate than under Alternative C.

Grazing and Range Management

For grazing and range management, management guidance is less specific in older land management plans; however, Standards for Rangeland Health and Guidelines for Grazing Management apply. The standards and guidelines require periodic assessments of range conditions and adjustments to grazing practices to improve ecosystem function, although they do not specifically address GRSG habitat needs. Allowable utilization can be adjusted during permit renewals and in annual operating plans to account for the current conditions. Newer plans often have some guidance related to drought, and IM 2013-094 provides detailed procedures for adjusting grazing during drought that apply to all plans.

Grazing is widespread across GRSG habitat and its impacts of grazing on GRSG are debated, but research suggests that grazing up to moderate levels can co-exist with GRSG habitat and may support range health by reducing dead fuel buildup in grass crowns, limiting bunchgrass mortality during fires and helping to maintain healthy bunchgrass plants and allow for seed production.

Alternatives A, B, and F have lowest probability of adjusting grazing management to meet sage-grouse habitat needs due to the lack of direction in the older plans under Alternative A, and the unclear management direction in Alternatives B and F. Grazing restrictions under Alternative C could be counterproductive and decrease GRSG habitat quality and quantity over time. Alternative E is less likely to adjust grazing management to meet sage-grouse habitat needs, largely because assessments are not prioritized. Alternative D provides the clearest direction with highest likelihood of adjusting grazing management to meet GRSG habitat needs.

Energy Development and Mining

For energy development and mining, the most definitive way to avoid new mining activities and associated infrastructure in GRSG habitat is to close the habitat to mineral development or withdraw it from mineral entry, in the case of locatable minerals.

For leasable and salable minerals, Alternatives B, C, and F would close all PPMA to new mineral leases. With Alternative E, new leases in suitable GRSG habitat within Core Area habitat would be avoided. Leasing in GRSG habitat would not be avoided in Alternative A. While Alternative D also would not avoid leasing in GRSG habitat, new leases would be subject to NSO or CSU stipulations and a total surface disturbance cap of three percent applied. Disturbed areas would be restored to habitats used by GRSG before additional disturbance would be allowed. While stipulations would be available to the BLM in Alternatives B, C, D, and F, they can be imposed with leased fluid minerals only to the extent allowed by law. Thus, the alternatives that close GRSG to new leases (Alternatives B, C, and F) provide a greater degree of habitat protection on BLM-administered land, but may push development onto private lands that lack BLM land use controls.

For locatable minerals, Alternatives C and F would petition to withdraw the largest amount of GRSG habitat (all occupied habitat) from locatable minerals. Alternative B would withdraw only PPMA, which includes 95 percent of known occupied habitat in Oregon. Alternative E would not recommend withdrawing habitat, but states that no development in Core Areas would occur if there is evidence of GRSG use. Alternatives A and D do not recommend to withdraw habitat from mineral entry, so new mining activities would be avoided in occupied habitat. However, a three percent surface disturbance threshold in Alternative D could preclude levels of development reported to cause range abandonment (Knick et al. 2013). Further impact avoidance may occur if the operator agrees to implement BMPs (Appendix D).

All of the action alternatives, except Alternative E, have the same RDFs (Appendix C) and BMPs (Appendix D). These RDFs and conservation measures include such requirements (to the extent allowed by law) as surface disturbance limitations, TLs, noise restrictions, structure height limitations, design requirements, water development standards, remote monitoring requirements, and reclamation standards.

In addition, under all alternatives, reclamation bonds are required (pursuant to 43 15 CFR, Part 3104), with amount of the bond required to be sufficient to ensure full restoration of lands. The objective is to restore disturbed areas to the pre-disturbance landforms and desired plant community that will meet sage-grouse habitat needs (Pyke 2011), though these objectives are not always achieved. Reclamation objectives for PPMA and PGMA in the RDFs apply to Alternatives B, C, D, and F. Reclamation of abandoned mine lands to healthy sagebrush ecosystems would occur consistent with priority objectives for GRSG habitat restoration and vegetation management.

Overall, Alternatives A, D, and E are less effective in avoiding new mining activities and/or any associated facilities within occupied habitats, because they rely on discretionary actions by BLM and/or mining operators, while Alternatives C and F would be more effective at protecting GRSG habitat on BLM-administered land from mining activities. However, Alternative D (as well as Alternatives B and F) would adhere to a three percent disturbance cap to limit damage to GRSG habitat.

Infrastructure

For lands and realty, Alternative A would allow development in existing corridors, which have been established in location to minimize impacts on wildlife habitat. Alternatives B, C, E, and F would establish ROW exclusion areas in PPMA and avoidance areas in PGMA. Alternative D would avoid ROWs in PPMA, and on a case-by-case basis in PGMA, but would not establish exclusion areas. Exclusion areas may be ineffective, because existing infrastructure corridors have been sited in locations that minimize impacts, and relocation could merely push ROW development onto adjacent private land with fewer land use restrictions. Thus, Alternative D's flexible approach would be most effective in protecting GRSG habitat.

Recreation, including Travel

Most recreational activity in GRSG habitat is benign, with the exception of off-road vehicle use. Issuance of SRPs would be restricted under Alternatives B, D and F, but dispersed recreational activity does not require a permit and would not be impacted.

For road closures, Alternatives A, B, D and F do not seasonally close roads in GRSG habitat. Alternative C closes roads seasonally in habitat areas and limits OHVs to existing routes and Alternative E also provides for seasonal closures during nesting season. Alternatives B and D also limit OHVs to existing routes in PPMA. Alternatives C and E are most protective of GRSG from road impacts.

Land Tenure

All alternatives would be effective in retaining lands from disposal. Alternative A does not specify retention of GRSG habitat, but has a similar objective to retain land with wildlife habitat value. Alternative E retains Alternative A's approach. Alternatives B, C, D and F would avoid disposal of PGMA/Core Area habitat lands, but Alternative C would also retain PGMA, protecting the largest acreage of GRSG habitat from exchange or disposal.

Alternatives C and F are the only alternatives to establish new ACECs for GRSG. In ACECs where GRSG is a relevant and important value, management prescriptions would be tailored to the threats to GRSG in the specific location and would be more likely to protect intact GRSG habitats or populations than alternatives lacking new ACECs.

4.3 VEGETATION

4.3.1 Methods and Assumptions

Indicators

Indicators of impacts on vegetation are as follows:

Upland Vegetation

- Acres and condition of native vegetation communities
- Change in the trend or trajectory of conifer encroachment

Noxious Weeds and Invasive Species

- Change in the likelihood for noxious weed or invasive plant species introduction or spread
- Change in the amount or density of noxious weed or invasive plant species

Riparian and Wetland

- Amount and condition of riparian and wetland vegetation

Special Status Plants, Including Federally Listed Plants

Potential impacts on special status plants could occur if anticipated future actions were to change and of the following:

- Number of special status plant populations
- Size of special status plant populations
- Habitat quality and distribution
- Extent or number of invasive plant species in occupied or potential habitat
- Fire frequency and intensity

Assumptions

The analysis includes the following assumptions:

- The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors, including location in the watershed; the type, time, and degree of disturbance; existing vegetation; precipitation; and mitigating actions applied to the disturbance.

- New invasions of noxious and invasive weeds would continue to occur and spread as a result of ongoing vehicle traffic in and out of the planning area, recreation, wildland fire, wildlife and livestock grazing and movements, and surface-disturbing activities.
- Because the effects of climate change are complex and not yet well known or understood, the analysis was conducted assuming continuation of the current climate regime.
- Ecological health and ecosystem functioning depend on a number of factors, including vegetative cover, species diversity, nutrient cycling and availability, water infiltration and availability, percent cover of weeds, and climatic fluctuation.
- Short-term effects on upland vegetation would occur over a time frame of up to ten years, and long-term effects would occur over longer than ten years.
- Short-term effects on riparian and wetland vegetation would occur over a time frame of two years or less, and long-term effects would occur over longer than two years.

4.3.2 Nature and Type of Effects

GRSG rely on sagebrush ecosystems for all aspects of their life cycle. Typically, a range of sagebrush community composition within the landscape (including variations in subspecies composition, co-dominant vegetation, shrub cover, herbaceous cover, and stand age) are needed to meet seasonal and interseasonal requirements for food, cover, nesting, and wintering habitats. The landscape required for GRSG may be up to 40 square miles. Thus, conserving and managing GRSG is as much about the ecology, management, and conservation of large, intact sagebrush ecosystems as it is about the dynamics and behaviors of the populations themselves (Manier et al. 2013).

Historically, sagebrush-dominated vegetation was one of the most widespread habitats in the country, but its expanse has been fragmented, lost, or altered by invasive plants and human disturbance (NTT 2011). Protection of GRSG habitat would involve restrictions and limitations on activities that contribute to the spread of invasive species, fire, and other surface disturbance and management of vegetation to promote healthy sagebrush and understory vegetation to support GRSG.

Implementing management for non-motorized recreation and coal resources would have negligible or no impact on vegetation for all alternatives; therefore, they are not discussed in detail.

Vegetation Management and Habitat Protection

In addition to landscapes with large, intact patches of sagebrush, GRSG require high-quality habitat conditions. This includes a diversity of herbaceous species, vegetative and reproductive health of native grasses, and an abundance of sagebrush. This requires management for high-quality condition in seasonally important habitats (Manier et al. 2013). The distribution of suitable sagebrush habitats is limited and the cost of habitat restoration is high. Given this, management plans that protect intact sagebrush and restore impacted areas to enhance existing habitats (for example, connectivity of intact sagebrush) have the best chance of increasing the amount and quality of sagebrush cover (Manier et al. 2013). Over the long term, sagebrush-promoting vegetation treatments will enhance native vegetation and overall ecosystem productivity, while reducing the distribution of invasive species and some woody species.

Invasive plants can alter plant community structure and composition, productivity, nutrient cycling, and hydrology and can competitively exclude native plant populations. In particular, invasive plants can reduce and eliminate vegetation that GRSG use for food and cover, resulting in habitat loss and fragmentation, and can also increase the risk of wildfire. The spread of invasive plants such as cheatgrass (*Bromus tectorum*) has increased the frequency and intensity of fires (Balch et al. 2012). An assortment of invasive annuals and perennials and native conifers are currently invading sagebrush ecosystems.

Expansion of conifer woodlands, especially western juniper (*Juniperus occidentalis* var. *occidentalis*), presents a threat to GRSG because they do not provide suitable habitat, and mature trees displace shrubs, grasses, and forbs through direct competition for resources. Juniper expansion is also associated with increased bare ground and increased potential for erosion. Mature trees can offer perch sites for raptors, so woodland expansion would also represent expansion of predation threat, similar to perches on power lines and other structures (Manier et al. 2013).

Current treatments and active vegetation management typically focus on the following:

- Vegetation composition and structure for fuels management
- Habitat management
- Productivity manipulation for improving the habitat and forage conditions for ungulates and other grazers, using surface soil stabilization to increase productivity or removing invasive plants.

Locally and regionally, the distribution of these treatments can affect the distribution of GRSG and sagebrush habitats (Manier et al. 2013). Vegetation treatments would have short-term effects on vegetation from vegetation removal and disturbance, but they would result in long-term improvements.

Management of vegetation resources to protect GRSG would alter vegetative communities by promoting increases in sagebrush height and herbaceous cover and vegetation productivity. Treatments designed to prevent encroachment of shrubs, nonnative species, or woody vegetation would alter the condition of native vegetation communities by changing the density, composition, and frequency of species within plant communities. The intent of these management programs is to improve rangeland condition and to enhance sagebrush ecosystems over the long term.

Vegetation manipulations in the riparian zone, such as weed treatments, native plantings, and erosion control in the channel, would improve the condition of the riparian vegetation community, individual riparian species, and hydrologic functionality to attain proper functioning condition. Habitat connectivity for GRSG could be increased through vegetation manipulation designed to restore vegetation, particularly sagebrush overstory cover.

Direct protection of sagebrush habitat to support GRSG would limit or modify uses in this habitat type. Such use restrictions would reduce damage to native vegetation communities and individual native plant species in areas that are important for regional vegetation diversity and quality. Likewise, use restrictions would minimize loss of connectivity and would be more likely to retain existing age class distribution within these specific areas. Use restrictions could also minimize the spread of invasive species by limiting human activities that cause soil disturbance or seed introductions.

Wildland Fire

While wildfires likely played an important role historically in creating a mosaic of herbaceous dominated areas (recently disturbed) and mature sagebrush (less-frequently disturbed), current land-use patterns have restricted the system's ability to support natural wildfire regimes. Slow rates of regrowth and recovery of vegetation after disturbances (driven by low water availability and other constraints) are coupled with high rates of disturbance and conversion to introduced plant cover. These conditions are largely responsible for the accumulating displacement and degradation of the sagebrush ecosystem (Manier et al. 2013). Thus, preservation of sagebrush against wildfire and limiting use of prescribed burning is important to preserving GRSG habitat over both the short and long terms.

Sagebrush ecosystems are adapted to a historic fire regime and fire return intervals. Big sagebrush does not resprout after a fire but is replenished by wind-dispersed seed from adjacent unburned stands or by seeds in the soil. Depending on the species and the size of a burn, sagebrush can reestablish within five years; however, a return to a full pre-burn community cover can take 15 to 100 years (Manier et al. 2013; Evers 2013). Fire suppression can be used to maintain habitat for GRSG (NTT 2011). When management reduces wildland fire frequency by controlling natural ignitions, the indirect impact is that vegetation ages across the landscape, and early successional vegetation communities are diminished. In addition, woody plant density increases, leading to a reduction in the herbaceous understory, and the fuelbed structure homogenizes, promoting the development of larger fires with homogenized fire effects. Fire suppression can preserve the condition of some vegetation communities, as well as habitat connectivity. This is particularly important in areas where fire frequency has increased as a result of weed invasion, or where landscapes are highly fragmented. Fire suppression can also lead to increased fuel loads, which can lead to more damaging or larger-scale fires in the long term. Fire also increases opportunities for invasive species, such as cheatgrass, to expand (Brooks et al. 2004); fire suppression can limit the dominance of some invasive species.

Controlled burning can be used to treat fuel buildup and can assist in the recovery of sagebrush habitat in some vegetation types. Reseeding with native plants and long-term monitoring to ensure the production of GRSG cover and forage plants will assist vegetation recovery (NTT 2011).

Lands and Realty

Permitted activities, such as construction of utility ROWs, involve short-term and sometimes long-term vegetation removal. This reduces the condition of native vegetation communities and individual native plant species, alters age class distribution, reduces connectivity, and encourages the spread of invasive species. Construction activities could compact soils. This would inhibit natural revegetation in areas without active reclamation efforts. It also would reduce plant vigor, which would make plants more susceptible to disease, drought, or insect attack. In most cases soils in reclaimed areas would be ripped and seeded during interim or final reclamation (NTT 2011).

Different types of ROWs would impact vegetation in different ways. Above ground linear and underground ROWs, such as transmission lines or pipelines, would temporarily remove vegetation during construction, but areas would be reclaimed or restored after construction. Vegetation would be permanently removed for construction of surface linear ROWs, such as roads. Furthermore, since above ground and surface linear ROWs can extend for many miles, vegetation communities could be fragmented and the potential for weeds to be introduced or spread would increase. Above-ground site-type ROWs and wind energy projects would remove vegetation during project construction; however, areas would be restored after the ROW is installed.

ROW exclusion areas would prohibit all development of ROWs in areas where they are designated, which would directly protect vegetation from disturbance and removal. In ROW avoidance areas, the BLM would consider on a case-by-case basis whether a ROW should be allowed. This flexibility may be advantageous where federal and private landownership areas are mixed, and exclusion areas could result in more widespread development on private lands.

Land tenure adjustments can be made to reduce the fragmentation of GRSG habitat, which would improve the BLM's ability to implement management actions. These would result in increased vegetation diversity, ecological health, and attainment of land health standards. In addition, retention of federal lands would prevent sagebrush removal associated with land conversion to agricultural or urban uses.

Mineral Resources
Energy development requires construction of roads, well pads, wells and other infrastructure, and associated noise, traffic, and lights. These conditions alter, degrade, or entirely displace native ecosystems in the short and long terms (Manier et al. 2013). Surface disturbance associated with mineral development often removes vegetation, reduces the condition of native vegetation communities and the connectivity of habitat, and encourages the spread of invasive species (NTT 2011). Since most mines or claims in Oregon are relatively small, the surface impacts are also generally small. Vegetation removal would convert areas to an earlier seral stage, which could change vegetation community succession and reduce desired plant communities. The remaining vegetation could have reduced vigor or productivity due to mechanical damage, soil compaction, and dust. Impacts would not occur in areas closed to mineral leasing or development.

Impacts are reduced through the implementation of required reclamation and approved reclamation plans that are created, approved, and implemented prior to any surface disturbance and address vegetation, invasive weeds, and other important resource values, such as special status plants.

There are no anticipated effects on vegetation from coal development or management. This is because this resource is not expected to be developed over the course of the plan.

Recreation
Recreation in GRSG habitat can be benign, but casual use, such as camping, bicycling, and off-road vehicle use, can degrade sagebrush vegetation in the short and long terms. Potential impacts from casual recreation use include trampling, soil compaction, erosion, spread of invasive plants, and generation of fugitive dust (Knick et al. 2011). Recreation can also increase the potential for wildfire caused by invasive plant spread or humans (Knick et al. 2011). Most impacts occur in easily accessible areas and in areas open to cross-country travel, particularly motorized use. Restrictions on recreation in GRSG habitat would limit damage to the vegetation communities that comprise this habitat. This would be accomplished by directly reducing disturbance to vegetation from trampling, motorized vehicles, dust, and spread of invasive species. Such restrictions could involve seasonal area closures or limitations on the number of users or types of uses permitted, particularly off-road vehicle use (NTT 2011).

Travel and Transportation
Road construction can divide and fragment vegetation over the long term, depending on the location of the road. The use of roads creates soil compaction and allows the spread of human disturbance, including wildfire and invasive plant species (USFWS 2010a; Manier et al. 2013). Invasive species can outcompete

sagebrush and other vegetation essential for GRSG survival. Invasive plant species also increase wildfire frequencies, further contributing to loss of habitat (Balch et al. 2012).

The more areas that restrict motorized vehicle use, the less likelihood there would be for impacts on vegetation from surface disturbance, such as reduced acreage and condition of vegetation, increased likelihood for weed invasion, and reduction in the number and size of special status plant populations and habitat quality and distribution.

Livestock Grazing

Livestock grazing is the most widespread land use across the sagebrush habitat (Connelly et al. 2004). Livestock grazing affects soils, vegetation health, species composition, water, and nutrient availability over the short and long terms by consuming vegetation, redistributing nutrients and seeds, trampling soils and vegetation, and disrupting microbial systems (Connelly et al. 2004; NTT 2011).

Livestock grazing has been described as a diffuse form of biotic disturbance; unlike point sources of disturbance (e.g., a frequently used undeveloped campsite), livestock grazing exerts repeated pressure across the landscape over many years (Manier et al. 2013). Thus, effects of grazing are not likely to be detected as disruptions but as differences in the processes and functioning of the sagebrush, riparian, and wetland systems (Manier et al. 2013). Grazing effects are not distributed evenly because historic practices, management plans and agreements, and animal behavior all lead to differential use of the range (Manier et al. 2013). Livestock often use riparian and wetland areas for water and shade, which reduces riparian community conditions and hydrologic functionality at certain levels. Properly managed grazing could help restore functioning condition of riparian areas, and could also reduce litter and fine fuel loading, helping to reduce fire size and severity.

Water developments, roads, and structural range improvements associated with livestock grazing throughout the planning area would remove vegetation over the long term and could be a source of weed introduction to rangelands. Livestock tend to congregate around water developments, compacting soil and trampling nearby vegetation, including shoreline and riparian areas. This makes reestablishment of native vegetation difficult in the area surrounding water developments. However, water developments and fencing also facilitate movement, distribution, and concentration of livestock more evenly across the range and thereby potentially improve rangeland health.

At certain levels, grazing leads to loss of vegetative cover, reduced water infiltration rates and nutrient cycling, decreased plant litter and water quality, and increased bare ground and soil erosion (Manier et al. 2013). Land health evaluations are used to assess rangeland condition and help to identify where a change in grazing management would be beneficial to rangeland health.

Management of grazing systems that aims to protect sagebrush and riparian ecosystems would enhance vegetation by allowing more plant growth and reducing trampling and introduction of exotic species. Conversely, concentration of livestock grazing in certain areas would increase surface-disturbing impacts in those areas.

Wild Horses and Burros

Unlike cattle and other ungulates, horses can crop vegetation close to the ground, potentially limiting or delaying recovery of plants (Menard et al. 2002, p. 127). In addition, horses seasonally move to higher elevations, spend less time at water, and range farther from water resources than cattle (Beever and Aldridge, in press, p. 21). Given these differences, along with the confounding factor of past range use, it is difficult to assess the overall magnitude of the impact of horses on the landscape in general, or on GRSG habitat in particular.

Similar to domestic livestock grazing, wild horses and burros have the potential to negatively affect GRSG habitats over the short and long terms in in areas where they occur by decreasing grass cover, fragmenting shrub canopies, altering soil characteristics, decreasing plant diversity, and increasing the abundance of invasive species.

Water developments, roads, and structural range improvements associated with wild horse and burro grazing would remove vegetation over the long term and could be a source of weed introduction to rangelands. Wild horse and burros congregate around water developments, compacting soil and trampling nearby vegetation, including shoreline and riparian areas. This would make reestablishment of native vegetation difficult in the area surrounding water developments.

Management of wild horse and burros populations within the Appropriate Management Level (AML) range and emphasis on meeting rangeland health standards would enhance the suitability of habitat for GRSG, reduce trampling and introduction of exotic species. Land health evaluations are used to assess rangeland condition and help to identify where a change in AML would be beneficial. Conversely, concentration of wild horse and burros would increase surface disturbing impacts on those areas.

Special Designations

Special designations (e.g., ACECs, Wilderness, and WSAs) and other conservation measures may be established to protect vegetation in GRSG habitat as a relevant or important value. While existing ACECs, Wilderness, WSAs, and other special designations do not have GRSG habitat as a relevant or important value, some incidental protection may be conferred to vegetation in existing ACECs by restricting resource uses intended to protect other values.

4.3.3 Impacts Common to All Alternatives

Impacts from Special Status Species—Greater Sage-Grouse Management

There are no impacts on vegetation common to all alternatives from GRSG management.

Impacts from Vegetation Management

Under all alternatives, Integrated Vegetation Management Handbook policies would be followed and would provide guidance on which treatments and chemicals could be used. Application of these policies would improve vegetation management in sagebrush habitat over the short and long terms, thereby likely improving the condition of native vegetation in these areas. In addition, riparian and wetland areas would be managed to achieve or trend towards achieving proper functioning condition under all alternatives.

Impacts from Wild Horse and Burro Management

There are no impacts on vegetation common to all alternatives from wild horse and burro management.

Impacts from Wildland Fire Management

Post-wildland fire management would be common to all alternatives, with implementation of emergency stabilization and rehabilitation. This would help to reduce the effects of fire and maintain the extent of vegetation over the long term.

Impacts from Livestock Grazing/Range Management

There are no impacts on vegetation common to all alternatives from livestock grazing/range management.

Impacts from Travel Management

There are no impacts on vegetation common to all alternatives from travel management.

Impacts from Lands and Realty Management

There are no impacts on vegetation common to all alternatives from lands and realty management.

Impacts from Leasable Minerals Management

There are no impacts on vegetation common to all alternatives from leasable minerals management.

Impacts from Locatable Minerals Management

There are no impacts on vegetation common to all alternatives from locatable minerals management.

Impacts from Mineral Materials (Salables) Management

There are no impacts on vegetation common to all alternatives from mineral materials management.

Impacts from Nonenergy Leasable Minerals Management

There are no impacts on vegetation common to all alternatives from nonenergy leasable minerals management.

Impacts from Mineral Split-Estate Management

There are no impacts on vegetation common to all alternatives from mineral split-estate management.

Impacts from Special Designations Management

There are no impacts on vegetation common to all alternatives from special designations management.

Impacts from Air Quality and Climate Change Management

There are no impacts on vegetation common to all alternatives from air quality and climate change management.

Impacts from Special Status Plants Management

Under all alternatives, the BLM would follow management policy for federally listed and BLM-sensitive species provided in BLM Manual 6840. Under all alternatives, the BLM would protect and manage habitat for the enhancement and protection of the species' future existence. This would help to retain the number and size of special status plant populations over the long term.

4.3.4 Alternative A

In general, Alternative A would rely on management guidance that would not reflect the most up-to-date science regarding GRSG. Older land use plans would be implemented that often would lack a landscape-level approach to land use planning; however, many incorporate objectives for maintaining, improving, or restoring vegetation communities, particularly sagebrush and riparian and wetland habitats. As a result, there is general direction to preserve and improve vegetation communities. Nevertheless, discrete human disturbances, such as road construction and mineral and ROW development, would continue. This could result in a number of impacts on vegetation, as described under **Section 4.3.2**, Nature and Type of Effects.

Impacts from Special Status Species—Greater Sage-Grouse Management

There would be no impacts on vegetation resulting from GRSG management under Alternative A.

Impacts from Vegetation Management

Under Alternative A, the BLM would continue to incorporate vegetation objectives in management actions. This would improve the condition and increase the extent of native vegetation in areas where they are applied. In particular, the BLM would manage for the benefit of vegetation that provides wildlife forage, forbs, and sagebrush. Native species would be used when possible, but not required, allowing for some introduced species in areas where they are necessary for site stabilization, restoration, and protection from invasive plant species.

Impacts from Wild Horse and Burro Management

There would be no additional impacts on vegetation from wild horse and burro management under Alternative A. Impacts described under **Section 4.3.2** would continue.

Impacts from Wildland Fire Management

Under Alternative A, projects would be designed to minimize the size of wildfire and prevent the further loss of sagebrush, thereby retaining the extent of native vegetation over the short and long terms. In addition, prescribed burning can be used in support of resource management objectives, such as restoring grassland or shrubland, reducing conifer encroachment, or increasing age-class variety. As a result, vegetation condition and desired species composition would be improved in certain areas over the long term. Further, chemical weed treatments applied following prescribed burns would limit the expansion of weeds or invasive species in the burned area and would facilitate revegetation of native species. Impacts from fire, including those described under **Section 4.3.2**, would continue under Alternative A.

Impacts from Livestock Grazing/Range Management

Livestock grazing would continue to occur under Alternative A, with over 8.8 million acres of GRSG habitat open to grazing and over 120,000 acres closed to grazing on BLM-administered lands. Rangelands would continue to be managed to conform to the Oregon Standards for Rangeland Health, so vegetation communities would continue to be maintained and improved to some extent across the planning area over the short and long terms. Changes and adjustments would be considered on a case-by-case basis and would incorporate standards for rangeland health and guidelines for livestock grazing management to evaluate the ability to meet desired conditions.

Riparian and wetland areas would be managed to maintain or attain proper functioning condition. Plant communities that provide GRSG habitat that would be open and closed to livestock grazing in each alternative are presented in **Table 4-39**, GRSG Habitat1 Open and Closed to Livestock Grazing. Under Alternative A, over 8 million acres of vegetation communities used by GRSG within PPH and PGH would be open to grazing. Impacts described under

Table 4-39
GRSG Habitat[1] Open and Closed to Livestock Grazing

Alternative	Open (acres)	Closed (acres)
Alternative A		
PPH	3,979,400	29,400
PGH	4,811,400	90,900
Alternative B		
PPMA	3,979,400	29,400
PGMA	4,811,400	90,900
Alternative C		
PPMA	0	4,009,600
PGMA	0	4,905,400
Alternative D		
PPMA	3,924,500	84,300
PGMA	4,762,600	139,700
Alternative E		
Core	3,979,400	29,400
Low Density	3,367,200	56,700
Alternative F		
PPMA	3,979,400	29,400
PGMA	4,811,400	90,900

[1]GRSG habitat represents those vegetation communities that provide habitat for GRSG.
Source: Oregon/Washington BLM 2013

Section 4.3.2 would continue in areas where rangeland health standards are not being met and livestock grazing is causing impacts on vegetation. Impacts, such as reduced acreage and condition of native vegetation and increased likelihood of weed spread, would be reduced in the areas where GRSG habitat would be closed to grazing (**Table 4-39**). Areas such as RNAs and ACECs could also be closed to grazing after assessment of rangeland health standards.

Impacts from Travel Management

Impacts from OHV use would continue under Alternative A over the short and long terms on over 5 million acres that would be open to cross-country motorized travel. Plant communities that provide GRSG habitat that would be open, closed, or limited to OHV use under each alternative are presented in **Table 4-40**, GRSG Habitat1 Open, Closed, or Limited to OHV Use. Under Alternative A, most GRSG habitat would be open or limited to existing routes. Route and trail modifications would be considered on a case-by-case basis. Impacts described under **Section 4.3.2** would continue to occur, particularly in areas open to OHV use.

Table 4-40
GRSG Habitat[1] Open, Closed, or Limited to OHV Use

Alternative	Open (acres)	Closed (acres)	Limited (acres)
Alternative A			
PPH	2,386,100	43,100	1,591,500
PGH	2,603,800	101,200	2,210,500
Alternative B			
PPMA	0	43,100	3,977,900
PGMA	2,603,800	101,200	2,210,500
Alternative C			
PPMA	0	43,100	3,977,900
PGMA	0	101,200	4,816,100
Alternative D			
PPMA	0	43,100	3,977,900
PGMA	2,603,800	101,200	2,210,500
Alternative E			
Core	0	33,000	2,532,900
Low Density	1,434,100	49,200	1,487,900
Alternative F			
PPMA	2,386,100	43,100	1,591,500
PGMA	2,603,800	101,200	2,210,500

[1]GRSG habitat represents those vegetation communities that provide habitat for GRSG.
Source: Oregon/Washington BLM 2013

Impacts from Lands and Realty Management

Under Alternative A, lands and realty management would continue, with over 3 million acres of ROW avoidance and over 800,000 acres of ROW exclusion areas. Plant communities that provide GRSG habitat that would be managed as ROW avoidance and exclusion under each alternative are presented in **Table 4-41**, GRSG Habitat1 Managed as ROW Avoidance and Exclusion. Under Alternative A, over 2.5 million acres of GRSG habitat would be managed as ROW avoidance areas, with nearly 500,000 acres of ROW exclusion areas. Impacts from ROW avoidance and exclusion areas would be similar to those described under **Section 4.3.2**.

Table 4-41
GRSG Habitat[1] Managed as ROW Avoidance and Exclusion

Alternative	ROW Avoidance (acres)	ROW Exclusion (acres)
Alternative A		
PPH	1,157,000	233,900
PGH	1,425,900	222,100
Alternative B		
PPMA	0	4,021,100

Table 4-41
GRSG Habitat[1] Managed as ROW Avoidance and Exclusion

Alternative	ROW Avoidance (acres)	ROW Exclusion (acres)
PGMA	4,917,400	0
Alternative C		
PPMA	0	4,021,100
PGMA	0	4,917,400
Alternative D		
PPMA	3,787,200	233,900
PGMA	1,425,900	222,100
Alternative E		
Core	1,157,000	233,900
Low Density	1,198,900	121,000
Alternative F		
PPMA	0	4,021,100
PGMA	0	4,917,400

[1]GRSG habitat represents those vegetation communities that provide habitat for GRSG.
Source: Oregon/Washington BLM 2013

Impacts from Leasable Minerals Management

Plant communities that provide GRSG habitat that would be open to leasing, open subject to NSO stipulation, and not available for leasing under each alternative are presented in **Table 4-42**, Leasable Minerals Management within GRSG Habitat by Alternative. Under Alternative A, over 1.5 million acres of plant communities that provide GRSG habitat would be open to leasing, while over 2 million acres would be closed. Stipulations and COAs would be applied in certain areas to reduce impacts from mineral leasing or development over the short and long terms, but these stipulations would not be applied consistently across the planning area. Impacts from leasable mineral development on vegetation, as described under **Section 4.3.2**, would continue to occur in areas open to leasing and development.

Table 4-42
Leasable Minerals Management within GRSG Habitat by Alternative[1]

Alternative	Open (acres)	Open, with NSO (acres)	Not available (acres)
Alternative A			
PPH	979,400	178,200	1,000,200
PGH	574,400	77,000	1,302,000
Alternative B			
PPMA	0	0	4,021,100
PGMA	574,400	77,000	1,302,000

Table 4-42
Leasable Minerals Management within GRSG Habitat by Alternative[1]

Alternative	Open (acres)	Open, with NSO (acres)	Not available (acres)
Alternative C			
PPMA	0	120	4,009,200
PGMA	2,800	60	4,864,800
Alternative D			
PPMA	0	2,439,800	1,000,600
PGMA	0	551,300	1,301,900
Alternative E			
Core	0	0	4,021,100
Low Density	469,600	54,500	1,062,100
Alternative F			
PPMA	0	0	4,021,100
PGMA	2,800	60	4,864,800

Source: Oregon/Washington BLM 2013
[1] Applies to both leasable fluid minerals and nonenergy leasable minerals. GRSG habitat represents those vegetation communities that provide habitat for GRSG.

Impacts from Locatable Minerals Management

Plant communities that provide GRSG habitat that would be withdrawn or recommended for withdrawal under each alternative are presented in **Table 4-43**, Locatable Mineral Withdrawals in GRSG Habitat1 by Alternative. Under Alternative A, over 600,000 acres of GRSG habitat would be withdrawn or recommended for withdrawal. Impacts from locatable mineral development on vegetation, as described under **Section 4.3.2**, would continue to occur in areas open to development.

Table 4-43
Locatable Mineral Withdrawals in GRSG Habitat[1] by Alternative

Alternative	Withdrawn (acres)	Recommended for Withdrawal (acres)
Alternative A		
PPH	221,400	12,000
PGH	427,500	7,250
Alternative B		
PPMA	80	4,020,600
PGMA	427,500	7,250
Alternative C		
PPMA	0	4,021,100
PGMA	0	4,917,400
Alternative D		
PPMA	221,400	12,000

Table 4-43
Locatable Mineral Withdrawals in GRSG Habitat[1] by Alternative

Alternative	Withdrawn (acres)	Recommended for Withdrawal (acres)
PGMA	426,900	7,250
Alternative E		
Core	80	4,020600
Low Density	323,200	7,240
Alternative F		
PPMA	90	4,019,100
PGMA	426,900	7,250

[1]GRSG habitat represents those vegetation communities that provide habitat for GRSG.
Source: Oregon/Washington BLM 2013

Impacts from Mineral Materials (Salables) Management
Plant communities that provide GRSG habitat that would be open, open subject to NSO, or closed to mineral materials development under each alternative are presented in **Table 4-44**, Salable Minerals Management within GRSG Habitat1 by Alternative. Under Alternative A, over 500,000 acres of GRSG habitat would be closed to mineral materials development, while over 300,000 acres would be open. NSO stipulations would be applied in some areas, which would reduce impacts over the short and long terms. Impacts from mineral materials development on vegetation, as described under **Section 4.3.2**, would continue to occur in areas open to development.

Table 4-44
Salable Minerals Management within GRSG Habitat[1] by Alternative

Alternative	Open (acres)	Open, with NSO (acres)	Closed (acres)
Alternative A			
PPH	2,804,100	117,100	277,100
PGH	3,233,200	358,400	230,400
Alternative B			
PPMA	0	0	4,020,900
PGMA	230,400	39,500	806,800
Alternative C			
PPMA	0	0	4,021,100
PGMA	0	0	4,917,400
Alternative D			
PPMA	0	0	4,019,600
PGMA	228,300	39,500	806,200
Alternative E			
Core	0	0	4,020,900

Table 4-44
Salable Minerals Management within GRSG Habitat[1] by Alternative

Alternative	Open (acres)	Open, with NSO (acres)	Closed (acres)
Low Density	216,000	27,300	638,300
Alternative F			
PPMA	160	40	4,019,400
PGMA	230,400	39,500	806,200

[1]GRSG habitat represents those vegetation communities that provide habitat for GRSG.
Source: Oregon/Washington BLM 2013

Impacts from Nonenergy Leasable Minerals Management

Impacts would be similar to those described for leasable minerals above (**Table 4-42**). Impacts from nonenergy leasable development on vegetation, as described under **Section 4.3.2**, would continue to occur in areas open to leasing and development.

Impacts from Mineral Split-Estate Management

Impacts on vegetation from mineral split-estate management are the same as those described for leasable minerals under Alternative A. No additional impacts on vegetation from mineral split-estate management are expected.

Impacts from Special Designations Management

Under Alternative A, the BLM would continue to manage 715,049 acres of ACECs. Existing ACECs likely protect vegetation over the short and long terms through use restrictions; these impacts are analyzed under each existing RMP within the planning area. As a result, there would be no additional effects from ACEC management on vegetation under this alternative.

Impacts from Air Quality and Climate Change Management

There would be no impacts on vegetation from air quality and climate change management under Alternative A.

Impacts from Special Status Plants Management

Impacts on vegetation are the same as those described under **Section 4.3.3**. There would be no additional impacts on vegetation from special status plant management under Alternative A.

4.3.5 Alternative B

Under Alternative B, the BLM would manage lands to conserve, enhance, and restore sagebrush ecosystems. Direct protection of sagebrush habitat to support GRSG would limit or modify uses in this habitat type, improving the acreage and condition of native vegetation communities. Use restrictions and a 3 percent disturbance cap on anthropogenic disturbances would reduce damage to native vegetation communities and special status plant populations. Likewise, use restrictions would minimize loss of connectivity and would be more likely to retain existing age class distribution within these specific areas. Use restrictions could also minimize the spread of invasive species by limiting human activities that disturb the soil or introduce seed.

Impacts from Special Status Species—Greater Sage-Grouse Management

PPMA (4.5 million acres) and PGMA (5.5 million acres) would be designated. The BLM would apply a three percent human disturbance cap to activities in PPMA and would implement numerous conservation measures to reduce impacts from human activities in PPMA. This would reduce the likelihood for vegetation removal, degradation, or fragmentation and would maintain the acreage and condition of sagebrush vegetation over the short and long terms.

Impacts from Vegetation Management

Under Alternative B, vegetation management actions would aim to improve GRSG habitat and prioritize restoration to benefit GRSG habitats. The BLM would require the use of native seeds and would design post-restoration management to ensure the long-term persistence of the restoration. In addition, the BLM would consider changes in climate when determining species for restoration.

Together, these management actions would maintain the condition and increase the extent of native vegetation communities, reduce the likelihood of invasive weed introduction and spread, and reduce the extent of invasive weeds through restoration and seeding over the long term. Treatments designed to prevent encroachment of trees and nonnative species would alter the condition of native vegetation communities by changing the density, composition, and frequency of species within plant communities. Habitat connectivity for GRSG could be increased through vegetation manipulation designed to restore vegetation, particularly sagebrush overstory cover.

Vegetation manipulations in riparian areas, such as weed treatments, native plantings, and erosion control in the channel, would improve the acreage and condition of the riparian vegetation community, individual riparian species, and hydrologic functionality to attain proper functioning condition over the long term.

Impacts from Wild Horse and Burro Management

Incorporating GRSG habitat objectives and conducting land health assessments within HMAs would improve vegetation management. These measures could lead to improved vegetation conditions over time if changes in HMA management were to result in certain areas.

Impacts from Wildland Fire Management

Fuels treatments under Alternative B would be designed to protect sagebrush ecosystems by maintaining sagebrush cover, applying seasonal restrictions and protections for winter range, and requiring use of native seeds in restoration. Post-fuels treatments and emergency stabilization and rehabilitation (ES&R)

would be designed to ensure long-term persistence of seeded areas and native plant restoration areas.

These management actions would help to retain the extent of sagebrush vegetation and prevent degradation or destruction of sagebrush caused by wildland fires over the long term. Furthermore, emphasizing the use of native seeds and noninvasive species would reduce the likelihood for weed invasion in burned or treated areas. The BLM would also prioritize suppression in PPMA, which would retain the existing conditions and trends of vegetation in these areas. Impacts from fuels treatments, ES&R, and suppression are similar to those described under **Section 4.3.2**.

Impacts from Livestock Grazing/Range Management

Under Alternative B, the BLM would not change acres open or closed to livestock grazing, compared to Alternative A (**Table 4-39**). However, the BLM would implement a number of management actions in PPMA to incorporate GRSG habitat objectives and management considerations into livestock grazing management. These include the following:

- Prioritizing completion of land health assessments
- Consideration of grazing methods and systems to reduce impacts on GRSG habitat
- Improved management of riparian areas and wet meadows
- Evaluation of existing introduced perennial grass seedings, water developments, and structural range improvements

Such measures would help to maintain or improve the acreage and vegetation condition of rangeland and riparian and wetland areas and could reduce the likelihood of nonnative invasive species introduction or spread over the long term. Together, these efforts would reduce, but would not eliminate, impacts from grazing on vegetation, such as reduced acreage and condition of native vegetation and increased likelihood for spread of noxious weeds, by implementing a more comprehensive approach to grazing with vegetation management as a priority.

Impacts from Travel Management

Under Alternative B, motorized travel would be limited to existing roads, primitive roads, and trails within PPMA not already closed to off-road use (**Table 4-40**). This would reduce the likelihood of impacts caused by roads, as described under **Section 4.3.2**, and would increase the acreage and connectivity of sagebrush vegetation.

Impacts from Lands and Realty Management

Managing PPMA as ROW exclusion and PGMA as ROW avoidance areas would reduce impacts on vegetation, as described under **Section 4.3.2** (**Table 4-41**)

(43 CFR 2805.12, 43 CFR 2807.19). In addition, the BLM would restore ROWs that are no longer in use. This would increase the extent and connectivity of sagebrush habitats and reduce the spread of weeds to these areas over the long term. Lands would be retained in federal ownership, with limited exceptions, which would reduce fragmentation over the long term as described under **Section 4.3.2**.

Impacts from Leasable Minerals Management

In addition to acres closed to fluid mineral leasing in PPMA (**Table 4-42**), the BLM would require numerous conservation measures in leased PPMA. Over the long term, closures and NSO stipulations would protect existing vegetation from removal, degradation, fragmentation, and nonnative invasive species introduction or spread in unleased areas. Conservation measures would help to reduce such impacts in leased areas; restoration would improve the condition and increase the extent of vegetation and, depending on the location, could remove nonnative invasive species and reduce fragmentation.

Impacts from Locatable Minerals Management

The BLM would recommend all PPMA for withdrawal from locatable mineral entry (43 CFR 2300) (**Table 4-43**), which would reduce the likelihood that vegetation would be removed, degraded, or fragmented in these areas over the short and long terms. This would also reduce the likelihood that weeds could be introduced or spread as a result of locatable mineral development.

Impacts from Mineral Materials (Salables) Management

In addition to acres closed to mineral material sales (**Table 4-44**), the BLM would restore salable mineral pits no longer in use. Over the long term, closures would protect existing vegetation from removal, degradation, fragmentation, and nonnative invasive species introduction or spread. Restoration could take many years, but would ultimately increase the extent of vegetation and, depending on the location, could remove nonnative invasive species and reduce fragmentation.

Impacts from Nonenergy Leasable Minerals Management

Under Alternative B, PPMA would be closed to nonenergy leasable mineral leasing, and BMPs would be required on existing leases. This would prevent impacts on vegetation from nonenergy leasable mineral development in unleased areas, as described under **Section 4.3.2**. It also would reduce impacts in leased areas.

Impacts from Mineral Split-Estate Management

Under Alternative B, conservation measures and RFDs would be applied on mineral split estate in PPMA where possible. This would reduce impacts on vegetation, as described for leasable minerals on these lands.

Impacts from Special Designations Management

Impacts from ACEC management on vegetation under Alternative B are the same as described for Alternative A.

Impacts from Air Quality and Climate Change Management

There would be no impacts on vegetation from air quality and climate change management under Alternative B.

Impacts from Special Status Plants Management

Impacts are the same as those described under **Section 4.3.3**. There would be no additional impacts on vegetation from special status plant management under Alternative B.

4.3.6 Alternative C

Under Alternative C, the BLM would manage lands to conserve, enhance, and restore sagebrush ecosystems. Designation of PPMA and PGMA would be the same as described for Alternative B. Management would focus on removing livestock grazing from occupied habitats and a zero percent disturbance cap would be implemented, with most other management similar to Alternative A.

Impacts from Special Status Species—Greater Sage-Grouse Management

Impacts from designation of PPMA are similar to those described for Alternative B. The exception is that they would apply to a larger area (all occupied habitat) and a zero percent disturbance cap would be applied, thus protecting more vegetation under Alternative C.

Impacts from Vegetation Management

Management under Alternative C would be similar to that described under Alternative A, though with an increased focus on restoration. Impacts are similar to those described for Alternative A; however, impacts would be reduced over the long term in areas where vegetation is restored to the reference state of the appropriate ecological site description.

Impacts from Wild Horse and Burro Management

Impacts from wild horse and burro management on vegetation are the same as those described for Alternative A.

Impacts from Wildland Fire Management

Impacts from wildland fire management on vegetation under Alternative C are similar to those described for Alternative A.

Impacts from Livestock Grazing/Range Management

Under Alternative C, livestock grazing would be removed from all occupied GRSG habitats (**Table 4-39**). The effects of livestock exclusion would depend on site conditions, including climate, soils, fire history, and disturbance and grazing history (Strand and Launchbaugh 2013). Grazing is associated with direct and indirect impacts on vegetation, such as introduction of invasive plant species, as described below and in **Section 4.3.2**.

There is evidence that grazing can reduce resistance to invasion from cheatgrass (Reisner et al. 2013), reduce water infiltration, increase soil compaction and erosion, and decrease water quality (Braun 1998; Dobkin et al. 1998, in USFWS 2010a). Cessation of grazing would relieve these impacts and allow for recovery of native understory perennials, as well as increase cover of sagebrush and herbaceous understory vegetation (Strand and Launchbaugh 2013). This would improve habitat components important to GRSG nest success, including cover and forage, by increasing the insect population.

Other research suggests that understory herbaceous productivity does not increase in depleted sagebrush ranges when grazing is removed (Beck and Mitchell 2000). Furthermore, in some areas, passive restoration is not sufficient to improve GRSG habitat, and in these areas, restoration is necessary (Davies et al. 2011).

Riparian and wetland areas that have been altered by grazing-associated water developments would be restored over the long term. This could increase the acreage and improve the condition of these vegetation communities toward proper functioning condition (PFC). However, impacts from wildlife use of riparian and wetland areas would continue.

In addition, removing grazing could also allow for buildup of fuel from grasses that could otherwise be consumed by livestock. This could increase the likelihood of a destructive fire over the short and long terms, which could result in stand replacement and permanent loss of vegetation over large areas. The influence on fire spread, severity, and intensity would depend on such factors as weather, fuel characteristics, and landscape features. Evidence suggests that the potential role of grazing on fire behavior is limited under extreme burning conditions—low fuel moisture and relative humidity and high temperature and wind speed (Strand and Launchbaugh 2013).

Impacts from Travel Management

Impacts from travel and transportation management on vegetation under Alternative C are the same as those described under Alternative A (**Table 4-40**).

Impacts from Lands and Realty Management

Lands and realty management under Alternative C are similar to that described for Alternative B. However, ROW exclusion areas would be designated in all occupied habitats and ACECs. In addition, all occupied habitat, ACECs, and restoration areas would be retained in federal ownership. Impacts from ROW exclusion areas and retention of federal lands would be as described under **Section 4.3.2**.

Impacts from Leasable Minerals Management

Impacts from leasable minerals management under Alternative C are similar to those described for Alternative B, although both PPMA and PGMA would be closed to leasing (**Table 4-42**).

Impacts from Locatable Minerals Management

Impacts from locatable minerals management on vegetation under Alternative C are the same as those described under Alternative A.

Impacts from Mineral Materials (Salables) Management

Impacts from salable minerals management on vegetation under Alternative C are the same as those described under Alternative A.

Impacts from Nonenergy Leasable Minerals Management

Impacts from nonenergy leasable minerals management on vegetation under Alternative C are similar to those described under Alternative A, although over 470,000 acres would be closed to nonenergy leasable exploration and development. Impacts would be reduced in those areas that would be closed, as described for Alternative B.

Impacts from Mineral Split-Estate Management

Impacts from mineral split-estate management on vegetation under Alternative C are the same as those described under Alternative A.

Impacts from Special Designations Management

Under Alternative C, the BLM would designate all PPMA as new ACECs covering 4.5 million acres (over 6 times more than under Alternative A). New ACEC management plans would be prepared to determine the necessary management to conserve GRSG in these areas. Impacts from management of ACECs would be as described under **Section 4.3.2**.

Impacts from Air Quality and Climate Change Management

There would be no impacts on vegetation from air quality and climate change management under Alternative C.

Impacts from Special Status Plants Management

Impacts are the same as those described under **Section 4.3.3**. There would be no additional impacts on vegetation from special status plant management under Alternative C.

4.3.7 Alternative D

Under Alternative D, the BLM would manage lands to maintain or enhance GRSG habitat to establish a mix of sagebrush classes. Management and impacts would be similar to Alternative B, though Alternative D would incorporate more flexibility to account for sub-regional conditions.

Impacts from Special Status Species—Greater Sage-Grouse Management

Impacts from GRSG management on vegetation under Alternative D are the same as those described for Alternative B.

Impacts from Vegetation Management

Management under Alternative D would be similar to that described for Alternative B. However, the BLM would identify focal areas to prioritize restoration projects and would use the most current science when implementing restoration projects. In addition, Alternative D provides guidance and priorities for sagebrush, juniper, and invasive weed treatments. Weed prevention measures would be incorporated during wildfire response and other agency activities. Together, these management actions would improve the likelihood for successful sagebrush restoration and vegetation and weed treatments, which would improve vegetation conditions over large areas and over the long term.

Impacts from Wild Horse and Burro Management

Impacts on vegetation from wild horse and burro management under Alternative D are similar to those described for Alternative B. Alternative D provides guidance for prioritizing land health evaluations, which would improve the efficiency and response time to improve vegetation conditions.

Impacts from Wildland Fire Management

Wildland fire management under Alternative D would be similar to that described for Alternative B, with additional management flexibility and guidance incorporated to tailor management to specific vegetation communities. The BLM would implement a comprehensive approach, with priorities for fuels management, wildfire management, and emergency stabilization and rehabilitation within GRSG habitat. This would improve wildland fire management over the short and long terms, given the limited resources available, and would target those areas that need most protection. Alternative D also establishes quantifiable objectives that would provide a measurable indication of progress or success. As a result, the likelihood for catastrophic wildfire would be reduced over the short and long terms, and subsequent impacts on vegetation from wildland fire, as described under **Section 4.3.2**, would also be reduced.

Impacts from Livestock Grazing/Range Management

Under Alternative D, the BLM would reduce the acres open to grazing compared to Alternative A (**Table 4-39**), as RNAs would be closed to grazing based on certain criteria, including nonattainment of rangeland health standards (**Appendix J**, Table 2). Nearly two times more acres would be closed to grazing under Alternative D compared to Alternative A. In addition, the BLM would prioritize allotments for processing grazing permits and leases and would prioritize land health assessments, emphasizing use of the habitat assessment framework to improve rangeland for GRSG habitat. Changes to permits may occur over the long term (more than 10 years). The impact of prioritizing land health assessments in GRSG habitat areas would be limited if these areas were already scheduled for land health assessments, or already provide GRSG habitat. Together, the provisions in this guidance could improve vegetation conditions if they led to expedited changes in livestock grazing management. Alternative D provides more detailed guidance for management during drought conditions. Together these measures would reduce the impacts from grazing, as described under **Section 4.3.2**, and would improve vegetation conditions on grazed lands.

Impacts from Travel Management

Impacts on vegetation from travel management under Alternative D are the same as those described for Alternative B (**Table 4-40**).

Impacts from Lands and Realty Management

Impacts on vegetation from lands and realty management under Alternative D are similar to those described for Alternative A. The same acreage would be managed as ROW exclusion areas, though two times more acres would be managed as ROW avoidance areas, providing additional protection to vegetation in these areas (**Table 4-41**).

Impacts from Leasable Minerals Management

Impacts from leasable minerals management under Alternative D are similar to those described for Alternative A. However, as shown in **Table 4-42**, 11 times more acres of plant communities that provide GRSG habitat would be open to leasing subject to NSO stipulations (2,991,100 acres compared to 255,200 acres).

Impacts from Locatable Minerals Management

Acres open to locatable mineral development under Alternative D would be the same as those described for Alternative A.

Impacts from Mineral Materials (Salables) Management

Impacts on vegetation from mineral materials management under Alternative D are the same as those described for Alternative B.

Impacts from Nonenergy Leasable Minerals Management

Under Alternative D, lands would be available to nonenergy leasable mineral, subject to an NSO stipulation. BMPs and restoration would be required on existing leases. This would reduce impacts on vegetation associated with nonenergy leasable mineral development in unleased and leased areas, as described under **Section 4.3.2**.

Impacts from Mineral Split-Estate Management

Impacts on vegetation from mineral split-estate management under Alternative D are the same as those described for Alternative B.

Impacts from Special Designations Management

ACECs managed under Alternative A would continue to be managed under Alternative D. However, the BLM would change management in some ACECs to reduce, modify, or eliminate vegetation impacts and fragmentation from resources uses and development (**Appendix J**, Table 2). As a result, large blocks of vegetation would be retained intact and the likelihood of weed invasion would be reduced over the short and long terms. Additional impacts on vegetation associated with such uses and development, as described under **Section 4.3.2**, would also be reduced.

Impacts from Air Quality and Climate Change Management

There would be no impacts on vegetation from air quality and climate change management under Alternative D.

Impacts from Special Status Plants Management

Alternative D includes additional special status plants management to conserve or recover special status plants and prevent future listing of species. Measures include maintaining current inventories, developing project-level mitigation measures, and monitoring populations. Such measures would increase the likelihood of retaining the number and size of special status plant populations throughout the decision area over the short and long terms.

4.3.8 Alternative E

GRSG conservation guidelines under Alternative E are designed to maintain (at a minimum) or enhance the quality (the optimum) of current habitats. They will also assist resource managers in achieving the population and habitat objectives of the ODFW State Plan.

Impacts from Special Status Species—Greater Sage-Grouse Management

Management of Core Area and Low Density habitat under Alternative E would have impacts similar to those described for Alternative B. In addition, Alternative E would require no net loss of sagebrush habitat in Core Areas, thereby maintaining the acreage of this vegetation community in these areas.

Impacts from Vegetation Management

Vegetation management under Alternative E emphasizes controlling invasive weeds, avoiding conversion of sagebrush to increase livestock forage, and using the connectivity model and habitat monitoring techniques in the ODFW plan.

Invasive weed management includes systematic detection surveys, priorities for weed control, and establishing weed protection areas. It provides guidance for detection, control, prevention, containment, and rehabilitation and restoration. Some guidance is also provided for conducting vegetation treatments. Overall, Alternative E would likely substantially reduce the introduction and spread of weeds over the short and long terms, compared to Alternative A.

Impacts from Wild Horse and Burro Management

Impacts from wild horse and burro management on vegetation are similar to those described for Alternative B.

Impacts from Wildland Fire Management

Impacts from wildland fire management under Alternative E are similar to those described for Alternative D. However, Alternative E provides slightly less specific guidance overall, which could mean less effective fire management and greater impacts on vegetation from wildland fire.

Impacts from Livestock Grazing/Range Management

Impacts on vegetation from livestock grazing under Alternative E are similar to those described for Alternative A. Alternative E emphasizes adaptive management, which would be more likely to reduce impacts on vegetation compared to Alternative A, if changes in livestock grazing management were made more quickly than under other alternatives.

Impacts from Travel Management

Impacts on vegetation from travel management under Alternative E are the same as those described for Alternative B.

Impacts from Lands and Realty Management

Impacts on vegetation from lands and realty management under Alternative E are the same as those described for Alternative A.

Impacts from Leasable Minerals Management

Impacts from leasable minerals management under Alternative E are the same as those described for Alternative B.

Impacts from Locatable Minerals Management

Acres open to locatable mineral development under Alternative E are the same as those described for Alternative B.

Impacts from Mineral Materials (Salables) Management

Impacts on vegetation from mineral materials management under Alternative E are the same as those described for Alternative B.

Impacts from Nonenergy Leasable Minerals Management

Impacts on vegetation from nonenergy leasable minerals management under Alternative E are the same as those described for Alternative B.

Impacts from Mineral Split-Estate Management

Impacts on vegetation from mineral split-estate management are the same as those described for leasable minerals under Alternative E. No additional impacts on vegetation from mineral split-estate management are expected.

Impacts from Special Designations Management

Impacts on vegetation from special designations management under Alternative E are the same as those described for Alternative A.

Impacts from Air Quality and Climate Change Management

Alternative E includes a measure to identify and protect resilient sagebrush habitats from climate change. This would help to retain the acreage and condition of intact sagebrush vegetation, which is likely to persist as the climate changes.

Impacts from Special Status Plants Management

Impacts are the same as those described under **Section 4.3.3**. There would be no additional impacts on vegetation from special status plant management under Alternative C.

4.3.9 Alternative F

Management under Alternative F would be largely similar to that described for Alternative B, though with more stringent guidance and restrictive management in sagebrush ecosystems, including a 3 percent disturbance cap that includes fire.

Impacts from Special Status Species—Greater Sage-Grouse Management

Impacts on vegetation from GRSG management under Alternative F are similar to those described for Alternative B. However, Alternative F would provide greater restrictions on allowable uses and the 3 percent disturbance cap would include fire. This would further reduce the acreage of vegetation that would be removed or fragmented by anthropogenic disturbances within occupied habitat over the long term.

Impacts from Vegetation Management

Impacts on vegetation from vegetation management under Alternative F are the same as those described for Alternative B.

Impacts from Wild Horse and Burro Management

Impacts on vegetation from wild horse and burro management under Alternative F are the same as those described for Alternative B.

Impacts from Wildland Fire Management

Impacts from wildland fire management under Alternative F are similar to those described for Alternative B. Alternative F would require exclusions of grazing post-fire. This would reduce grazing pressure on and trampling of ES&R seedings, thus improving the likelihood of native vegetation restoration post-fire over the short and long terms.

Impacts from Livestock Grazing/Range Management

Impacts from livestock grazing management under Alternative F are similar to those described for Alternative B (**Table 4-39**), though Alternative F would reduce grazing by 25 percent and would incorporate more stringent guidance and restrictive measures. This could further reduce impacts on vegetation in GRSG habitat areas, depending where and how the measures were applied.

Impacts from Travel Management

Impacts from travel and transportation management under Alternative F are similar to those described for Alternative B, though there would be fewer impacts on vegetation under Alternative F. This is because no new road construction would be allowed within 4 miles of leks in PPMA and mitigation of impacts from route construction would be required. Acres open, closed, and limited to OHV use would be the same as those described for Alternative A (**Table 4-40**).

Impacts from Lands and Realty Management

Impacts from management of ROW avoidance and exclusion areas are the same as those described under Alternative B. Impacts from land tenure decisions are similar to those described under Alternative B, though Alternative F would not allow for exceptions to disposal criteria. This would reduce management flexibility and could have implications for vegetation connectivity.

Impacts from Leasable Minerals Management

Impacts on vegetation from leasable minerals management under Alternative F are the same as those described for Alternative C.

Impacts from Locatable Minerals Management

Impacts on vegetation from locatable minerals management under Alternative F are the same as those described for Alternative B.

Impacts from Mineral Materials (Salables) Management

Impacts on vegetation from salable minerals management under Alternative F are the same as those described for Alternative B.

Impacts from Nonenergy Leasable Minerals Management

Impacts on vegetation from nonenergy leasable minerals management under Alternative F are the same as those described for Alternative C.

Impacts from Mineral Split-Estate Management

Impacts on vegetation from mineral split-estate management under Alternative F are the same as those described for Alternative B.

Impacts from Special Designations Management

Impacts from management of ACECs are similar to those described under Alternative C. However, 10 percent fewer acres would be managed as ACECs under Alternative F compared to Alternative C, thereby providing slightly reduced protection to vegetation associated with ACEC management.

Impacts from Air Quality and Climate Change Management

There are no impacts on vegetation from air quality and climate change management under Alternative F.

Impacts from Special Status Plants Management

Impacts are the same as those described under **Section 4.3.3**. There are no additional impacts on vegetation from special status plant management under Alternative F.

4.4 FISH AND WILDLIFE

4.4.1 Methods and Assumptions

The fish and wildlife environmental consequences discussion below is focused on the analysis of potential impacts on special status wildlife species from a range of alternative management actions. Implementing management for general fish and wildlife, big game, and migratory birds discussed in **Section 3.4**, Fish and Wildlife, would have negligible or no impacts on those resources and are not addressed in this analysis. Fish species might be of high economic and recreational value, but the proposed management alternatives within this EIS are not likely to have a substantial impact on fish species or their habitat. For sagebrush-obligate wildlife species, habitat improvements designed to enhance GRSG habitat and reduce anthropogenic disturbance activities would improve their habitat quality, quantity, and connectivity. Impacts on special status plant species are discussed in **Section 4.3**, Vegetation.

Data on known locations and habitats within the planning area are available, however, the data are not complete or comprehensive concerning all special status wildlife species known to occur or potential habitat that could exist. Known and potential special status wildlife species and habitat locations were considered in the analysis; however, the potential for species to occur outside of these areas was also considered, and, as a result, some impacts are discussed in more general terms.

Impacts on special status wildlife species would primarily result from unmitigated surface disturbance such as wildfires, wildfire-suppression activities, erosion, and trampling. Direct and indirect impacts on special status species result from any surface-disturbing activity or alteration to occupied habitats. All federal actions would comply with ESA consultation requirements, and all implementation actions would be subject to further special status species review before site-specific projects are authorized or implemented. Federal regulations and BLM policy protecting threatened, endangered, and sensitive species were methods considered for reducing the potential impacts from permitted activities. If adverse impacts are identified, mitigation measures, including avoidance, would be implemented to minimize or eliminate the impacts.

Indicators

Special Status Wildlife Species

Indicators of impacts on special status wildlife species are as follows:

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

Assumptions

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

- The analysis presented is largely qualitative due to the lack of data or uncertainty in existing data on certain special status species' occurrences. Furthermore, because many special status species would potentially use habitats that are currently unoccupied and populations fluctuate, any quantitative analysis of occupied habitat would change over time as knowledge of species locations increases. Where appropriate, acreages from **Table 2-5**, Summary Comparison of Resource Alternatives in GRSG Habitats, are included to show a comparison between alternatives.
- Impacts on special status species would be more significant than impacts on common species because population viability would be already uncertain for special status species, and certain species.
- Short-term effects are defined as those that would occur over a timeframe of 5 years or less, and long-term effects would occur over longer than 5 years.
- USFWS would be consulted on any action that could potentially affect any listed wildlife species or their habitat.

4.4.2 Nature and Type of Effects

Special status wildlife species including federally-listed species and BLM sensitive species are likely to inhabit the GRSG population areas within the decision area. Special status wildlife habitats on BLM-administered lands within the decision area would be affected under all alternatives, and the condition of habitats is directly linked to vegetation conditions and progression towards land health standards (**Section 4.3**, Vegetation). Habitat loss or modification due to human activity is a substantial threat to ecosystems and has effects on species adapted to specific ecological niches. The BLM's land management practices are intended to sustain and promote species that are legally protected and to prevent plant and animal species that are not yet legally protected from needing such protection.

Changes to special status wildlife species and their habitats would be caused by the following: 1) disturbance and disruption from casual use; 2) disturbance and disruption from permitted activities; and 3) changes to habitat conditions.

Disturbance and Disruption from Casual Use

The BLM does not actively manage casual use activities on federal lands, however, activities such as recreation, motorized vehicle use, and use of authorized and unauthorized routes can threaten special status wildlife species and their habitat. Examples of impacts on special status wildlife from casual use include habitat loss, fragmentation, or degradation; mortality or injury of animals; sedimentation of waterways; increased turbidity; decreased water quality; disturbance to species during sensitive or critical periods in their life cycle such as spawning, nesting, or denning; short-term displacement; and long-term habitat avoidance by species such as raptors that are sensitive to noise or human presence. Some species would adapt to disturbances over time and could recolonize disturbed habitats. Areas open to motorized travel could impact special status species due to noise disturbance, human presence, potential for weed spread and habitat degradation, and the potential for injury or mortality to wildlife from vehicle collisions.

Both short-term, loud noise (such as from vehicles or construction) and long-term, low-level noise (such as from industrial activities such as oil and gas development) have been documented to cause physiological effects on multiple wildlife species. These effects include increased heart rate, altered metabolism, and changes in hormones, foraging, anti-predator behavior, reduced reproductive success, density, and community structure (Radle 2007; Barber et al. 2009a). In addition, noise can impact wildlife species including mammals and birds through the disruption of communication and environmental cues (FHA 2011). Determining the effect of noise is complicated because different species and individuals have varying responses, and certain species rely more heavily on acoustical cues than others (Radle 2007; Barber et al. 2009b). Impacts would be both short- and long-term, depending on the type and source of noise, and the depending on the species.

On-site management of recreation and motorized activity, and designation and closure of travel routes could prevent or reduce impacts. Seasonal closure of routes would prevent impacts on species during sensitive or critical times of the year, such as during winter or birthing periods.

Disturbance and Disruption from Permitted Activities

Permitted, surface-disturbing activities (e.g., mineral exploration and development, and ROWs) would result in short-term direct impacts on special status wildlife species through mortality, injury, displacement, and noise or human disturbance caused by increased vehicle traffic and use of heavy machinery. Displacement of species could increase competition for resources in adjacent habitats. Over the long term, these activities would remove and fragment habitats due to road development and use, facility construction and placement, creation of well pads and pipelines, and construction within ROWs. Species could avoid developed areas over the long-term, or would adapt and recolonize sites after construction. ROW avoidance and exclusion areas would reduce or avoid habitat impacts and could reduce the total acreage of habitat disturbance and fragmentation.

Bird mortality or injury could occur from collision or electrocution with transmission lines and other ROW structures. Development in areas where there are existing ROWs would reduce impacts, since resident birds could have adapted to the existing ROWs. Wind energy could also cause direct impacts on birds and bats, including blade strikes, barotrauma (injury or mortality caused by rapid or excessive pressure changes), habitat loss, and displacement. Indirect impacts could include introduction of invasive vegetation that results in alteration of fire cycles; increase in predators or predation pressure; decreased survival or reproduction of the species; and decreased habitat effectiveness. Areas managed under NSO, CSU, and TL stipulations would limit surface disturbance and associated impacts in certain areas.

Changes to Habitat Conditions

Changes to habitat conditions could occur from vegetation and weed treatments; livestock grazing; GRSG habitat enhancements; fire; fuels treatments; and range improvements. Overall, the BLM would aim to achieve or trend toward achieving Rangeland Health Standard 5: Biodiversity, which would maintain and/or restore habitat values for fish and wildlife. Over the short-term, vegetation, fire, and weed treatments would remove habitat, and impacts would occur until the desired habitat was established. Over the long-term, vegetation and habitat treatments would increase habitat structural and compositional diversity, increase cover and nesting habitat, prevent sedimentation of waterways, and retain riparian and wetland habitats. Depending on the extent and severity, fire can improve habitat for some species in the long-term.

Special Status Species, that use rangelands can benefit from the proper management of livestock. These benefits include providing sustainable, diverse, and vigorous mixtures of native vegetation for forage and habitat. Also, proper management of grazing livestock can control noxious weeds and reduce fuel accumulations, protect intact sagebrush habitat, and increase habitat extent and continuity (NRCS 2011). If managed improperly, overutilization of forage by livestock could occur, leading to increased competition with wildlife for forage, and potentially reduced cover and nesting habitat for other species. Livestock could also spread weeds, which would degrade habitats. Special status wildlife could be displaced from their habitats, which could increase competition for resources in adjacent habitats. Impacts would vary depending on the extent of vegetation removal, type of habitat impacted, and length of the grazing period. In general, the more acres that are open to grazing and AUMs available under a given alternative, the greater the risk for impacts. Livestock could degrade riparian areas, which could impact riparian-dependent, aquatic, and fish species.

Natural disturbances such as unplanned fire ignitions could cause short- or long-term damage to habitats depending on the seral type affected, extent, and severity of the fire. In the short-term, fire removes nesting and cover habitat and leaves bare areas that provide little habitat value and could erode to cause sedimentation of waterways. Fire could displace species from suitable habitat, which could increase competition for resources in adjacent habitats. In the long-term, wildland and prescribed fires, as well as fuels treatments, improve habitat by increasing structural diversity. Often, fire and fuels treatments lower the risk for an uncharacteristically large or severe wildfire that would destroy a large acreage of wildlife habitats.

Management actions and special designated areas (e.g., ACECs) that restrict surface-disturbing activities would reduce impacts such as habitat removal, fragmentation, and human disturbance. Such management actions include stipulations to protect GRSG; closure of areas to mineral leasing and development; ROW avoidance and exclusion areas; areas proposed for withdrawal from mineral entry; restrictions within ACECs; and route closures or restrictions.

Criteria would be used to guide land exchanges, disposals, and acquisitions, which could reduce the fragmentation of BLM-administered land in the planning area. This could improve the BLM's ability to implement management actions that would result in improved habitats, undisturbed fish and wildlife populations, and attainment of land health standards. However, lands identified for disposal could cause fragmentation and habitat loss if the disposed land is converted to other uses, such as agriculture or residential or industrial development.

4.4.3 Impacts Common to All Alternatives

There are no impacts on special status wildlife species that are common to all alternatives.

4.4.4 Alternative A

Impacts from Special Status Species – Greater Sage-Grouse Management

There would be no new impacts on special status wildlife species resulting from GRSG management under Alternative A.

Impacts from Vegetation Management

Under Alternative A, the BLM would continue to protect special status species habitat or populations to avoid the species from being federally listed. These actions would continue implement current management efforts to protect habitat for all special status species described in **Section 3.4**, Fish and Wildlife, which overlap with GRSG habitat. There would be no new impacts on special status wildlife species resulting from vegetation management under Alternative A.

Impacts from Wild Horse and Burro Management

There would be no new impacts on special status wildlife species resulting from Wild Horse and Burro Management under Alternative A.

Impacts from Wildland Fire Management

Alternative A would limit the number of projects in sage grouse spring-summer-fall range to 60 percent of the area in a 10 year period and reduce encroaching conifers from riparian and sagebrush habitats. These actions would increase and enhance habitat for special status wildlife species that occur in sagebrush and riparian habitats. Special status wildlife that occupy western juniper trees less than 120 years old that are encroaching on sagebrush or GRSG riparian areas would have reduced habitat as a result of Alternative A. Impacts from fire on special status wildlife species described in **Section 4.4.2**, Nature and Type of Effects, would continue under Alternative A.

Impacts from Livestock Grazing/Range Management

Under Alternative A, livestock grazing could be used to promote the establishment of sagebrush by reducing stands of competing vegetation. Efforts to enhance and maintain wet meadows including riparian and wetlands, would be managed to meet proper functioning condition status. Seeding projects would increase desirable forage in areas of low vegetation diversity. These actions could result in increased habitat for sagebrush dependent special status species including many of the species listed in **Section 3.4**, Fish and Wildlife. Special status amphibians and other aquatic species habitat would increase under Alternative A as a result of riparian and wetlands restoration activities.

Impacts from Travel Management

Under Alternative A, over 6.8 million acres would remain open to unrestricted cross-country motorized travel. Impacts on special status wildlife species as a result of continued motorized vehicle use described in **Section 4.4.2** would continue.

Impacts from Lands and Realty Management

Under Alternative A, lands and realty would continue to manage over 850,000 acres as ROW exclusion and nearly 3.5 million acres as ROW avoidance areas. Management actions would not change under Alternative A and, therefore, there would be no new impacts on special status wildlife species.

Impacts from Leasable Minerals Management

Under Alternative A, over 7.4 million acres of GRSG habitat (3.4 million acres of PPMA and 4.1 million acres of PGMA) would continue to be open to mineral leasing; 2.7 million acres (1.2 million acres of PPM and 1.6 million acres of PGMA) would be closed. Impacts on special status wildlife species that occupy GRSG as a result of leasable minerals management, including habitat avoidance and other impacts described in **Section 4.4.2**, would continue in areas open for leasing under Alternative A.

Impacts from Locatable Minerals Management

Under Alternative A, areas inhabited by federally-listed species and lands within 0.6 miles of GRSG leks would be withdrawn or recommended for withdrawal from locatable mineral exploration and development. Areas that remain open for locatable mineral development that overlap with special status wildlife species not federally-listed, including the majority of bird, amphibian, mammal, and invertebrate species would continue to be impacted under Alternative A as described in **Section 4.4.2**.

Impacts from Mineral Materials (Salables) Management

Similar to the management actions proposed under locatable minerals in Alternative A, areas inhabited by federally-listed species and lands within 0.6 miles of GRSG leks would be withdrawn or recommended for withdrawal from mineral exploration and development. Areas that remain open for mineral development that overlap with special status wildlife species not federally-listed, including the majority of the bird, amphibian, mammal, and invertebrate species, would continue to be impacted under Alternative A as described in **Section 4.4.2**.

Impacts from Nonenergy Leasable Minerals Management

Nonenergy leasable minerals management actions proposed under Alternative A would have similar impacts on special status wildlife species as described for locatable minerals and mineral materials management above. Areas inhabited by federally-listed species and lands within 0.6 miles of GRSG leks would be withdrawn or recommended for withdrawal from mineral exploration and development. Areas that remain open for mineral development that overlaps with special status wildlife species not federally-listed, including the majority of the bird, amphibian, mammal, and invertebrate species, would continue to be impacted under Alternative A as described in **Section 4.4.2**.

Impacts from Mineral Split-Estate Management

Under Alternative A, management of mineral split-estate would not close, withdraw, or propose to withdraw locatable mineral entry. Over 2.6 million acres would continue to remain open to locatable mineral exploration or development. Impacts on special status wildlife species would continue as described in **Section 4.4.2**.

Impacts from Special Designations Management

Management of 715,049 acres of ACECs would continue to protect wildlife habitat and special status species under Alternative A. Management actions would not change under Alternative A and, therefore, there would be no new impacts on special status wildlife species.

Impacts from Air Quality and Climate Change Management
Under Alternative A, no new impacts on special status wildlife species from air quality and climate change management are expected.

Impacts from Special Status Plants Management
Special status wildlife species habitat would not be impacted under special status plants management actions proposed under Alternative A.

4.4.5 Alternative B

Impacts from Special Status Species – Greater Sage-Grouse Management
Under Alternative B, 4.5 million acres of PPMA and 5.6 million acres of PGMA would be designated and a three percent disturbance cap on human activities in PPMA would be applied. Compared to Alternative A, the actions proposed under Alternative B would increase habitat protection for special status wildlife species that occupy GRSG habitat listed in **Section 3.4**, Fish and Wildlife.

Impacts from Vegetation Management
Vegetation restoration efforts proposed under Alternative B would prioritize projects that would most likely improve GRSG habitat including seasonally important habitats and riparian areas. Special status wildlife species, including riparian species that overlap with GRSG habitat would receive increased habitat quality and protection under the vegetation management actions proposed under Alternative B compared with the no action alternative.

Impacts from Wild Horse and Burro Management
Under Alternative B, management of wild horses and burros would incorporate GRSG objectives and assess land health within Herd Management Areas (HMA). These actions would likely increase habitat quality and protection for special status wildlife species within these areas relative to Alternative A.

Impacts from Wildland Fire Management
Fire management under Alternative B in PPMA would be designed and implemented to protect existing sagebrush communities. These actions would likely reduce impacts from fire on GRSG habitat as described in **Section 4.4.2** and therefore, increase protection from fire on special status wildlife species that overlap with GRSG habitat compared with to the no action alternative.

Impacts from Livestock Grazing/Range Management
The total number of acres open to livestock grazing would be the same as the no action alternative. Under Alternative B however, the BLM would incorporate GRSG habitat objectives and considerations into all BLM grazing allotments through AMPs or permit renewals. Additional actions would include conducting land health assessments specific to achieving GRSG habitat objectives. Objectives to conserve, enhance, or restore PPMA would be developed and include wetlands and riparian areas. Grazing management actions would be included to meet seasonal GRSG habitat requirements. These management

actions would protect and improve special status wildlife habitat within livestock grazing rangeland as well as riparian and wetlands habitat. Compared to Alternative A, these actions would reduce impacts from grazing described in **Section 4.4.2** on special status wildlife species.

Impacts from Travel Management

Under Alternative B, 4.1 million acres would remain open to cross-country motorized travel and 4.5 million acres within PPMA would be limited to existing routes until travel management planning is complete. Actions proposed under Alternative B would reduce impacts described in **Section 4.4.2** on special status wildlife species compared to Alternative A.

Impacts from Lands and Realty Management

Under Alternative B, PPMA would be ROW exclusion areas (4.5 million acres) and PGMA would be ROW avoidance areas (5.6 million acres). The designation of ROW exclusion and avoidance areas would reduce habitat fragmentation to allow improved sagebrush connectivity for GRSG. These efforts would reduce impacts from permitted activities described in **Section 4.4.2** on special status wildlife species compared to the no action alternative.

Impacts from Leasable Minerals Management

Management actions proposed under Alternative B would close all PPMA (4.5 million acres) to fluid mineral leasing; approximately 4 million acres would remain open in PGMA. Over 1.5 million acres of PGMA would be closed to fluid mineral leasing, similar to the no action alternative. The actions under Alternative B would reduce impacts from fluid mineral leasing (see **Section 4.4.2**) described under Alternative A on special status wildlife species that inhabit PPMA.

Impacts from Locatable Minerals Management

Under Alternative B, nearly 4.3 million acres would be petitioned for withdrawal from locatable mineral entry. Additionally, the BLM would recommend applying best management practices in PPMA from the NTT Report as COA. Actions described under this alternative would reduce the impacts described under permitted activities in **Section 4.4.2** on special status wildlife species in PPMA compared to Alternative A.

Impacts from Mineral Materials (Salables) Management

Alternative B would close all PPMA to mineral material sales and restore defunct mineral pits to meet GRSG habitat objectives. These actions would reduce the potential impacts on special status wildlife species described in **Section 4.4.2** (permitted activities) compared to the no action alternative.

Impacts from Nonenergy Leasable Minerals Management

Nonenergy leasable minerals management actions proposed under Alternative B would close PPMA to leasing; no new leases to expand would be issued. Additionally, best management practices and design features would be applied during solution mining. Special status wildlife species within PPMA would receive increased habitat protection from these measures and reduce impacts described under permitted activities in **Section 4.4.2.**

Impacts from Mineral Split-Estate Management

Under Alternative B, where federal mineral estates occur under non-federal surface ownerships in PPMA, the BLM would apply conservation measures on public lands. Best management practices and design features would be applied to surface developments where the surface is federally owned and the mineral state is non-federal. These actions would reduce the potential for impacting special status wildlife species in PPMA compared to the no action alternative.

Impacts from Special Designations Management

Management actions proposed under Alternative B would be the same as those in the no action alternative. Management actions would not change under Alternative B and, therefore, there would be no new impacts on special status wildlife species.

Impacts from Air Quality and Climate Change Management

Under Alternative B, no impacts on special status wildlife species from air quality and climate change management are expected.

Impacts from Special Status Plants Management

Special status wildlife species habitat would not be impacted under special status plants management actions proposed under Alternative B.

4.4.6 Alternative C

Impacts from Special Status Species – Greater Sage-Grouse Management

Proposed management actions under Alternative C would designate the same acreage of PPMA (4,547,043 acres) and PGMA (5,662,632 acres) as Alternative B except that a zero percent disturbance cap would be applied. As a result, under Alternative C, special status wildlife species and their habitat would receive more protection than under the no action alternative or Alternative B.

Impacts from Vegetation Management

Under Alternative C, vegetation management actions would be similar to those described under the no action alternative. However, actions proposed under Alternative C to restore riparian and meadow vegetation by removing livestock watering infrastructure (troughs, pipelines, and wells) could reduce the availability of water for special status wildlife species compared with the no action alternative.

Impacts from Wild Horse and Burro Management

Under Alternative C, management of wild horses and burros would result in impacts on special status wildlife species similar to those described under Alternative A.

Impacts from Wildland Fire Management

Fire management under Alternative C would impact special status wildlife species the same as described under Alternative A.

Impacts from Livestock Grazing/Range Management

All occupied GRSG habitat would be closed to grazing under Alternative C and there would be zero AUMs. Potential impacts on special status wildlife from proper and improper grazing management described under changes to habitat conditions in **Section 4.4.2** would be eliminated. The exclusion of livestock grazers from occupied habitat would likely result in increased fencing and thus would result in an increase in habitat fragmentation compared to all of the alternatives.

Impacts from Travel Management

Under Alternative C, impacts on special status wildlife species from travel management actions would be similar to those described under Alternative A.

Impacts from Lands and Realty Management

Management proposed under Alternative C would prohibit transmission corridor, ROW corridor, and tower construction in all GRSG habitat including PPMA and PGMA. New corridors or infrastructure would be located outside of GRSG habitat. These actions would reduce impacts from permitted activities as described in **Section 4.4.2** on special status wildlife; however, special status species that inhabit areas outside of sagebrush ecosystems could receive more impacts from development in ROWs in non-GRSG habitat.

Impacts from Leasable Minerals Management

Under Alternative C, all occupied habitat (10.6 million acres) would be closed to fluid mineral leasing. Management actions proposed under Alternative C would result in an increase of over 4 million acres of PGMA closed to leasing. Therefore, Alternative C would provide the greatest amount of habitat protection for sagebrush-obligate special status wildlife species from leasable mineral development compared to all alternatives.

Impacts from Locatable Minerals Management

Impacts on special status wildlife species from locatable minerals management proposed under Alternative C would be the same as those described under Alternative A.

Impacts from Mineral Materials (Salables) Management

Impacts on special status wildlife species from mineral materials management proposed under Alternative C would be the same as those described under Alternative A.

Impacts from Nonenergy Leasable Minerals Management

Impacts on special status wildlife species from nonenergy leasable minerals management proposed under Alternative C would be the same as those described under Alternative A.

Impacts from Mineral Split-Estate Management

Impacts on special status wildlife species from mineral split-estate management proposed under Alternative C would be the same as those described under Alternative B.

Impacts from Special Designations Management

Under Alternative C, all PPMA would be designated as new ACECs for GRSG conservation and habitat protection. These efforts would increase habitat quality and reduce impacts on special status wildlife species in PPMA as described in changes to habitat conditions (see **Section 4.4.2**).

Impacts from Air Quality and Climate Change Management

Under Alternative C, no impacts on special status wildlife species from air quality and climate change management are expected.

Impacts from Special Status Plants Management

Special status wildlife species habitat would not be impacted under special status plants management actions proposed under Alternative C.

4.4.7 Alternative D

Impacts from Special Status Species – Greater Sage-Grouse Management

Impacts on special status wildlife species as a result of management actions proposed under Alternative D would be similar to the impacts described under Alternative B.

Impacts from Vegetation Management

Under Alternative D, vegetation management actions would prioritize Restoration Opportunity Areas (**Section 2.5.6**, Alternative D), throughout all occupied habitat that have a high probability for success. These actions would increase special status wildlife habitat quality and protection relative to the no action alternative.

Impacts from Wild Horse and Burro Management

Under Alternative C, management of wild horses and burros would result in impacts on special status wildlife species similar to those described under Alternative B.

Impacts from Wildland Fire Management

Alternative D provides the most comprehensive fire management direction of all the alternatives. Fire management under Alternative D would increase the focus of implementing protection for multiple resources including GRSG habitat.

These efforts would reduce the impacts from fire described in **Section 4.4.2** on special status wildlife species.

Impacts from Livestock Grazing/Range Management

Management actions proposed under Alternative D would result in 12,022,428 acres open for livestock grazing, which would be a reduction of less than 100 acres relative to the no action alternative. Also, nearly 100,000 acres of rangeland would be closed under Alternative D compared to the no action alternative. Also, Alternative D provides more comprehensive livestock grazing and range management actions aimed at protecting and restoring GRSG habitat compared the no action alternative. Therefore Alternative D would reduce impacts described in changes to habitat conditions in **Section 4.4.2** on special status wildlife compared to Alternative A.

Impacts from Travel Management

Under Alternative D, impacts on special status wildlife species from travel management actions would be similar to those described under Alternative A.

Impacts from Lands and Realty Management

Under Alternative D, lands and realty management actions would continue to manage current BLM ROWs in PPMA as exclusion areas. The remaining PPMA (4.3 million acres) would be managed as avoidance areas. PGMA under Alternative D would be open to new ROWs and would require the local BLM wildlife biologist, in cooperation with ODFW, to conduct a field evaluation to determine if the proposal would impact occupied, suitable, or potential habitat for GRSG. Additionally, development within avoidance areas would be allowed but subject to a three percent disturbance cap for human disturbance activities. Management actions proposed under Alternative D would be more protective of special status wildlife species within GRSG habitat compared to the no action alternative; however, not as protective as Alternative B.

Impacts from Leasable Minerals Management

Under Alternative D, leasable minerals management would result in the same number of acres open (9,483,868 acres) and closed (3,134,159 acres) as the no action alternative. However, Alternative D would impose a 3 percent disturbance limitation and an authorization to limit impacts from permitted activities (**Section 4.4.2**) on GRSG. Therefore, special status wildlife species that occupy GRSG habitat would receive an increased level of habitat protection.

Impacts from Locatable Minerals Management

Impacts on special status wildlife species from locatable minerals management proposed under Alternative D would be the same as those described under the no action alternative. Alternative D would include more protective considerations for GRSG and their habitat that could also increase protection for special status wildlife in sagebrush ecosystems.

Impacts from Mineral Materials (Salables) Management

Impacts on special status wildlife species from mineral materials management proposed under Alternative D would be the same as those described under Alternative B.

Impacts from Nonenergy Leasable Minerals Management

Impacts on special status wildlife species from nonenergy leasable minerals management proposed under Alternative D would be the same as those described under Alternative B.

Impacts from Mineral Split-Estate Management

Impacts on special status wildlife species from mineral split-estate management proposed under Alternative D would be the same as those described under Alternative B.

Impacts from Special Designations Management

Under Alternative D, the management plans for existing ACECs and RNAs in the planning area would be revised and updated to improve the management for GRSG and sagebrush habitat. Compared to Alternative C, only 20 percent of PPMA and/or 50 percent of PGMA GRSG habitat would be managed for GRSG. Therefore, impacts on special status wildlife species would be less than those as a result of the no action alternative but greater than those described under Alternative C.

Impacts from Air Quality and Climate Change Management

Under Alternative D, no impacts on special status wildlife species from air quality and climate change management are expected.

Impacts from Special Status Plants Management

Under Alternative D, the BLM would coordinate with the USFWS, ODFW, Oregon State Department of Agriculture, Oregon Biodiversity Information Center, and other organizations on the conservation efforts for special status species. Direction provided under Alternative D would include tools for establishing and assessing objectives for monitoring special status species populations. Compared to Alternative A, these measures would improve habitat within special status plant communities and increase the habitat quality for special status wildlife that could occur in those habitats.

4.4.8 Alternative E

Impacts from Special Status Species – Greater Sage-Grouse Management

Management actions proposed under Alternative E would include a zero percent disturbance cap applied in Core Area habitats; however, the disturbance threshold would not be implemented in non-GRSG habitat. Habitat improvements in Low Density habitat (3.9 million acres) under Alternative E would provide 1.7 million fewer acres of protection for special status wildlife habitat in these areas compared to the no action alternative.

Impacts from Vegetation Management

Under Alternative E, vegetation management actions would recommend planting livestock forage (alfalfa) within expansive sagebrush areas but would recommend avoiding the conversion of GRSG habitat on public lands for increasing livestock forage. Vegetation treatments would not occur during sensitive GRSG nesting and brood-rearing periods. Alternative E would also recommend using native seed sources for habitat restoration activities and provide increased protection for resilient sagebrush habitats in Core Area habitat. Water development for livestock would be added or relocated to maintain or improve GRSG habitat. The actions proposed under Alternative E would reduce impacts on special status wildlife described in **Section 4.4.2** compared to the no action alternative. In addition, compared to the other action alternatives, Alternative E would increase the availability of water in GRSG habitat which would increase habitat quality for special status wildlife in those areas including riparian and aquatic species.

Impacts from Wild Horse and Burro Management

Under Alternative D, management of wild horses and burros would result in impacts on special status wildlife species similar to those described under Alternative A with slightly more considerations given for the protection of GRSG habitat.

Impacts from Wildland Fire Management

Under Alternative E, impacts on special status wildlife from wildland fire management would be similar to those described under Alternative D with less focused protection directions. These actions would reduce the impacts described in **Section 4.4.2** on special status wildlife species compared to the no action alternative but to a lesser degree than Alternative D.

Impacts from Livestock Grazing/Range Management

Impacts on special status wildlife species from livestock grazing management proposed under Alternative E would be similar to those described under Alternative A. However, Alternative E would provide more management flexibility in assessing and correcting impacts from overgrazing of livestock to improve habitat quality. Special status wildlife habitat in these areas would increase in quality and be more protected under Alternative E compared to Alternative A; however, management actions would not be as comprehensive as those described under Alternative D.

Impacts from Travel Management

Under Alternative E, impacts on special status wildlife species from travel management actions would be similar to those described under Alternative B.

Impacts from Lands and Realty Management

Lands and realty management actions under Alternative E would include all Core Area habitat (4.5 million acres) as ROW exclusion areas. The actions proposed under Alternative E would be more protective of special status wildlife species within GRSG habitat compared to the no action alternative; and more protective than Alternative B.

Impacts from Leasable Minerals Management

Under Alternative E, impacts from leasable minerals management on special status wildlife species would be similar to Alternative B.

Impacts from Locatable Minerals Management

Impacts on special status wildlife species from locatable minerals management proposed under Alternative E would be the same as those described under the Alternative B.

Impacts from Mineral Materials (Salables) Management

Impacts on special status wildlife species from mineral materials management proposed under Alternative E would be the same as those described under Alternative B.

Impacts from Nonenergy Leasable Minerals Management

Impacts on special status wildlife species from nonenergy leasable minerals management proposed under Alternative E would be the same as those described under Alternative B.

Impacts from Mineral Split-Estate Management

Impacts on special status wildlife species from mineral split-estate management proposed under Alternative E would be the same as those described under Alternative B.

Impacts from Special Designations Management

Under Alternative E, 715,048 acres of GRSG habitat would continue to be managed as an ACEC as described under Alternative A. Therefore, impacts on special status wildlife species would be similar to those described under Alternative A.

Impacts from Air Quality and Climate Change Management

Under Alternative E, climate change forecasting would be included in vegetation management of sagebrush and reduce impacts on special status wildlife species over the long-term compared to Alternative A.

Impacts from Special Status Plants Management

Special status wildlife species habitat would not be impacted under special status plants management actions proposed under Alternative E.

4.4.9 Alternative F

Impacts from Special Status Species – Greater Sage-Grouse Management
Impacts on special status wildlife species as a result of management actions proposed under Alternative F would be similar to the impacts described under Alternative B.

Impacts from Vegetation Management
Under Alternative F, vegetation management actions would result in similar impacts on special status wildlife as those described under Alternative B.

Impacts from Wild Horse and Burro Management
Under Alternative F, management of wild horses and burros would continue to provide 2,657,537 acres of HMAs. This would be the same number of HMA acres as the no action alternative except that wild horse AMLs would be reduced by 25 percent for HMAs that contain PPMA and PGMA to reduce grazing pressure on vegetation. Therefore, the actions proposed under Alternative F would result in more available habitat and forage for special status wildlife species that rely on wild horse and burro ranges than all of the action alternatives.

Impacts from Wildland Fire Management
Alternative F would provide less direction for controlling invasive weeds and resting recently treated vegetation areas from livestock grazing areas compared to Alternative B. These actions would reduce the impacts described in **Section 4.4.2** on special status wildlife species compared to the no action alternative but to a lesser degree than Alternative B.

Impacts from Livestock Grazing/Range Management
Alternative F would close 25 percent of PPMA and PGMA to livestock grazing. These actions would reduce impacts from livestock grazing on special status wildlife habitat described in **Section 4.4.2** compared to all alternatives except Alternative C.

Impacts from Travel Management
Under Alternative F, new roads would not be constructed within 4 miles of a lek in PPMA and therefore would increase habitat protection for special status wildlife species that occupy those areas compared to Alternative B.

Impacts from Lands and Realty Management
Impacts on special status wildlife species from lands and realty management actions under Alternative F would be similar to those described under Alternative B.

Impacts from Leasable Minerals Management
Under Alternative F, 4.5 million acres of PPMA would be closed to fluid mineral leasing (Alternative B) and 5.6 million acres of PGMA would also be closed to

leasing (Alternative C). No fluid mineral leasing would be allowed in GRSG occupied habitat similar to Alternative C. Impacts from leasable minerals management on special status wildlife species would close the greatest amount of occupied habitat of all the alternatives. Therefore, Alternative F would provide the most habitat protection for all special status wildlife species that overlap with GRSG habitat.

Impacts from Locatable Minerals Management

Impacts on special status wildlife species from locatable minerals management proposed under Alternative F would be the same as those described under the Alternative B.

Impacts from Mineral Materials (Salables) Management

Impacts on special status wildlife species from mineral materials management proposed under Alternative F would be the same as those described under Alternative B.

Impacts from Nonenergy Leasable Minerals Management

Impacts on special status wildlife species from nonenergy leasable minerals management proposed under Alternative F would be the same as those described under Alternative B.

Impacts from Mineral Split-Estate Management

Impacts on special status wildlife species from mineral split-estate management proposed under Alternative F would be the same as those described under Alternative B.

Impacts from Special Designations Management

The designation of 17 ACECs to conserve GRSG and their habitat under Alternative F would provide the second-most total acres of protection for GRSG and their habitat compared to Alternative C. Therefore, impacts on special status wildlife species under Alternative F would be greater than those described under Alternative C.

Impacts from Air Quality and Climate Change Management

Under Alternative F, no impacts on special status wildlife species from air quality and climate change management are expected.

Impacts from Special Status Plants Management

Special status wildlife species habitat would not be impacted under special status plants management actions proposed under Alternative F.

4.5 WILD HORSES AND BURROS

4.5.1 Methods and Assumptions

Indicators

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

- Changes in Acres available
- Changes in permitted AMLs
- Changes in allotted forage (AUMs)
- Changes in funding or resources available for management

Sources of indicators of land health status include Standards for Rangeland Health, ESI data, NRCS Soil Survey Geographic Database (SSURGO) Soil-Vegetation Inventory Method (SVIM), which is the predecessor to ESI. These sources provide the data to describe a site's vegetation and soil conditions and the potential for sagebrush to occupy the site. The sources also supply images of the current status of sagebrush on a site.

Assumptions

The analysis includes the following assumptions:

- Horses and burros depend on the herbaceous component of a shrub/grass plant community. Encroachment of shrubs or pinyon-juniper onto established range lands are adverse, and increases in grasses and forbs are beneficial. Vegetation treatments, such as prescribed burns or weed control, can enhance the plant community composition and forage availability.
- Although the BLM cannot control when wild horses and burros use certain areas, heavy or poorly timed wild horse and burro grazing may adversely affect plant composition, plant succession, and ground cover.
- Water is the primary resource associated with wild horse distribution. Water developments can improve wild horse distribution. Furthermore, human-made water developments that employ some type of mechanical device, such as a windmill or electric pump, can fail and cause horses to go without or to go elsewhere for water.
- Fences and other disturbances can restrict wild horse movement and access. Fences are sometimes necessary to restrict horse distribution to areas inside HMAs or to protect sensitive resources within HMAs.
- While wild horses and burros may be found on lands outside HMAs, these areas have no forage allocated to wild horses and

burros. The BLM has no authority to manage wild horses and burros outside of HMAs, except to remove them.

- The scheduling for wild horse and burro gathers is influenced by a national priority process. Factors affecting gather priorities include determinations of excess horses and overpopulations, wild horse and range condition, annual appropriations, litigation and court orders, emergency situations, such as disease, weather, and fire, availability of contractors, the market for adoption, and long-term holding availability for unadoptable excess horses. The principal factor affecting gather priories is that short- and long-term holding facilities are at or near capacity, significantly reducing the number of excess wild horse and burros that can be removed from HMAs.
- Population growth suppression (fertility control agents, sterilization, and sex ratio adjustments) can aid in population control, but periodic gathers are still necessary to remove excess wild horses.
- Wild horse and burro distribution varies by season, climatic conditions, water and forage availability, and population size.
- Intensive livestock grazing management strategies (scheduled pasture rotations) that involve fences are generally not appropriate for long-term wild horse management.

4.5.2 Nature and Type of Effects

All HMAs are managed for AML. Initially, AML is established in RMPs at the outset of planning and is adjusted based on monitoring data through revision of HMAPs and subsequent LUPA. Priorities for gathering excess wild horses and burros to maintain AML are based on population inventories, resource monitoring objectives, gather schedules, and budgets. Gathers are also conducted in emergency situations when the health of the population is at risk due to lack of forage or water and in some situations wildland fire.

Implementing management to protect GRSG generally involves reducing or otherwise restricting land uses and activities that could reduce forage and water availability or disturb a wild horse and burro population. For example, mineral extraction, recreation, and construction within ROW grants may result in any of the following:

- Reduce forage availability
- Disturb horses or burros
- Prohibit the ability of wild horses or burros to move freely across HMAs
- Limit ability to perform management activities (for example, energy development infrastructure may impact the ability to conduct helicopter gathers)

Limiting development from these activities to protect GRSG would also protect forage for wild horse and burros and would limit human and surface disturbance.

Conversely, there could be impacts on wild horse and burros and the ability to support AMLs when management options for HMAs are restricted. Impacts from range improvement restrictions would generally vary based on type of range improvement affected. Restrictions on fences would improve wild horse habitat by allowing free range, while limiting projects that could enhance forage and water availability would not help to support the AML.

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

4.5.3 Impacts Common to All Alternatives

Across all alternatives, there would be no direct change to AML levels or acres managed for wild horse and burros as HMAs. For the planning area as a whole, there are approximately 2,657,500 acres of HMAs, with approximately 800,800 acres overlapping PPMA and 1,562,100 acres overlapping PGMA. For HMAs entirely or partially within the occupied habitat, the combined total for AML range is from 1,340 to 2,655 individuals.

Impacts from Energy and Minerals Management

As described below, for many energy and mineral resources (leasable minerals and nonenergy leasable), there is minimal current development and future development levels are predicted to remain low in the planning. As a result, impacts on wild horses and burros management would be negligible across all alternatives. For locatable minerals, potential is unknown, although some level of development may occur in the future impacts on wild horses and burros management are likely to be minimal.

Impacts from Leasable Minerals Management

While there is a potential for development, there have been no wells developed on the leases issued on occupied GRSG habitat in the planning area. Under all alternatives, the potential for reasonably foreseeably development is low; therefore, impacts on wild horses and burros from development would be limited, independent of the area available for leasing or stipulations applied.

Impacts from Locatable Minerals Management

All locatable minerals have the potential to exist within the planning area, but exploration has been minimal and potential is unknown across all alternatives.

Impacts from Nonenergy Leasable Minerals Management

Because mineral potential reports are not completed and there is currently no commercial interest in solid leasables, the potential is unknown. Impacts on wild horses and burros are likely to be minimal across all Alternatives.

Impacts from Mineral Split-Estate Management

Impacts on wild horse and burros from split-estate minerals are similar to those described above by category of minerals.

4.5.4 Alternative A

Impacts from Vegetation Management

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

Impacts from Wild Horse and Burro Management

Within the sub-region, all BLM field offices manage for wild horses and burros within established HMAs. Most HMAs contain GRSG habitat within a sagebrush vegetation community. Overall management direction is to manage for healthy populations of wild horse and burros to achieve a thriving natural ecological balance with respect to wildlife, livestock use, and other multiple uses.

Prioritizing wild horse and burro gathers to maintain AML is not based on GRSG habitat needs; nevertheless, this is implicit in the congressional directive to maintain a thriving natural ecological balance.

Impacts from Wildland Fire Management

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

Impacts from Livestock Grazing/Range Management

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

Impacts from Recreation Management

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

Impacts from Travel Management

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

Impacts from Lands and Realty Management

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

Impacts from Mineral Materials (Salables) Management

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

4.5.5 Alternative B

Impacts from Vegetation Management

Management prescriptions to conserve, enhance, or restore riparian areas and wet meadows in GRSG habitat could also improve forage conditions and water quality for wild horses and burros. However, when management requires increased fences to protect vegetation for GRSG, this could limit wild horse and burro access to riparian areas and reduce water availability. This could result in potential need for reduction of wild horse and burro numbers within an HMA in the long term in order to meet vegetation objectives for GRSG.

Impacts from Wild Horse and Burro Management

Wild horse and burro numbers within an HMA may need to be reduced to achieve GRSG habitat objectives or other management changes for overlapping HMAs. This would be the result of developing or amending HMAPs to incorporate GRSG habitat objectives and management considerations and prioritizing the evaluation of AMLs in PPMA.

Prioritizing wild horse and burro gathers in HMAs that overlap PPMA can reduce the funding for or the ability to manage populations on HMAs outside of PPMA. However, this plan would allow for exceptions for herd health, thereby limiting impacts. Modifying watering sites to conserve GRSG habitat could reduce water availability. This could result in the potential reduction of wild horse and burro numbers or develop alternative water sources within the HMA.

Impacts from Wildland Fire Management

Fuels projects and fire suppression to protect sagebrush ecosystems and associated PPMA would benefit wild horses and burros where HMAs overlap. This would be due to a reduction in the likelihood of high intensity wildfire. However, temporary or long-term management changes to wild horses and burros, such as reduction in AML, removals, movement patterns, and forage access, may be necessary to achieve and maintain the desired project objectives. This would reduce management options for wild horse and burro management or would increase the costs of management.

Impacts from Livestock Grazing/Range Management

Management to conserve, enhance, or restore GRSG habitat and that benefit livestock would also benefit wild horses and burros within GRSG in the long term. Modifying or eliminating livestock watering sites would reduce water availability. This could result in the need to reduce wild horse and burro numbers or develop alternative water sources within specific HMAs.

Impacts from Recreation Management
Under Alternative B, limits on SRPs in PPMA would reduce any conflicts between recreation and wild horse and burro management.

Impacts from Travel Management
Under Alternative B, limits to motorized travel in PPMA would decrease any disturbance of horses and burros from OHV use. Administrative access for gathers would be retained; however, closures or reduced maintenance on routes during comprehensive travel management planning would have the potential to impact time and costs of population control gathers.

Impacts from Lands and Realty Management
Implementation of exclusion and avoidance actions to maintain priority GRSG habitat would reduce devolvement in these HMAs overlapping PPMA. This would indirectly reduce related disturbance to wild horses and burros.

Impacts from Mineral Materials (Salable) Management
Under Alternative B, PPMA would be closed to mineral materials development. As a result, the chance of development disturbing wild horses and burros from mineral development would be decreased in this area. However, it should be noted that in many cases in the planning area, mineral material extraction sites are small in size and result in minimal impacts on wild horses and burros.

4.5.6 Alternative C

Impacts from Vegetation Management
Restoration proposed under Alternative C includes removing water developments. This would reduce available water in HMAs and result in the need to reduce wild horse and burro AMLs within a HMAs in occupied habitat where no alternative source of water was available.

Impacts from Wild Horse and Burro Management
Impacts are as discussed under Alternative A.

Impacts from Wildland Fire Management
Impacts are similar to those discussed under Alternative A.

Impacts from Livestock Grazing/Range Management
Elimination of livestock grazing in occupied habitat would provide additional forage for wild horses and burros where HMAs overlap these habitats. This would occur by reducing competition for forage in these areas. Elimination of livestock watering sites or failure to maintain water developments would reduce water availability. This would result in the need to reduce wild horse and burro numbers in HMAs in occupied habitat where no alternative sources of water were available.

Impacts from Recreation Management

Impacts are as discussed under Alternative A.

Impacts from Travel Management

Impacts are as discussed under Alternative A.

Impacts from Lands and Realty Management

Under Alternative C, new transmission corridors and ROWs for corridors would be prohibited. As a result, disturbance from development and related impacts on wild horses and burros management would be reduced compared with Alternative A.

Impacts from Mineral Materials (Salables) Management

Impacts from mineral materials are as described under Alternative A.

4.5.7 Alternative D

Impacts from Vegetation Management

Under Alternative D, PPMA and PGMA would be prioritized for restoration treatment, with a particular emphasis on Restoration Opportunity Areas. Management for wild horses and burros is most likely to be impacted in HMAs that overlap these areas, including South Steen, Riddle Mountain, and portions of Sheepshead Health Creek, Kiger, Ligget Table, and Warm Springs. Other portions of PPMA, PGMA and other habitat deemed of importance for GRSG may also be treated. Impacts would likely occur if wild horses and burros are found to be causal factors in GRSG habitat not achieving or moving toward achieving objectives. If this is found to be the case, the adjustment of wild horse and burro populations to restore objectives would be assessed and the BLM may reduce AMLs in some HMAs in the long term. Measures to prevent and reduce invasive plants in GRSG habitat would improve habitat for wild horses and burros in the long term if forage quality and quantity were increased. Replacing annual grasses with perennial grasses would also reduce interannual variability in forage quantity in the long term.

Impacts from Wild Horse and Burro Management

Under Alternative D, total AML in the decision area would remain within the current range unless monitoring data warrants a change that benefits GRSG habitat suitability. In the long term, this may require additional population control measures compared with Alternative A. Assessment of AMLs would be prioritized for portions of HMAs in PPMA, followed by those from PGMA. As a result, changes to wild horse and burro management would follow these priorities. As discussed under Alternative B, management in these areas may result in reduced management in HMAs outside of GRSG habitat.

Impacts from Wildland Fire Management

Under Alternative D, fire management actions would focus on a system of fuel breaks and treatment of up to 30 percent of GRSG habitat. The purpose of this would be to reduce the probability of large-scale wildfire. Wildfire suppression priorities would include PPMA and PGMA and other sensitive GRSG habitat types. HMAs that overlap these areas would have the risk of large-scale fires reduced. HMAs outside of priority areas, however, may have an increased risk or large-scale wildfire should resources for vegetation treatment or fire suppression not be available.

Impacts from Livestock Grazing/Range Management

Under Alternative D, a slight reduction in acres available for authorized livestock grazing (9,876,578 acres open to livestock grazing) would result in impacts on wild horse and burro management that would likely be minimal. Livestock grazing permits and leases would be processed and land health assessment would occur in Category "I" allotments most in need of habitat improvement with an emphasis on allotments in GRSG habitat, with PPMA prioritized over PGMA. As a result, range conditions for both livestock and wild horses and burros overlapping these allotments should be improved, compared with Alternative A. Range improvements, including seeps and springs, would be developed or modified to enhance functionality during periods that livestock are absent from the allotment. In addition, if water developments were to be removed for GRSG protection, new water sources would be located beforehand. As a result of these management actions, there is potential for maintained or enhanced use of water sources by horses and burros, increasing the ability to meet AML.

In PPMA, forage enhancement treatments must also enhance GRSG habitat; therefore, there is a potential for reduced treatments for livestock, which could in turn impact forage availability for wild horses and burros. New structural range improvements would be the same as described for Alternatives B and E. Supplemental winter feeding for livestock would be avoided, but would be authorized as needed for resource objectives per BLM policy; this would impact wild horses and burros that may utilize these winter feedings.

Impacts from Recreation Management

Changes may occur to SRPs and RUPs in PPMA in order to reduce direct and indirect disturbance to GRSG. As a result, the potential for disturbance of wild horses and burros from recreation would be similarly reduced.

Impacts from Travel Management

Travel management impacts are similar to those described under Alternative B.

Impacts from Lands and Realty Management

Under Alternative D, current ROW exclusion areas would be retained in PPMA. All other GRSG habitat, including PGMA, would be managed as open for ROWs, unless already managed as avoidance or exclusion by the existing planning. All new ROWs in PGMA would require the BLM to cooperate with ODFW to determine impacts on occupied, suitable, or potential habitat, and development and associated disturbance to livestock would be avoided in occupied habitat, and minimized in suitable or potential habitat ,

Impacts from Mineral Materials (Salables) Management
Impacts are the same as described under Alternative B.

4.5.8 Alternative E

Impacts from Vegetation Management
Under Alternative E, vegetation management would include the connectivity model and habitat monitoring suggested in the ODFW Plan to minimize the impacts of habitat loss and fragmentation. The intent of this plan is to improve and maintain habitat for GRSG. If minimization of fragmentation and habitat loss was improved by use of this model, this would also result in improvement of habitat for wild horse and burros by removal of barriers to movement.

Impacts from Wild Horse and Burro Management
Under Alternative E, limits on total AMLs would be applied as discussed under Alternative D. Under this alternative, management agencies would be strongly encouraged to prioritize funding for wild horse gathers in GRSG areas that are over AML. In the absence of additional overall funds, funding and resources for HMAs outside of GRSG habitat would be reduced. This would impact the ability to meet AMLs and manage for rangeland and herd health in these areas in the long term. Measures to reduce invasive species spread would improve habitat for wild horses and burros in the long term.

Impacts from Wildland Fire Management
Preventing fire from entering at-risk communities would be a high priority for protecting GRSG habitat under Alternative E. As a result, the risk of ignition and spread of fire in occupied GRSG habitat would be reduced, thereby reducing the impacts of fire on HMAs in GRSG habitat. The risk of fire spread in other habitat could increase, should limited resources be allocated for GRSG. Removing juniper in GRSG habitat would improve forage for wild horses and burros. An emphasis on fire suppression near leks would reduce the risk of fire spread for HMAs.

Impacts from Livestock Grazing/Range Management
Changes to livestock grazing systems under Alternative E would be required only when management resulted in livestock removing forage to the point that it would be detrimental to GRSG due to the decrease in cover.

In the case of range improvements, water developments would be located or relocated to maintain or enhance habitat quality. Existing water improvements would be directed to maintain free-flowing nature. These requirements may necessitate changes to water developments that would limit ability of wild horses and burros to use water, especially if dirt tanks or overflow ponds were removed. This may result in a need to reduce AMLs in HMAs where alterative water sources are not available. Allowing the construction and use of some developments should result in some water availability for horse and burro use, thereby limiting overall impacts.

Impacts from Recreation Management

Under Alternative E, recreation management would be similar to that described under Alternative A, but seasonal restrictions may be imposed to limit disturbance to GRSG. Such restrictions would likely reduce disturbance to wild horse and burros also.

Impacts from Travel Management

Seasonal and site-specific limits on OHV travel in GRSG habitat would limit disturbances on wild horses and burros from other recreational users. As described in Alternative B, administrative acres for gathers would be retained; however, closures or reduced maintenance on routes during comprehensive travel management planning would have the potential to impact time and costs of population control gathers.

Impacts from Lands and Realty Management

All Core Area habitat would be classified as an exclusion area, decreasing the risk of development and associated disturbance to wild horses and burros, compared with Alternative A.

Impacts from Mineral Materials (Salables) Management

Under Alternative E, no development is recommended in Core Area habitat if they occur in GRSG habitat with evidence of GRSG presence. Due to the potential for greater flexibility in the application of restrictions, some level of development and related disturbance of wild horses and burros may increase in GRSG habitat as compared with other action alternatives. However, it would be at a reduced level, as compared with Alternative A, where few restrictions are specific GRSG habitat.

4.5.9 Alternative F

Impacts from Vegetation Management

Under Alternative F, restoration would be prioritized in areas that have the most likely chance of successful restoration. Because the exact areas prioritized would be determined at implementation, comparison with other alternatives is difficult; however, emphasis on these areas may result in more effective vegetation treatments, thereby improving habitat for GRSG and wild horse and burros as compared with Alternative A in the long term. Meeting objectives for GRSG in occupied habitat would be the highest restoration priority. As a result, habitat improvement would most likely occur in occupied GRSG habitat.

Impacts from Wild Horse and Burro Management

Under Alterative F, proposed management includes an objective for 25 percent reduction in wild horse and burro populations in GRSG habitat compared to current AML levels. As a result, costs for management, particularly related to gathers, would increase dramatically above Alternative A due to the need to conduct additional gathers and/or increase fertility control measures. Available funding and national level restrictions of the wild horse and burro program (such as lack of space in long-term holding facilities) may impact the ability to achieve this objective. Location specific population reductions and impacts on particular HMAs would be determined at implementation and likely related to land health and current population size.

Other management actions and related impacts are similar in nature to those described under Alternative B.

Impacts from Wildland Fire Management

Impacts from Wildland Fire Management are similar to those described under Alternative B. Closures in place for livestock grazing post-fire until woody and herbaceous cover achieve sage-grouse habitat objectives would result in long-term (10 to 50 years or longer) exclusion of from burned sites should wild horse and burros are be excluded. It would generally take more than a decade to reestablish adequate Wyoming sagebrush cover in low precipitation areas. The level of impacts would depend on locations, size, and intensity of wildfire in GRSG habitat in relation to location of HMAs.

Impacts from Livestock Grazing/Range Management

Under Alternative F, 25 percent of the area in PPMA/PGMA open to livestock grazing would be rested each year and utilization would be limited to 25 percent of current levels, therefore. AUMs would be reduced accordingly. As described in Alternative C, a reduction in areas available for livestock grazing could result in additional forage available for wild horse and burros. In addition, a prohibition on new water developments and requirements to make modifications, including potential dismantling of developments would be in place As a result, there would likely be impacts on the availability of water sources for wild horses and burros. This would result in impacts on the ability to manage for AML in the long term, particularly for those HMAs with no alternate water source. Alternative F also calls for avoiding all new structural range developments in occupied GRSG habitat, unless independent peer-reviewed studies show that the range improvement structure benefits GRSG. In practice, this would result in few range developments being approved. The lack of new fences would benefit wild horses and burros by reducing barriers to movement across the range. The lack of water developments would restrict the ability to provide sufficient water for wild horses and burros and to manage for AML.

Impacts from Recreation Management

Recreation management would be similar to management proposed under Alternative B. In addition, camping and other nonmotorized recreation would be prohibited within 4 miles of active GRSG leks. This would reduce potential conflicts between wild horses and burros and recreationists in these areas.

Impacts from Travel Management

Impacts from travel management are similar to Alternative B, with the addition of limitations on road construction within 4 miles of active leks in occupied GRSG habitat. As a result, any potential disturbance from roads to wild horses and burros would be reduced; however, potential access routes for wild horses and burros management, including population gathers, monitoring herd health and data acquisition to support gathers may be reduced. This would increase the time and costs for this management

Impacts from Lands and Realty Management

For Alternative F, occupied GRSG habitat areas would be exclusion areas for new ROW permits. As a result of ROW exclusion, no additional development would occur in these areas, thus reducing potential impacts on wild horse and burros.

Impacts from Mineral Materials (Salables) Management

Under Alternative F, impacts are as described under Alternative B.

4.6 Wildland Fire Management

4.6.1 Methods and Assumptions

Indicators

Indicators of impacts on wildland fire management are as follows. Details for each of these factors is included in the current conditions discussion in **Section 3.6.2**:

- Alteration of vegetative cover or composition that is likely to result in a shift in fire regime condition class (FRCC)
- A change in the likelihood of human-caused wildfire in the planning area
- A change in the size, extent, or occurrence of wildfire in the planning area
- Changes in the response to wildland fire or appropriate treatments to prevent wildland fire

Assumptions

The analysis includes the following assumptions:

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

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

4.6.2 Nature and Type of Effects

Impacts on wildland fire management are generally the result of the following:

- Activities that alter vegetative cover or composition
- The ability to respond to wildland fires or to implement appropriate treatment methods to prevent wildland fire
- Impacts from human-caused wildfires

Key types of impacts are detailed below. As discussed in Section 3.6, Wildland Fire Management, there have been a number of wildland fires in PPH and PGH habitat.

There is a high probability for wildland fires in GRSG habitat in the future. During the 2012 fire season nearly one million acres burned, most of which was in designated PPH. Section 3.6 also states that most of the lands in the planning area have a moderate to high level of departure from historical conditions and related fire risk. Actions that change the condition class from highly altered ecosystems (FRCC 3) to one closer to historical conditions (FRCC 1 or 2) could reduce the risk of losing key ecosystems and could decrease fire risk.

Various resource uses may introduce additional ignition sources into the planning area. These sources increase the probability of wildland fire and the need for fire prevention. Fire intensity can be affected by activities that decrease fuel loading, such as vegetation treatments and activities that alter the composition and structure of vegetation communities.

Characteristics of individual fire events as well as the collective fire regime are important drivers of structure, composition, and abundance of vegetation within sagebrush communities (Miller et al. 2011). Individual fires are described by severity (the level of biological and physical effect of fire on all plant layers, soils, and animals), intensity (the amount of energy released during a fire), season, extent or size, and complexity (patchiness of burned and unburned areas within the fire boundary). Fire regime is a function of the mean and range of the interval (usually in years) between fire events for a defined area. The fire regime for a specific area is influenced by climate, regional location, fuel characteristics (biomass and structure), and recovery time following disturbance, topography, season and frequency of ignition, and vegetation composition (Miller et al. 2011).

Transportation and travel management can impact fire occurrence by changing the level of risk of human-caused fires. The risk of ignition is increased where travel is less restrictive, particularly where motorized vehicles travel cross-country. All forms of travel encourage the spread of invasive weeds (CEC 2012), particularly cheat grass. This can shift fire regimes and increase fire behavior potential, size, extent, and occurrence. If management restricts access, wildfire risk may be decreased and historic conditions may be restored. Yet, transportation management may impact fire suppression; when routes are closed and rehabilitated, they become unavailable for response to wildfires, limiting access.

Similarly, the level and type of recreation permitted can impact fire risk. Increased recreation may increase the probability of unintentional fire starts and the need for fire suppression. Threats from recreation and recreation management are addressed under Travel Management ((**Table 2-1**, Threats to Greater Sage-Grouse and Their Habitat and Applicable BLM RMP Programs for Addressing Threats), therefore, recreation is not addressed as a separate topic in this section. Lands and realty actions may indirectly result in development and associated fire risk. For example, issuing ROWs can result in indirect impacts by increasing the risk of human-caused ignition should construction of transmission lines, renewable energy projects, or other development occur. Permitted activities, such as construction of utility ROWs, involve vegetation removal. This reduces the condition of native vegetation communities and individual native plant species and encourages the spread of invasive species. These situations can increase wildland fire occurrence and extent and alter fire condition class.

Surface disturbance caused by development would generally contribute to the modification of the composition and structure of vegetation communities in the vicinity of developed areas. This could then be more likely to result in fire starts. ROW exclusion areas would prohibit all development of ROWs in areas where they are designated. This would limit alteration of vegetative cover or composition that is likely to result in a shift in fire regime condition class (FRCC.).

However, constructing roads and removing weeds associated with developments may facilitate wildland fire response and help limit the size or extent of a wildland fire. These activities would create fire breaks and staging areas for fire suppression. In ROW avoidance areas, the BLM would consider on a case-by-case basis whether a ROW should be allowed.

Overall, the development of energy and minerals resources increases the risk of wildfires by introducing new ignition sources (Shlisky et al. 2007). Associated facilities, infrastructure, and transmission lines can increase fire and fuels program costs while decreasing fire suppression options. Energy development also poses hazards to firefighters from unknown toxins and overhead power lines and the need to protect facilities and evacuate industry personnel. The more acres open to mineral exploration, development, and mining, the greater the risk of human-ignited fire. Limitations on mineral development would have an indirect effect of decreasing fires. However, as stated previously, constructing roads and removing weeds associated with energy and minerals developments may facilitate wildland fire response and help limit the size or extent of a wildland fire. These activities would also create fire breaks and staging areas for fire suppression.

The development of federal minerals underlying nonfederal surface ownership may impact fire management on BLM-administered lands. This would be the case particularly when ownership is in a patchwork pattern because fires ignited on nonfederal lands may quickly spread onto and impact BLM-administered lands.

Range grazing management can impact the ability to manage fire as a natural process through changes in fine fuels availability, such as grasses. Removing grazing will increase fine fuel loading and does not significantly affect the spread of invasive plant species, generally, although it might play a role with certain species. However, removing grazing could also allow for annual grasses to build up that could otherwise be consumed by livestock. This could increase the size, extent, or frequency of wildland fires. The influence on fire spread, severity, and intensity would depend on such factors as weather, fuel characteristics, and landscape features. Evidence suggests that the potential role of grazing on fire behavior is limited under extreme burning conditions, such as low fuel moisture and relative humidity, high temperature, and wind speed (Strand and Launchbaugh 2013).

Grazing may reduce resistance to invasion from cheat grass (Reisner et al. 2013). Nevertheless, cessation of overgrazing could relieve these impacts and allow for the recovery of native understory perennials and an increase in sagebrush and herbaceous vegetation cover (Strand and Launchbaugh 2013), Recent research indicates that the increase in fine fuel loading, particularly the build-up of litter in bunchgrass crowns, from the removal of grazing can increase bunchgrass mortality in a fire, facilitating the spread of invasive plants. However, livestock grazing also preserves herbaceous vegetation that provides side cover for sage-grouse nests and both insects and forbs needed for brood-rearing. Increasing utilization reduces fine fuel loading but increases the risk that too much side-cover will be removed, reducing sage-grouse nesting habitat suitability and chick survival. Utilization at too high a level also increases bunchgrass mortality in interspaces and facilitates the spread of invasive plants. Thus, there is a utilization level that reduces the risk of invasive plant spreads by promoting healthy bunchgrass plants that can survive a fire and preserves needed side cover for successful sage-grouse nesting.

Big sagebrush ecosystems of the intermountain west evolved with little herbivore utilization prior to the introduction of livestock grazing (Mack & Thompson 1982). These communities are susceptible to invasions by cheatgrass even in the absence of fire, and cheatgrass may, under some circumstances, dominate the herbaceous understory community (Miller et al. 2011). Once cheatgrass sufficiently dominates the understory it creates a continuous, highly flammable fuel that significantly increases the risk of fire (Pyke 2011). Once a fire occurs, cheatgrass increases the frequency of fires. This change in fire regime can transform native shrub-steppe communities in annual grasslands dominated by cheatgrass (Miller et al. 2011).

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

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

Implementing management for the following resources would have negligible or no impact on wildland fire management for all alternatives; therefore, they are not discussed in detail:

- Wild horses and burro
- Special designations
- Air quality and climate change
- Special status plants
- Recreation

4.6.3 Impacts Common to All Alternatives

Impacts from Vegetation Management

Under all alternatives, policies and practices outlined in the Record of Decision for the Vegetation Treatments Using Herbicides on BLM Lands in Oregon EIS (BLM 2010a) would be followed and would provide guidance on which treatments and chemicals could be used. Application of these policies would improve vegetation management in sagebrush habitat, thereby likely reducing the fire potential in these areas.

Impacts from Mineral Split-Estate Management

Impacts on wildland fire management from mineral split-estate management are the same as those described for leasable minerals. No additional impacts from mineral split-estate management are expected.

4.6.4 Alternative A

Impacts from Special Status Species—Greater Sage-Grouse Management

There would be no impacts on wildland fire management resulting from special status species—GRSG management under Alternative A.

Impacts from Vegetation Management

Under Alternative A, the BLM would continue to incorporate vegetation objectives in management actions, which would improve the condition and increase the extent of native vegetation in areas where they are applied. Encouraging the growth of native vegetation under this alternative could contribute to healthy plant communities and an associated lower risk of high-intensity wildfire. Vegetation could also be managed to alter fuel loads.

Impacts from Wildland Fire Management

Under Alternative A, projects would be designed to prevent the further loss of sagebrush, thereby retaining native vegetation and minimizing wildland fire potential. This could reduce the size, extent, and occurrence of wildland fires. In addition, prescribed burning may be used in support of resource management objectives, such as restoring grassland or shrubland, reducing conifer encroachment, or increasing age-class variety. As a result, alteration of vegetative cover or composition that is likely to contribute to a shift in FRCC would be reduced. Further, chemical weed treatments applied following prescribed burns would limit the expansion of weeds or invasive species in the burned area and further reduce the potential for wildland fire.

Impacts from Livestock Grazing/Range Management

Livestock grazing would continue to occur under Alternative and more than 9.9 million acres would be open to grazing in PPH and PGH on BLM-administered lands. Allowing grazing throughout most of the planning area may decrease the risk of wildfire due to the reduction in fuel load caused by livestock grazing. Rangelands would continue to be managed to conform to the Oregon Standards for Rangeland Health, so vegetation communities would continue to be maintained and improved to some extent across the planning area. Land treatments for livestock forage could reduce fuels and the risk of wildland fire as described under *Nature and Type of Impacts*.

Impacts from Travel Management

Impacts from OHV use would continue under Alternative A with 2,669,145 acres open to cross-county travel in PPH, 2,940,051 acres in PGH and 1,828,999 acres in PPH and 2.576,796 acres in PGH limited to existing routes. Under Alternative A, most GRSG habitat would be open or limited to existing routes. Impacts described under **Section 4.6.2**, Nature and Type of Effects, would continue to occur, particularly in areas open to OHV use.

Impacts from Lands and Realty Management

Under Alternative A, lands and realty management would continue, 257,154 acres would be classified as ROW exclusion areas for new ROW development in PPH and 288,195 acres in PGH and the potential for disturbance from development would be limited in ROW avoidance areas (1,336,146 acres in PPH and 1,672,025 in PGH).. The nature and type of impacts on wildland fire management from ROW avoidance and exclusion areas would be the same as those described under **Section 4.6.2**.

Impacts from Leasable Minerals Management

Under Alternative A, over 9 million acres would be open to leasing, while over 3 million acres would be closed. Stipulations may be applied in certain areas to reduce impacts from mineral leasing or development, but these stipulations would not be applied consistently across the planning area. Impacts from leasable mineral development on wildland fire management would continue to occur in areas open to leasing and development. As discussed under Section 4.6.2. The chance of human ignition under this alternative would continue and could indirectly effect fire management through increased fire risk. However, based on the most recent approvals, the risk of high acreage fires would be reduced because water storage for fire suppression is required to be on-site. As described in **Section 4.6.2**, minerals developments could act as staging areas and fire breaks for fires suppression efforts.

Impacts from Locatable Minerals Management

Under Alternative A, over 900,000 acres would be withdrawn or proposed for withdrawal, while 11,600,814 million acres would remain open. Impacts from locatable mineral development on wildland fire management from increased human activity and as described under **Section 4.6.2** would continue to occur in areas open to development.

Impacts from Mineral Materials (Salables) Management

More than 2 million acres would be closed to mineral materials development under Alternative A, while approximately 9 million acres would be open. Impacts from mineral materials development on wildland fire management, as described under **Section 4.6.2**, would continue to occur in areas open to development.

Impacts from Nonenergy Leasable Minerals Management

Under Alternative A, approximately 3,134,159 acres within the planning area would be closed to nonenergy leasable mineral leasing. Impacts from nonenergy leasable development on wildland fire management, as described under **Section 4.6.2**, would continue to occur in areas open to leasing and development, which is most of the planning area.

Impacts from Special Designations Management

Under Alternative A, the BLM would continue to manage 715,049 acres of ACECs. Existing ACECs likely protect vegetation through use restrictions.

These impacts are analyzed under each existing RMP within the planning area. As a result, there would be no additional effects from ACEC management on wildland fire management under Alternative A.

4.6.5 Alternative B

Impacts from Special Status Species—Greater Sage-Grouse Management

PPMA and PGMA would be designated and would encompass over 4.5 million acres and over 5.5 million acres, respectively. The BLM would apply a three percent human-caused disturbance cap to activities in PPMA. It also would implement numerous conservation measures to reduce impacts from human activities in PPMA, which would reduce the likelihood for human-caused fires. Limited vegetation removal under this alternative could lead to increased fuel loads and increased occurrence or extent of wildland fires, as described under **Section 4.6.2**. It also could reduce development-related roads and fire breaks used for fire suppression.

Impacts from Vegetation Management

Under Alternative B, vegetation management would aim to improve GRSG habitat and prioritize restoration to benefit GRSG habitats. The BLM would require the use of native seeds and would consider changes in climate when determining species for restoration. Together, these management actions would alter vegetation communities by promoting increases in sagebrush height, herbaceous cover, and vegetation productivity. Treatments designed to prevent encroachment of trees and nonnative species would alter the condition of native vegetation communities by changing the density, composition, and frequency of species within plant communities. These management actions could increase fuel loads and fire size or extent, as discussed under **Section 4.6.2**.

Impacts from Wildland Fire Management

Fuel treatments under Alternative B would be designed to protect sagebrush ecosystems by maintaining sagebrush cover, applying seasonal restrictions and protections for winter range, and requiring use of native seeds as a component of restoration. Post-fuels treatments and emergency stabilization and rehabilitation (ES&R) would be designed to ensure long-term persistence of seeded areas and native plant restoration areas.

These management actions would help to retain the extent of sagebrush vegetation and prevent degradation or destruction of sagebrush caused by wildland fires. Furthermore, emphasizing the use of native seeds and noninvasive species would reduce the likelihood for weed invasion in burned or treated areas. The BLM would also prioritize suppression in PPMA, which would retain the existing conditions and trends of vegetation in these areas. Impacts from fuels treatments, ES&R, and suppression would be similar to those described under **Section 4.6.2**.

Impacts from Livestock Grazing/Range Management

Under Alternative B, the BLM would not change acres open or closed to livestock grazing. Impacts on wildland fire would be similar to Alternative A. However, the BLM would implement a number of management actions in PPMA to incorporate GRSG habitat objectives into livestock grazing management. Such measures would help to maintain or improve the vegetation condition and could reduce the likelihood of nonnative invasive species introduction or spread, thereby reducing fire potential.

Impacts from Travel Management

Under Alternative B, only 2,938,846 acres of BLM-administered lands in GRSG habitat would be open to cross-country use, all within PGMA (an 52 percent decrease from Alternative A for GRSG habitat), Related increases would occur in areas limited to existing routes (7,075,386 total acres in GRSG habitat, a 60 percent increase from Alternative A). Additionally, in PPMA, motorized travel would be limited to existing roads, primitive roads, and trails until travel management planning is complete and the need for additional closures is evaluated. Management actions would also aim to reduce new route construction and restore roads, primitive roads, and trails not designated in travel management plans. These actions would reduce the likelihood of human-caused fires, as discussed under **Section 4.6.2**, but would also reduce access for fire response.

Impacts from Lands and Realty Management

Managing the majority of PPMA as ROW exclusion (over 4 million acres) and PGMA as ROW avoidance (over 5 million acres) would reduce impacts on wildland fire management associated with human activities, as described under **Section 4.6.2**. Decreased development due to exclusion areas could also reduce development-related vegetation and weed removal and construction of roads that would provide fire breaks and access for wildland fire response.

Impacts from Leasable Minerals Management

Over 6 million acres would be closed to fluid mineral leasing, with approximately 4 million acres open under Alternative B (the PPMA would be closed to fluid mineral leasing, while the PGMA would be closed or would require stipulations). Development would be more limited than under Alternative A and would result in fewer development-related roads and fire breaks that could be used for fire suppression. However, there would also be a reduction in human activities and fewer human-caused ignitions. Over the long term, closures and NSO stipulations would protect vegetation from removal and would reduce nonnative invasive species introduction or spread. This would result in impacts on wildland fire management, as described under **Section 4.6.2**.

Impacts from Locatable Minerals Management

Under this alternative, approximately 5.5 million acres, most of the PPMA and PGMA, would be withdrawn or be proposed for withdrawal from locatable minerals. These actions would reduce the likelihood that vegetation would be removed and that weeds could be introduced, resulting in impacts on wildland fire management, as discussed under **Section 4.6.2**. The remaining areas (almost 7 million acres) would remain open to locatable minerals and would allow for human activities that could lead to human-caused fires. When compared with other alternatives, this alternative allows for more development and thus more human-related activities that can result in increased fire risk.

Impacts from Mineral Materials (Salables) Management

Approximately 5.8 million acres, all of the PPMA, would be closed to mineral material sales. The BLM would restore salable mineral pits no longer in use, which would protect vegetation from removal and reduce nonnative invasive species introduction or spread. Over 4 million acres would remain open to mineral material sales. This may lead to impacts on wildland fire management, such as reduced access, increased fuel loading, and other impacts, as described under **Section 4.6.2**.

Impacts from Nonenergy Leasable Minerals Management

Under Alternative B, 6.5 million acres would be closed to nonenergy leasable mineral leasing; BMPs would be required on existing leases. Approximately 6 million acres would remain open. The increase in open areas, compared to Alternative A, could increase fire frequency and human-caused fires and other impacts, as described under **Section 4.6.2**.

Impacts from Special Designations Management

Impacts from ACEC management on vegetation under Alternative B would be the same as described for Alternative A.

4.6.6 Alternative C

Impacts from Special Status Species—Greater Sage-Grouse Management

Impacts from designating PPMA would be similar to those described for Alternative B. The exception is that they would apply to a larger area (all occupied habitat) and thus would protect more vegetation. Impacts on wildland fire management would be similar to those for Alternative B, with an even further reduction in the likelihood for human-caused fires but increased fuel loads and other impacts, as described under **Section 4.6.2**.

Impacts from Vegetation Management

Management under Alternative C would be similar to that described under Alternative A, though with an increased focus on restoration.

Impacts from Wildland Fire Management

Impacts from wildland fire management under Alternative C would be the same as those described for Alternative A.

Impacts from Livestock Grazing/Range Management

Under Alternative C, no PPMA or PGMA areas would be open to livestock grazing. The effects of livestock exclusion would depend on site conditions, including climate, soils, fire history, and disturbance and grazing history (Strand and Launchbaugh 2013). Grazing is associated with indirect impacts on wildland fire management, as described under **Section 4.6.2**. In particular, grazing may reduce resistance to invasion from cheat grass and cessation of overgrazing could allow for the recovery of native understory perennials and an increase in sagebrush and herbaceous vegetation cover.

However, removing grazing could also allow for annual grasses to build up that could otherwise be consumed by livestock. This could increase the size, extent, or frequency of wildland fires. As stated in **Section 4.6.2**, the influence on fire spread, severity, and intensity would depend on such factors as weather, fuel characteristics, and landscape features.

Impacts from Travel Management

As under Alternative B, additional limitations for motorized travel would apply in GRSG habitat, including closure of all cross-county motorized travel in PPMA and PGMA. Additionally, new road construction would be prohibited. Impacts from travel and transportation management on wildland fire management under Alternative C would be the same as those described under Alternative B.

Impacts from Lands and Realty Management

Impacts from lands and realty management under Alternative C would be similar to those described for Alternative B; however, a significant increase in the acres that would be managed as ROW exclusion (10,682, 124 acres) would reduce the amount of human activity and risk from human-ignited fires but would also limit potential fire breaks and staging areas for fire suppression. In addition, all occupied habitat, ACECs, and restoration areas would be retained in federal ownership.

Impacts from Leasable Minerals Management

Impacts from leasable minerals management under Alternative C would be similar to those described for Alternative B; however, a significant increase in the acres closed to fluid mineral leasing (10,615, 593 acres) would reduce the amount of human activity and risk from human-ignited fires but would also limit the number of water sources and staging areas for fire suppression.

Impacts from Locatable Minerals Management

Impacts from locatable minerals management on wildland fire management under Alternative C would be the same as those described under Alternative B. However, a significant increase in the acres petitioned for withdrawal (over 9 million acres) and the decrease in acres open (2.2 million acres) would reduce the amount of human activity and risk from human-ignited fires but would also limit the number of water sources and staging areas for fire suppression.

Impacts from Mineral Materials (Salables) Management

Impacts from salable minerals management on wildland fire management under Alternative C would be the same as those described under Alternative B. However, a significant increase in the acres closed to mineral materials disposal (over 10 million acres) and the decrease in acres open (1.9 million acres) would reduce the amount of human activity and risk from human-ignited fires but would also limit the number of water sources and staging areas for fire suppression.

Impacts from Nonenergy Leasable Minerals Management

Impacts from nonenergy leasable minerals management on wildland fire management under Alternative C would be the same as Alternative B. However, a significant increase in the acres closed to nonenergy mineral leasing (10,615, 593 acres) would reduce the amount of human activity and risk from human-ignited fires but would also limit the number of water sources and staging areas for fire suppression.

Impacts from Special Designations Management

Under Alternative C, the BLM would designate all PPMA as new ACECs covering 4.5 million acres. Over 5 million acres, or more than 6 times the area under Alternative A, would be designated as ACECs. New ACEC management plans would be prepared to determine the necessary management in these areas. Impacts from management of ACECs on wildland fire management are as described under **Section 4.6.2**.

4.6.7 Alternative D

Impacts from Special Status Species—Greater Sage-Grouse Management

Impacts from GRSG management on wildland fire management under Alternative D would be the same as those described for Alternative B.

Impacts from Vegetation Management

Management under Alternative D would be similar to that described for Alternative B, though the BLM would identify focal areas to prioritize restoration projects. It would use the most current science when implementing restoration projects. In addition, Alternative D provides guidance and priorities for sagebrush, juniper, and invasive weed treatments. Weed prevention measures would be incorporated during wildfire response and other agency activities. Together, these management actions would improve the likelihood for successful sagebrush restoration and vegetation and weed treatments. This would improve vegetation conditions and thus reduce impacts on wildland fire management.

Impacts from Wildland Fire Management

Wildland fire management under Alternative D would be similar to that described for Alternative B, with additional management flexibility and guidance incorporated to tailor management to specific vegetation communities. The BLM would implement a comprehensive approach with priorities for fuels management, wildfire management, and ES&R within GRSG habitat. This would improve wildland fire management, given the limited resources available, and would target those areas that need most protection. Alternative D also establishes quantifiable objectives that would provide a measurable indication of progress or success. As a result, the likelihood for catastrophic wildfire would be reduced and subsequent impacts from wildland fire, described under **Section 4.6.2**, would also be reduced.

Impacts from Livestock Grazing/Range Management

Under Alternative D, a slight reduction in acres available for authorized grazing (approximately 9.8 million acres open to grazing, approximately a 1.0 percent reduction from Alternative A) would occur in GRSG habitat due to the closure of 117, 710 acres of RNAs to grazing. In addition, the BLM would prioritize allotments for processing grazing permits and leases and would prioritize land health assessments. Use of the HAF would be emphasized, and Alternative D provides more detailed guidance for management during drought conditions. Together these measures would reduce the impacts on wildland fire management from grazing, described under **Section 4.6.2**.

Impacts from Travel Management

Impacts on wildland fire management from travel management under Alternative D would be the same as those described for Alternative B.

Impacts from Lands and Realty Management

Impacts on wildland fire management from lands and realty management under Alternative D would be the same as those described for Alternative A. The same acreage would be managed as ROW exclusion areas as ROW avoidance areas.

Impacts from Leasable Minerals Management

Impacts from leasable minerals management under Alternative D would be the same as those described for Alternative B.

Impacts from Locatable Minerals Management

Acres open to locatable mineral development under Alternative D would be the same as those described for Alternative A.

Impacts from Mineral Materials (Salables) Management

Impacts on wildland fire management from mineral materials management under Alternative D would be the same as those described for Alternative B.

Impacts from Nonenergy Leasable Minerals Management

Impacts on wildland fire management from nonenergy leasable minerals management under Alternative D would be the same as those described for Alternative A.

Impacts from Special Designations Management

ACECs managed under Alternative A would continue to be managed under Alternative D. However, under Alternative D, the BLM would change management in some ACECs to reduce or modify vegetation impacts from resource uses and development. As a result, large blocks of vegetation would remain intact and the likelihood of weed invasion and impacts on wildland fire management would be reduced. Additional impacts on wildland fire management associated with such uses and development, as described under **Section 4.6.2**, would also be reduced.

4.6.8 Alternative E

Impacts from Special Status Species—Greater Sage-Grouse Management

Management of Core Area and Low Density habitat under Alternative E would have the same impacts as those described for Alternative B.

Impacts from Vegetation Management

Vegetation management under Alternative E emphasizes invasive weed control, avoiding conversion of sagebrush to increase livestock forage, and using the connectivity model and habitat monitoring techniques in the ODFW plan. Some guidance is also provided for conducting vegetation treatments. Overall, Alternative E would substantially reduce the introduction and spread of weeds, compared to Alternative A.

Impacts from Wildland Fire Management

Impacts from wildland fire management under Alternative E would be similar to those described for Alternative D. However, Alternative E provides slightly less specific guidance overall, which could mean less effective fire management and greater impacts from wildland fire.

Impacts from Livestock Grazing/Range Management

Impacts on wildland fire management from livestock grazing under Alternative E would be similar to those described for Alternative A as acres open and closed to grazing would be the same. However, this alternative would include grazing in GRSG habitat outside of Core and Low Density areas and priority for wildland fire management would be concentrated on fewer acres than under other alternatives.

Impacts from Travel Management

Impacts on wildland fire management from travel management under Alternative E would be the same as those described for Alternative B.

Impacts from Lands and Realty Management
Impacts on wildland fire management from lands and realty management under Alternative E would be the same as those described for Alternative C.

Impacts from Leasable Minerals Management
Impacts from leasable minerals management under Alternative E would be the same as those described for Alternative B.

Impacts from Locatable Minerals Management
Acres open to locatable mineral development under Alternative E would be the same as those described for Alternative B.

Impacts from Mineral Materials (Salables) Management
Impacts on wildland fire management from mineral materials management under Alternative E would be the same as those described for Alternative B.

Impacts from Nonenergy Leasable Minerals Management
Impacts on wildland fire management from nonenergy leasable minerals management under Alternative E would be the same as those described for Alternative B.

Impacts from Special Designations Management
Impacts on wildland fire management from special designations management under Alternative E would be the same as those described for Alternative A.

4.6.9 Alternative F

Impacts from Special Status Species—Greater Sage-Grouse Management
Impacts on wildland fire management from GRSG management under Alternative F would be similar to those described for Alternative B. However, Alternative F would provide greater restrictions on allowable uses including a 3 percent disturbance cap. This would further reduce the acreage of vegetation that would be removed and could reduce impacts on wildland fire management.

Impacts from Vegetation Management
Impacts on wildland fire management from vegetation management under Alternative F would be the same as those described for Alternative B.

Impacts from Wildland Fire Management
Impacts from wildland fire management under Alternative F would be similar to those described for Alternative B. Alternative F would require exclusions of grazing post-fire, which would reduce grazing pressure on and trampling of ES&R seedings. This would improve the likelihood of native vegetation restoration post-fire.

Impacts from Livestock Grazing/Range Management

Impacts from livestock grazing management under Alternative F would be similar to those described for Alternative B. However, Under Alternative F, 25 percent of areas open to grazing in GRSG habitat would be rested per year (7,495,716 acres open to grazing), and utilization level would be reduced in order to not exceed 25 percent of current use. This could further reduce impacts on wildland fire management, depending on where livestock management is app.

Impacts from Travel Management

Impacts from travel and transportation management under Alternative F would be the same as those described for Alternative B.

Impacts from Lands and Realty Management

Impacts from management of ROW avoidance and exclusion areas would be the same as those described under Alternative B.

Impacts from Leasable Minerals Management

Impacts on wildland fire management from leasable minerals management under Alternative F would be the same as those described for Alternative C.

Impacts from Locatable Minerals Management

Impacts on wildland fire management from locatable minerals management under Alternative F would be the same as those described for Alternative B.

Impacts from Mineral Materials (Salables) Management

Impacts on wildland fire management from salable minerals management under Alternative F would be the same as those described for Alternative B

Impacts from Nonenergy Leasable Minerals Management

Impacts on wildland fire management from nonenergy leasable minerals management under Alternative F would be the same as those described for Alternative B.

Impacts from Special Designations Management

Impacts from management of ACECs would be similar to those described under Alternative B. However, 10 percent fewer acres would be managed as ACECs under Alternative F.

4.7 Livestock Grazing/Range Management

4.7.1 Methods and Assumptions

Indicators

Indicators of impacts on livestock grazing/range management are as follows:

- Changes in permitted AUMs in areas open to livestock grazing

- Changes in the type of livestock permitted on allotments
- Prohibitions on or limitations to the construction or maintenance of structural and nonstructural range improvements
- Modifications to or removal of structural range improvements
- Closure of areas to livestock grazing for the life of the plan
- Changes to the timing, duration, or frequency of permitted use, including temporary closures

Assumptions

The analysis includes the following assumptions:

- This analysis uses PPH and PGH categories for Alternative A only to facilitate comparison across the other alternatives. There are currently no BLM-administered lands formally designated as PPH or PGH within the sub-regional planning area, and Alternative A would neither result in the designation of PPH or PGH nor assign additional management actions to PPH or PGH areas
- .All new and renewed leases and permits would be subject to terms and conditions determined by the Authorized Officer to achieve the management and resource condition objectives for BLM-administered lands and to meet BLM Oregon Public Land Health Standards
- Range improvements (e.g., fences, pipeline, water wells, troughs, and reservoirs) could create a localized loss of vegetation cover throughout the improvements' useful life. To the extent possible, vegetation would be reestablished through reclamation along water pipelines and naturally along fence lines within five years; a portion of the disturbed areas with water wells, troughs, and reservoirs could remain disturbed during their useful life and would be revegetated only if abandoned.
- The construction and maintenance of range improvements would continue in the decision area as needed. New range improvements would be subject to limitations, as defined in the Oregon GRSG RMPA/EIS. Range improvements are generally intended to better livestock distribution and management.
- By definition in this in the Oregon GRSG RMPA/EIS, livestock grazing is not considered a surface-disturbing activity, but it could affect the surface in areas where livestock concentrate, such as around range improvements.

4.7.2 Nature and Type of Effects

Impacts on livestock grazing are generally the result of the following:

- Activities that affect forage production
- Areas open to livestock grazing
- The kind of livestock (e.g., cattle, sheep, or goat)
- The season of use and timing
- The ability to construct and maintain range improvements
- Impacts from human disturbance, including disruption of livestock movement or unwanted dispersal.

Key types of impacts are detailed below.

Protecting GRSG habitat would directly affect livestock grazing under the following circumstances:

- If management were to limit areas open to livestock grazing or available AUMs
- If livestock grazing strategies (e.g., season of use and rotation) were modified, which could increase time and cost to permittees/lessees

For example, management actions to enhance habitat for GRSG could affect livestock grazing management options in the short and long term by restricting grazing intensity or season of use, retiring grazing privileges in some areas, or changing livestock rotation patterns, in order to maintain residual herbaceous cover in sagebrush habitat (NTT 2011).

However, managing vegetation resources to benefit GRSG may indirectly benefit livestock grazing by increasing vegetation productivity and improving forage in the long term. This would be especially true in cases where current conditions are not meeting land health standards. For example, in allotments with a history of intensive grazing, transitions in the composition of sagebrush communities may have occurred that have reduced cover or forage for GRSG (Cagney et al. 2010) and forage for livestock. However, when livestock grazing management is put into place to promote health and vigor of the herbaceous community for livestock, this may also result in sufficient herbaceous cover to meet habitat requirements for breeding GRSG, such as those specified by Connelly et al. (2000b). However, some areas would require additional active restoration, such as reseeding native grasses and forbs or desirable nonnative species and/or controlling invasive species.

Under the Fundamentals of Rangeland Health regulations grazing permittees and lessees must not impair watershed function, riparian habitat, water quality, or wildlife habitat. The Fundamentals of Rangeland Health regulations require that BLM must revise livestock grazing management "as soon as practicable," and in any event no later than the start of the next grazing season, upon making determinations that the Fundamentals of Rangeland Health Standards and

Guidelines are not being met upon an allotment due to livestock grazing (43 CFR 4180.1 and 4180.2(c)). Therefore, changes may be required to livestock grazing management in order to meet these standards and guidelines. Some examples of the nature and type of impacts from management for vegetation, riparian habitat, and water quality are described below.

Vegetation management designed to curb incursion of invasive plant species or encroachment of shrubs could reduce forage availability in the short term. However, these treatments generally enhance rangeland conditions in the long term (NTT 2011).

Managing riparian habitat can directly impact livestock grazing through excluding livestock at specific sites, increasing herding, adding range improvements (such as cross fences and water gaps), and adjusting season of use and livestock numbers. Managing riparian habitat to maintain proper functioning condition is a goal for BLM-administered lands. This also benefits grazing livestock by indirectly providing cleaner and more reliable water sources and more dependable forage availability.

Protecting water quality and watershed health is one component of standards for rangeland health and guidelines for livestock grazing. State water and federal quality standards also apply. If it is found that livestock is a significant factor in not meeting water quality standards, additional management needs would be identified and changes could be required in livestock management. Changes include deferring or shortening livestock grazing periods, adding range improvements, excluding livestock grazing from riparian areas, establishing riparian pastures, and increasing livestock herding. In areas requiring exclusion of livestock or other restrictions on livestock management, these limitations could increase costs to permittees and lessees if changes were to reduce AUMs or increase livestock management costs.

Recreation can affect livestock grazing directly through human disturbance and indirectly through rangeland degradation. Direct disturbance can include undesired animal dispersing or trespassing. This would be the result of gates left open by recreational users, animal displacement, harassment or injury from collisions or shooting, or from damage to range improvements, particularly from the use of recreational vehicles or from recreational shooting. Disturbance could occur during the hunting season due to increased presence of people, vehicles, noise and accidental livestock shooting. In addition, OHV use results in indirect impacts, such as increased dust on forage in high use areas, leading to lower forage palatability. Limitations on recreational use in GRSG habitat could indirectly benefit livestock by reducing direct disturbances.

Other direct long-term recreation impacts are disturbance caused by increased levels of human activities. The degree of impacts would vary depending on the following:

- The intensity of recreation; for example, large numbers of people for special recreation permit (SRP) use would likely have a higher level of disturbance, compared to frequent use by a small number of visitors
- The timing of recreation (livestock could be more susceptible to disturbance during the spring when young are present)
- The location of recreation in the allotment (a higher level of disturbance could occur near areas frequented by livestock, such as water sources or salt licks)

As stated above, limitations on recreational use in GRSG habitat could indirectly benefit livestock by reducing direct disturbances.

Limits on construction or use of transportation routes may affect livestock grazing. Road construction may cause loss of forage, harassment, and displacement; thus, reducing these activities may benefit livestock by reducing disturbances. Closing roads or trails not leading to range improvements would also increase forage availability when the area is rehabilitated or when natural rehabilitation occurs. Limitations on cross-country travel may impact permittees' and lessees' ability to effectively manage livestock if exemptions are not granted for access to allotments. Travel management actions for GRSG protection generally involve increased limitations or restrictions on travel management.

Wildland fire alters sagebrush habitat due to the long time required for sagebrush to regenerate, which may allow for invasion of invasive species (NTT 2011). Wildland or prescribed fire would remove vegetation and forage over the short term; however, it can increase forage a few years post-fire as herbaceous vegetation increases and woody vegetation is removed or reduced. Impacts on livestock operations could also occur when agency policies or determinations require a rest period following rehabilitation and before livestock grazing is reestablished. These required rest periods may impact the ability of livestock operators to fully use permitted AUMs for a determined period of time. The specific impacts on livestock operators would be short term increased costs to provide alternative forage resources to livestock. The amount of impact on livestock permittees and lessees would depend on the location and intensity of the fire in relation to grazing allotments. Changes in wildland fire suppression and fuels management to protect GRSG habitat would have varying effects on livestock grazing. Measures to protect sagebrush habitat might reduce the spread of wildland fire and the associated disruption to livestock management. Use of livestock to aid in managing fuel loads may provide some increased opportunities for livestock grazing at a site-specific scale. The management of habitat for GRSG using natural disturbance regimes, such as fire, and using vegetative treatments to accomplish biodiversity objectives to improve plant community resilience could also benefit livestock grazing in the long term. This would come about by maintaining a balance of seral stages. In general, removing encroaching junipers may benefits livestock grazing by increasing productivity of forage species and forage quality (Vaitkus and Eddleman 1987; Bates et al. 2000).

Restrictions on ROWs or land transfers may indirectly impact livestock grazing by reducing construction impacts from development of these ROWs (such as dust, displacement, and introduction of noxious weeds) in the long term. Lands and realty actions taken to protect GRSG habitat would involve avoiding or excluding ROWs (e.g., for power lines, pipelines, and other structures) or land transfers in GRSG habitat. They may also slightly decrease disturbance in these areas. However, should development be relocated to areas outside of GRSG habitat these areas may see an increase in construction-related and associated disturbance or displacement of livestock.

Energy and mineral development could impact livestock grazing. During the exploration and testing phase of mineral development, the footprint of disturbance is usually small and localized; therefore, minimal acres available for livestock grazing would be directly impacted. However, during the exploration phase, impacts on livestock dispersal and trespass could occur, increasing time and cost to permittees and lessees. Outside of the exploration and testing phase, surface-disturbing mineral development directly affects areas of grazing in the short term during construction of well pads, roads, pipelines, and other facilities. Potential impacts include an increased potential for the introduction and proliferation of noxious weeds that are often unpalatable. Other potential impacts are changes in available forage, reduced forage palatability because of dust on vegetation, limits on livestock movement, harassment, and temporary displacement of livestock. In the long term, a smaller amount of grazing acreage is permanently lost from mining operations following rehabilitation. Improving roads for mineral development could facilitate livestock management by maintaining or improving access to remote locations within allotments. In addition, development may also provide other indirect benefits including but not limited to lower travel costs for livestock transportation and access to nutrient supplements for livestock use. Properly implemented BMPs and reclamation mitigation measures would likely maintain rangeland health and forage levels for livestock. Reducing mineral development in GRSG habitat could reduce potential impacts on grazing, as described above.

Changes in livestock grazing management could impact grazing opportunities in a variety of ways. For example, implementing particular livestock grazing management requirements to benefit GRSG could affect livestock grazing by changing required management actions. Management requirements would increase short-term and long-term costs to permittees and lessees and decrease AUMs, particularly when they require one or more of the following:

- Modification of a grazing strategy

- Change in season-of-use or kind of livestock
- Removal or modification of range improvements, when ability to disperse livestock is impacted

These management requirements could result in direct and indirect economic impacts on individuals, companies, and the local community. For example, if a ranch is dependent seasonally on forage on public lands, reducing or eliminating AUMs on public lands would affect the entire ranching operation by reducing the total amount of available forage (Torell et al. 2002).

Some management changes may require a short-term output of cost for permittees and lessees but will result in long-term benefits. For example, construction of range improvements to improve livestock distribution and allow use of a larger portion of the rangeland would generally enhance rangeland health in the long term; however, it would have short-term costs which may be borne by the BLM, permittees or lessees, or both. Constructing off-site water sources and fencing riparian and spring sources could keep livestock away from sensitive riparian areas and provide a cleaner more reliable source of water for livestock. However, it would increase costs for permittees and lessees should they be fully or partially responsible for the cost of construction. Other requirements could increase annual operating costs. Examples of this are increased time feeding animals on private land, more complex pasture rotations or herding, requiring increased labor and fuels costs for moving animals..

Where a permit or lease were retired from grazing in order to devote the BLM-administered lands covered by the permit or lease to another public purpose, the agency may have to compensate the permittee or lessee for the range improvement projects constructed under a range improvement permit or cooperative agreement, in accordance with 43 CFR, Part 4120.3-6(c).

Implementing GRSG management decisions for special designations, air quality, and special status plants would have negligible or no impact on livestock grazing/range management for all alternatives; therefore, they are not discussed in detail.

4.7.3 Impacts Common to All Alternatives

Impacts from Livestock Grazing Management

Routine maintenance is conducted on livestock grazing infrastructure, such as fences. This would continue under the alternatives that allow livestock grazing to occur. There would be no impacts on livestock grazing from routine maintenance.

At the request of permittees with allotments containing priority habitat on BLM-administered lands, candidate conservation agreements or their successors will be implemented. These agreements are on a voluntary basis and would, therefore, not impact permittees/lessees.

Impacts from Travel Management
Access to allotments for authorized use for the BLM and permittees/lessees would be permitted under all alternatives; therefore, travel management restrictions would have limited impacts on ability to manage livestock grazing.

Impacts from Energy and Minerals Management
As described below, for many energy and mineral resources (leasable minerals and nonenergy leasable), there is minimal current development and future development levels are predicted to remain low in the planning area. As a result, impacts on livestock grazing management would be negligible across all Alternatives. In addition, for locatable minerals, potential is unknown, although some level of development may occur in the future impacts on livestock grazing is likely to be minimal.

Impacts from Locatable Minerals Management
All locatable minerals have the potential to exist within the planning area, but exploration has been minimal and potential is unknown across all alternatives.

Impacts from Leasable Minerals Management
While there is potential for development, there have been no wells developed on the leases issued on occupied GRSG habitat in the planning area. Under all alternatives, the potential for development is estimated to be low; thus, impacts on livestock grazing from development would likely be limited and occur independent of areas available for leasing or stipulations applied.

Impacts from Nonenergy Leasable Minerals Management
There is currently no commercial interest in solid leasables, and potential is unknown. Impacts on livestock grazing are likely to be minimal across all alternatives.

Impacts from Mineral Split-Estate Management
For the purposes of impacts on livestock, split-estate minerals would be similar to that described above by category of minerals.

4.7.4 Alternative A

Impacts from Vegetation Management
Under Alternative A, management actions for GRSG would be applied in specific RMPs, but actions would not be consistent. Standards and guidelines for rangeland health would apply across all plans, and livestock grazing practices would be modified should standards for vegetation not be met as a result of livestock grazing. Management actions for invasive species would continue under the direction of current RMPs, with the focus on areas not meeting land health standards.

Under Alternative A, no new priorities are established; existing prioritization is given to projects that benefit multiple resources. Vegetation restoration would directly affect livestock grazing if treatments were to include restrictions on available grazing acreage or changes to permitted AUMs, grazing strategies, or season of use. These could increase costs to permittees. Required rest periods following treatments would impact the ability of livestock operators to fully use permitted AUMs.

Impacts from Wild Horse and Burro Management

Overall management direction is to manage for healthy populations of wild horse and burros to achieve a thriving natural ecological balance with respect to wildlife, livestock use, and other multiple uses. 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. Wild horse and burro management is included in the multiple use decision process for forage allocation. This process could decrease current permitted use in the planning area by reallocating forage resources to livestock, wild horses and burros, and wildlife Range improvement construction and maintenance could be increased if a need for additional water sources were identified for current populations of wild horses and burros.

Impacts from Wildland Fire Management

Under Alterative A, wildfire suppression is not specifically prioritized in PPMA. After firefighter safety, prioritization of suppression would be implemented for multiple resources protection. Mechanical treatments, prescribed fires, and other treatments would be used to treat conifer encroachment and to remove invasive plant and weed species. These actions could improve forage in the long term. This would be due to increased herbaceous understory, in turn due to a decline in the cover of shrubs and trees. This would depend on the amount of tree cover removed from the plant community.

On sites where additional sunlight would reach the herbaceous understory, there would also be an increase in forage quality and nutritional content. A minimum rest period from livestock grazing of two growing seasons would be required on BLM-administered lands after any major vegetative disturbance, including wildfire. Specific timing and the type of rest, as well as any modification to livestock grazing use, would be determined at the site-specific environmental assessment phase. As a result, impacts on costs and time for permittees and lessees would depend on the fire location, relative to grazing allotments.

Impacts from Livestock Grazing/Range Management

Under Alternative A, range management would be based on individual RMPs in the planning area. Approximately 924,617 AUMs would be permitted and 9,994,288 acres would be open to grazing in PPH and PGH on BLM-administered lands.

All permits and leases under Alternative A would continue to be required to meet or make progress toward meeting standards defined in the Oregon and Washington Public Land Health Standards. Evaluations of achievement or significant progress toward achievement would continue to occur. Grazing permits and leases would be renewed approximately every 10 years based on the set renewal schedule. Grazing permits, including grazing systems, permitted AUMs, and allotment boundaries, would be modified as necessary to conform to Standards and Guidelines for Livestock Grazing Management when grazing were determined to be the cause of a standard not being achieved, as required by regulation on BLM-administered lands. In this case, changes to management would be implemented prior to the start of the next grazing season per BLM regulation. As a result, any changes to grazing management would occur on a case-by-case basis at the time of the determination and would most likely change in those allotments found to be not meeting land health standards.

Management changes designed to address nonattainment of the wildlife habitat standard could reduce permitted AUMs and change current timing, duration, or frequency of permitted use, including temporary closures. Drought management actions would be directed to allotments with resource concerns. This alternative would not direct the BLM to manage certain areas more intensively for GRSG habitat objectives; therefore, impacts on grazing in GRSG habitat would be similar to those throughout the planning area.

Retirement of grazing privileges would remain an option in priority habitat. However, based on past rate of voluntary retirement in the planning area, few permittees are likely to use this option (BLM 2013a).

Lands would be maintained and restored to maintain healthy native plant and animal species. Changes to rangeland management would be directed first to allotments not meeting land health standards where current livestock is a significant factor in non-attainment. Similarly, the focus in riparian areas and wetlands would be to manage, maintain, protect, and restore riparian areas and wetlands toward proper functioning condition.

As described above, managing riparian habitat can directly impact livestock grazing through excluding livestock at specific sites, increasing herding, and adding range improvements, such as cross fences and water gaps. Such changes in grazing management options could increase time or costs for permittees.

In general, structural range improvement construction and modification would be allowed in the decision area when needed to support grazing systems or improve livestock distribution on a case-by-case basis. Examples are fences, water developments, and vegetation treatments. This would allow management options for permittees. Fences would be constructed to as determined necessary for resource and resource use programs under individual RMPs; however, few specific provisions are included for GRSG, so additional costs could be limited.

Impacts from Recreation Management

Under Alternative A, there would be no new restrictions on SRPs in the decision area; therefore, livestock could be disturbed by recreation or groups in the planning area. Some limited potential for disturbance from general recreation is possible, as described in **Section 4.7.2**, Nature and Type of Impacts.

Impacts from Travel Management

Under Alternative A, conflicts are most likely to occur between livestock grazing and OHV use. This would occur in the 2,669,145 acres open to cross-county travel in PPH and 2,940,051 acres open to grazing in PGH. Impacts would occur where areas open overlap with areas open to grazing. Impacts could occur to some extent on the 1,828,999 acres in PPH and 2.576,796 acres in PGH and limited to existing routes, with impacts concentrated on areas that are also open to grazing. Access to allotments would be maintained.

Impacts from Lands and Realty Management

Under Alternative A, approximately 257,154 acres would be classified as ROW exclusion areas for new ROW development in PPH and 288,195 acres in PGH. Disturbance of forage from development activities would be reduced where areas available for livestock grazing overlap these ROW exclusion areas. Similarly, the potential for disturbance from development would be limited in ROW avoidance areas (1,336,146 acres in PPH and 1,672,025 in PGH).

Impacts from Energy and Mineral Development

In general, Alternative A is the least restrictive on energy and mineral development of all the alternatives. As a result, the indirect impacts of development on livestock grazing as discussed in **Section 4.7.2** (including spread of noxious weeds, disturbance of livestock, and potential for increased access for permittees/lessees) would be the greatest under this alternative. Quantitative analysis here focuses only on mineral materials due to the lack of impacts on range management across alternatives and/or unknown potential for other mineral and energy resources; for mineral materials 9,026,017 acres would be open to consideration for development in PPH and PGH.

4.7.5 Alternative B

Impacts from Vegetation Management

Under Alternative B, restoration projects in priority habitat would be designed to benefit GRSG and, based on the likelihood of success, with reestablishment of sagebrush cover as the highest priority. Projects to remove nonnative species and improve habitat are often be in line with current grazing management practices and could improve livestock forage in the long term.

Vegetation restoration would directly affect livestock grazing if treatments were to include restrictions on available grazing acreage or changes to permitted AUMs, grazing strategies, or season of use. Any of these could result in increased costs to permittees and lessees. Impacts could occur on range management when objectives for range management do not match with those for GRSG habitat. Post restoration management requirements could also change grazing systems or other range management components, with a potential for increased costs and time for permittees and lessees. As a result, livestock grazing management from vegetation management could be limited in PPMA, particularly in important seasonal habitats and in areas post-restoration.

Actions for invasive species management would be similar to that described under Alternative A. There would be a greater focus on restoration and potential for impacts on grazing management in priority habitat.

Impacts on livestock management from vegetation treatment would be most likely when timing or specific location of treatment occurs in times of year or allotments where other options for livestock are limited.

Impacts from Wild Horse and Burro Management

Under Alternative B, HMAs in PPMA would be a higher priority for gathers. For the livestock grazing allotments that overlap HMAs in PPMA, wild horse and burro numbers would stay within appropriate management levels, resulting in maintenance of the level of forage permitted for livestock use. HMAs that do not contain PPMA would be categorized as a low priority for future gathers. As a result, forage availability would potentially decrease in the long term due to growing populations of wild horses that have not been gathered in those areas.

Impacts from Wildland Fire Management

Under Alternative B, suppression of fire would be prioritized when PPMA was threatened. As a result, disturbance on livestock grazing could be reduced in the long term due to fewer large wildland fires in this area. Fires burning outside of PPMA or PGMA may increase in size when they are prioritized for suppression after fires burning in GRSG habitat. This could slightly increase the disturbance to grazing outside of GRSG habitat.

Management actions to restore post-fire habitat could impact range management. Under Alternative B, management would be adjusted to support successful restoration post rehabilitation as needed, which could temporarily or permanently reduce grazing in areas reseeded post fire. The level of impacts would depend on size, location, and intensity of the fire and the related level of restoration needed.

Fuels management projects to reduce fine fuels could include the use of targeted livestock grazing. This would likely involve high-intensity, short-duration grazing in the late fall or early spring to target cheatgrass. It would involve intensive management, such as increased herding and temporary fencing, in order to concentrate livestock in the desired area. As a result, management costs and time would be high for this use. Impacts would likely be minimal overall due to the limited nature of this use of livestock grazing.

Impacts from Livestock Grazing/Range Management

Under Alternative B, no management actions would result in direct changes to acres open to grazing and permitted AUMs. The number of AUMs would be the same as Alternative A (924,617 AUMs).

All GRSG habitat objectives and management would be incorporated into permit and lease renewals; therefore, impacts would occur at a site-specific level during the renewal process. Land health assessment would include indicators specific to achieving GRSG habitat objectives, including local and state seasonal habitat objectives where available or general recommendations from Connelly et al. (2000b) and Hagen et al. (2007) if not available. As described under **Section 4.7.2**, this could require changes to management of a given allotment. Examples of this are changes in the kind of livestock permitted, changes to livestock rotation, or changed season of grazing permitted in order to meet these standards. Such changes could decrease management options and, therefore, increase the time and costs for permittees and lessees.

However, many of the habitat objectives for GRSG such as defined in Connelly et al. (2000a), Hagen et al. (2007) are in line with those currently used to assess land health, as they focus on maintenance or improvement of land health and grassland vegetation. Completion of land health assessments and permits and leases would be prioritized within PPMA. The focus would be on allotments that have the best opportunities for conserving, enhancing or restoring habitat for GRSG. As a result, impacts on range management would be most likely to occur in these areas.

Over all, effects would be similar to Alternative A but focus on PPMA due to the emphasis of management actions in this habitat. In the long term, livestock grazing in priority habitat would be reduced under compared to Alternative A should current grazing practices in in a given allotment be found to be contributing to a failure to meet GRSG habitat objectives; however, impacts would be site specific and likely would occur gradually.

The BLM would work with ranchers so that operations within GRSG habitat could be planned as single units. In this way, the time and costs required to implement these changes could be reduced, although they would still be higher than under current conditions, where no change would be required. Retirement of grazing privileges would remain an option for priority habitat, as discussed under Alternative A.

Vegetation treatments that benefit livestock forage could be completed only if these treatments would also conserve, enhance, or improve GRSG habitat; therefore, the management options in PPMA could be reduced and the ability to fully use permitted AUMs could be impacted in the long term.

Under drought conditions, as under Alternative A, grazing management changes would be implemented as needed, in accordance with WO IM 2013-094 or subsequent direction. However, under this alternative the focus would be on adjusting management in PPMA, so impacts would be more likely to occur in this area.

Under Alternative B, riparian areas would be managed with a goal of proper functioning condition or similar standards within priority habitat, as discussed in Alternative A. Measures to enhance wet meadows and to reduce hot season grazing on riparian and meadow complexes could limit management options for livestock in these areas. These measures also could impact the ability to effectively distribute livestock.

Structural range improvements, such as fences and exclosures, in priority habitat under Alternative B would be permitted only when they would also conserve or enhance GRSG habitat. In addition, some fences would require flagging to lessen risk for GRSG impacts, so the cost of building or maintaining these structures would increase, compared to Alternative A.

Similarly, new water developments from diverting springs or seeps would be permitted only when GRSG habitat would also benefit. For this reason, these new developments would be limited, and permittees and lessees would not be able to fully use permitted AUMs, particularly in cases where water is limited on a given allotment.

Overall, water improvements and fences are likely to be removed or modified to some extent under Alternative B, thereby increasing management costs and potentially decreasing grazing or shifting grazing use patterns in the long term.

Impacts from Recreation Management
Impacts would be the same as under Alternative A.

Impacts from Travel Management
As described under Alternative A, limiting travel management could decrease disturbances to livestock. Under Alternative B, only 2,938,846 acres of BLM-administered lands in GRSG habitat would be open to cross-country use, all within PGMA (an 52 percent decrease from Alternative A for GRSG habitat). Similarly, areas limited to existing routes would increase compared to Alternative A (7,075,386 total acres in GRSG habitat, a 60 percent increase from Alternative A). Additionally, in PPMA, motorized travel would be limited to existing roads, primitive roads, and trails until travel management planning is complete and the need for additional closures is evaluated. As a result, disturbance of livestock from recreational vehicles is likely to be reduced, particularly in PPMA. Access to allotments for authorized use would be permitted under this and all alternatives.

Impacts from Lands and Realty Management
Under Alternative B, no new ROW authorizations would be permitted in priority habitat unless the development would occur within the existing

developed footprint. Under this alternative, 4,866,030 acres of PPMA and PGMA would be managed as ROW exclusion areas (more than 8 times higher than Alternative A); 5,662,632 acres open to livestock grazing would be managed as ROW avoidance areas in PPMA and PGMA (88 percent increase over Alternative A). As a result, indirect impacts on livestock grazing from disturbance would be limited in ROW avoidance areas open to livestock grazing and would decrease, compared to Alternative A.

Impacts from Energy and Mineral Development

As described in **Section 4.7.3**, Impacts Common to All Alternatives, the potential for development and related impacts would be minimal for most of the energy and minerals resources; therefore analysis here focuses only on mineral materials. Under Alternative B, 6,224,557 acres (30 percent decrease from Alternative A) would be open to consideration for mineral material development.

Due to the increase in restrictions on development, impacts on livestock grazing management would be reduced under Alternative B. The 3 percent disturbance cap to anthropogenic disturbances in PPMA would specifically limit disturbance of livestock grazing from development in this area.

4.7.6 Alternative C

Under Alternative C, no resource decisions would impact grazing because grazing would be eliminated within GRSG habitat.

Impacts from Vegetation Management

Under Alternative C, prioritization of areas for restoration and vegetation management actions would be similar to that discussed under Alternative B. There would be no impacts on livestock grazing, because livestock grazing would be eliminated.

Impacts from Wild Horse and Burro Management

Management actions for wild horses and burros would be as described for Alternative A. There would be no impacts on livestock grazing, because livestock grazing would be eliminated.

Impacts from Wildland Fire Management

Under Alternative C, management priorities and impacts would be similar to those described under Alternative B. There would be no impacts on livestock grazing, because livestock grazing would be eliminated.

Impacts from Livestock Grazing/Range Management

Alternative C would eliminate livestock grazing from all allotments completely or partially within occupied GRSG habitat. There would be 0 AUMs in GRSG habitat. Eliminating grazing from all allotments intersecting occupied habitat would result in economic impacts on permittees and lessees. As discussed under **Section 4.7.2**, permittees and lessees would be faced with reducing livestock numbers for their operations or locating replacement forage, potentially at higher costs and with limited availability. Changes to permitted AUM levels could also impact property values of ranches next to federal lands, which act as base properties for authorized permittees and lessees. Closures would also impact permittees' and lessees' current seasonal rotations or other management strategies on federal and private lands. Due to these factors, the elimination of permitted grazing in PPMA could result in permittees and lessees going out of business, with impacts on them and local communities as a whole. Additional details of the economic impacts are discussed in **Section 4.20**, Social and Economic Impacts (Including Environmental Justice).

No specific management actions related to range infrastructure are in place under Alternative C due to the lack of permitted grazing. Proposed restoration includes removing water developments. In areas closed to grazing, any maintenance requirements for remaining infrastructure and associated costs would likely fall to the BLM. Permittees and lessees who have investments on impacted federal lands in occupied habitat would receive appropriate compensation, based on federal regulations in 43 CFR, Part 4120.3-6(c). Fencing on the boundaries of occupied habitat could be required to prevent livestock from trespassing on lands where grazing is excluded. This would be a potential additional cost for permittees and lessees.

Lack of ability to use range improvements and water developments on occupied habitat could result in other indirect costs. Permittees and lessees who currently rotate pastures between private and federal lands could need to construct additional water developments or other structural range improvements on private pastures. This would increase time and costs. Removing grazing from occupied habitat could increase conflicts between grazing and other resources and resource uses on lands of other surface ownership. This would be the case should livestock grazing increase on BLM-administered or private lands outside of occupied habitat.

Impacts from Recreation Management

Under Alternative C, SRP management would be the same as described under Alternative A. No impacts would occur under Alternative C due to the elimination of grazing from occupied habitat.

Impacts from Travel Management

As under Alternative B, additional limitations for motorized travel would apply in GRSG habitat, including closure of all cross-county motorized travel in PPMA and PGMA. Additionally, new road construction would be prohibited. However, impacts on livestock grazing would not occur due to the elimination of grazing.

Impacts from Lands and Realty Management

Under Alternative C, ROW exclusion areas would be the same as Alternative B for PPMA and increased 18 fold over Alternatives A for PGMA. Avoidance areas would be as described under Alternative B for PPMA and decreased to zero for

PGMA. However, due to the elimination of grazing in GRSG habitat, these actions would not impact livestock management.

Impacts from Mineral and Energy Development
Under Alternative C, additional restrictions would be applied to mineral and energy development. No impacts would occur from energy and mineral development on livestock grazing due to the elimination of grazing in occupied GRSG habitat.

4.7.7 Alternative D

Impacts from Vegetation Management
Under Alternative D, priority for restoration would be on the focal areas identified as restoration zones, as well as on other habitat important to GRSG. As a result, potential restrictions on grazing management are most likely to occur in these areas. Impacts would be similar to those described under Alternative B but potentially across a broader area. Restoration is also likely to improve habitat for both livestock and wildlife in the planning area in the long term. Similarly, actions to remove juniper and control the spread of invasive species may improve habitat conditions for both GRSG and livestock.

Impacts from Wild Horse and Burro Management
Under Alternative D, AMLs may be adjusted in the long term to meet GRSG objectives and would not exceed the current range. As a result, any conflict with livestock or competition for forage would be similar or reduced in scale, compared to Alternative A.

Impacts from Wildland Fire Management
Under Alternative D, management actions would focus on creating fuel breaks and cooperating with other agencies to assess, plan, and implement actions to minimize risk of severe wildfire in GRSG habitat. Treating approximately 30 percent of GRSG habitat over the next 10 years could have short-term impacts on grazing should forage become unavailable in treated areas. However, treatments should reduce the intensity and occurrence of wildfire in the long run. Specific suppression priorities would be applied in PPMA and PGMA, with emphasis on nesting, winter habitat and PPMA. There is therefore potential for reduced risk of fire and associated impacts on grazing in these areas. There also is a potential for increased risk of fire in other parts of the planning area should resources be redirected to GRSG habitat.

Impacts from Livestock Grazing/Range Management
Under Alternative D, a slight reduction in acres available for authorized grazing (9,897,743 acres open to grazing in GRSG habitat, approximately 1 percent reduction from Alternative A) and AUMs (915,624 permitted AUMs, approximately 1 percent reduction compared to Alternative A) would occur in GRSG habitat due to the closure of specific areas of RNAs to grazing. In the specific areas proposed for closures, permittees and lessees would need to

locate alternative forage or reduce AUMs, with economic impacts as described under Alternative C, albeit at a reduced scale.

Permit renewal and associated land health assessment would be prioritized in occupied habitat for those in the "I" category. As a result, changes to permitted grazing level and grazing systems are more likely to occur in these areas. The goal under Alternative D is to analyze all grazing allotments where permit/leases are coming up for renewal within 10 years. As stated in **Chapter 2**, the emphasis is on allotments in GRSG habitat, with priorities for land health assessments as follows:

1. Allotments or pastures in PPMA that have never been evaluated
2. Allotments or pastures in PPMA that have not been reevaluated in 10 or more years
3. Allotments or pastures in PGMA that have never been evaluated.

As a result, changes to grazing management are likely to occur in PPMA first and PGMA second.

In the long term, this action could improve rangeland habitat conditions for livestock as well as wildlife by focusing management on those lands that are in most need of improvement.

Land assessment would incorporate habitat indicators and associated values that are consistent with the HAF or with values adjusted for regional conditions. A more standardized approach would be in place, compared to Alternative A. In addition, this alternative allows for some flexibility in objectives to align with regional habitat conditions, making these objectives more obtainable and reducing potential impacts on grazing management.

Similarly, as described under Alternative B, modifications to grazing systems may be required to meet seasonal habitat requirements. However, under Alternative D, there is increased flexibility in this management approach due to adjustment for regional conditions; therefore, required changes to management and related impacts on permittees and lessees would be reduced.

For allotments not meeting rangeland health standards or conforming to the guidelines and where livestock grazing is determined to be a significant factor, appropriate changes in grazing management will be implemented prior to the start of the next grazing year.

Management for riparian and wetlands areas would be similar to that described under Alternative B, but with an emphasis on site specific ecological conditions. Therefore, required changes to grazing management and impacts on permittees and lessees may be reduced.

Under Alternative D, new and existing range improvements would be allowed to enhance functionality when livestock are absent. Range improvements would be modified to prevent danger of GRSG or other wildlife entrapment. In cases where water improvements have population limiting implications, modifications or removal could occur. As a result, some water developments may be modified; however, the ability to distribute livestock should generally be maintained and impacts on permittees and lessees should be limited.

Forage enhancement treatments would be limited, as described under Alternative B. Structural range improvement could also be limited as under Alternative B, but the emphasis under Alternative D is on improved grazing management relative to GRSG. For this reason, there is a potential for improvement to both livestock and GRSG habitat conditions, especially in the long term.

Alternative D would be more restrictive on use of supplements during the winter. While this may not prevent winter grazing it would likely affect livestock performance and health, and have a financial impact on grazing operators.

Impacts from Recreation Management

Under Alternative D, existing SRPs would be evaluated and would be changed if needed for GRSG protection. Disturbance to livestock from recreation is likely to be reduced in the long term compared to Alternative A, particularly near leks.

Impacts from Travel Management

Under Alternative D, travel management plans would be implemented within five years, as described under Alternative B. Area open to cross-county travel would be as described in Alternative B. Monitoring before travel management planning would provide information about ongoing activities that could be utilized to create travel management plans that would reduce the conflict between recreation use and livestock grazing, compared with Alternative A.

Impacts from Lands and Realty Management

Under Alternative D, current ROW exclusion areas would be retained in PPMA; all other GRSG habitat, including PGMA, would be managed as open for ROWs, unless already managed as avoidance or exclusion by the existing planning. All new ROWs in PGMA would require the BLM to cooperate with ODFW to determine impacts on occupied, suitable, or potential habitat, and development and associated disturbance to livestock would be avoided in occupied habitat and minimized in suitable or potential habitat compared to Alternative A,

Impacts from Mineral and Energy Development

As described in **Section 4.7.3**, Impacts Common to All Alternatives, the potential for development and related impacts would be minimal for most of the energy and minerals resources; therefore, quantitative analysis here focuses only on mineral materials. Under Alternative D, PPMA would be closed to development of new mineral sites. Existing permitted sites would not be closed but reclaimed upon exhaustion of resource. As a result, development and associated livestock disturbance from development of minerals would also be reduced.

4.7.8 Alternative E

Impacts from Vegetation Management

Under Alterative E, converting sagebrush for livestock grazing is discouraged and additional seasonal vegetation treatment restrictions would be applied. As a result, management options to improve forage for livestock would be restricted. This would result in the potential need to increase management, such as herding, in order to provide sufficient forage for livestock. Actions to remove juniper and to control invasive species spread may improve habitat conditions for both GRSG and livestock in the long term.

Impacts from Wild Horse and Burro Management

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

Impacts from Wildland Fire Management

Under Alternative E, management actions would focus on preventing fire from entering at-risk communities in GRSG habitat, such as cheat grass in understory and overstory sagebrush, and in reducing the spread of invasive species. Land within 3 miles of a lek, as well as identified winter range, would be given top priority in fire suppression.

These management actions would likely result in appropriation of funds and suppression efforts in areas most in need of protection for GRSG. In many cases, these actions also would support, maintain, or improve land health conditions. Such treatment as removing juniper would be conducted when necessary but may be limited, compared to Alternative A, especially in lower elevations. As a result some local restrictions may occur on the ability to treat vegetation to improve livestock forage.

Impacts from Livestock Grazing/Range Management

Under Alternative E, AUMs open to grazing would be the same as under Alternative A (924,617 AUMs). Acre open to grazing in GRSG habitat would be slightly reduced compared to Alternative A (8,316,730 acres, a 16.8 percent reduction). The difference in acreage in this alternative is due to the difference an increase in PPH compared with Low Density habitat (as defined in Alternative E) rather than a change in management direction. No changes to use or management would be required when livestock grazing management would result in a level of forage use consistent with direction and habitat quality meeting Rangeland Health Standards and Guidelines. Impacts on livestock grazing, therefore, would be similar to those described under Alternative A for areas meeting standards and objectives and maintaining appropriate levels of use under existing management direction (RMPs).

Structural range improvements would be allowed in order to maintain or enhance habitat quality for GRSG. Springs would be developed to maintain free-flowing nature. If this were to limit livestock use, the ability to distribute livestock and the costs and time for permittees and lessees would be impacted. Similarly, structural improvements would not be permitted within .6 mile of leks, and distribution would be impacted. Fences would be required to be modified within a mile of leks, with similar increases in time and costs for permittees and lessees.

Supplemental winter feeding restrictions would be applied with impacts as described under Alternative D.

Impacts from Recreation Management

Under Alternative E, recreation management would be similar to that described under Alternative A, but seasonal restrictions would be imposed to limit disturbance to GRSG. Such restrictions would also reduce disturbance to livestock.

Impacts from Travel Management

Under Alternative E, travel management restrictions on OHV use would be applied to areas within 2 miles of leks. This alternative would impose 2-mile buffers around occupied leks during breeding season. In addition, OHV use should be monitored and information utilized to mitigate potential conflicts with recreation and livestock grazing. As a result, any indirect impacts on livestock from travel near leks would be reduced. Overall, areas open to cross-county travel would be the same as Alternative B for PPMA/Core Area habitat and decreased to 1,610288 in PGMA/Low Density habitat (45 percent reduction from Alternative A in PGMA). There is a slight increase in the change of disturbance from OHV use in this alternative in Low Density habitat as a result. Permittees and lessees would still be allowed access to allotments for management.

Impacts from Lands and Realty Management

Under Alternative E, all Core Area habitat would be an exclusion area for ROW development, with impacts as described under Alternative B. For Low Density habitat, exclusion areas would be reduced compared with Alternative A (156,523 acres, 45 percent reduction). However, mitigation would be required to avoid, minimize, and mitigate impacts on GRSG habitat caused by BLM activities. As a result, disturbance from development in Core Area and Low Density habitat would decrease.

Impacts from Energy and Mineral Development

Under Alternative E, as discussed in **Section 4.7.3**, impacts would primarily be from mineral material development. Mineral materials would be open for development with impacts as described in Alternative B. Under this alternative, a zero percent surface disturbance cap to anthropogenic disturbances (not would be applied in Core Areas, unless non-habitat, specifically limiting the disturbance of livestock grazing from development.

4.7.9 Alternative F

Impacts from Vegetation Management

Vegetation management and associated impacts on livestock management would be similar to that described under Alternative B. As under Alternative E, management to avoid sagebrush reduction and treatments to increase livestock or big game forage in occupied habitat may further limit management options for permittees and lessees.

Impacts from Wild Horse and Burro Management

Impacts from wild horse and burro management would be similar to that described under Alternative B. However, under Alternative F, wild horse and burro populations in the areas would be managed with the objective a 25 percent from current AML levels in GRSG habitat, resulting reduced forage use by wild horses and burro.

Impacts from Wildland Fire Management

Under Alternative F, wildland fire management impacts are generally similar to those described under Alternative B. One exception would be measures to protect GRSG habitat post-fire. Livestock grazing would be excluded from burned areas until woody and herbaceous vegetation meet GRSG objectives, which could result in long-term (10 to 50 years or longer) exclusion from burned sites. It would generally take more than a decade to reestablish adequate Wyoming sagebrush cover in low precipitation areas. The level of impacts would depend on locations, size, and intensity of wildfire in GRSG habitat in relation to location and level of authorized grazing. Requirements to include livestock exclosures to monitor fire restoration progress are anticipated to have negligible impacts due to the limited size of exclosures.

Impacts from Livestock Grazing/Range Management

Under Alternative F, 25 percent of areas open to grazing in GRSG habitat would be rested per year (7,495,716 acres open to grazing), and in addition, utilization level would be reduced in order to not exceed 25 percent of current use with permitted AUMs reduced to 350,208 (approximately 37.5 percent reduction as compared to Alternative A). The reduction in authorized grazing in GRSG occupied habitat, while not as complete as under Alternative C, would include 25 percent reduction below billed AUM levels. While allotment specific impacts would be determined at implementation, overall, livestock grazing would be reduced in the decision area, potentially requiring permittees to reduce grazing or locate alternative sources of forage, with potential for economic impacts on as discussed in Alternative C.

In areas where grazing would still be permitted, management would be similar to that described in Alternative B, with the addition of other protective measures for GRSG habitat (such as increased prohibitions on grazing after fire and restriction on all vegetation treatments). As a result, management options would be limited and time and costs for permittees would be increased compared to Alternative A.

Alternative F includes increased restriction on the ability to construct or modify water developments and range improvements. Under Alternative F, all new structural range developments in occupied GRSG habitat would be avoided. The exception would be if independent peer-reviewed studies show that the range improvement structure benefits GRSG. This would likely lead to the authorization of minimal improvements. Similarly, management actions prohibiting new water development and requiring modification or removal of water developments could limit water sources for livestock. As a result, the ability to distribute livestock effectively would be reduced. Also, a change in grazing systems or permitted use level may be required to maintain GRSG habitat objectives. This could increase time and costs for permittees and lessees.

Impacts from Recreation Management

Impacts under Alternative F would be similar to those described under Alternative B. In addition, seasonal restrictions would be applied to camping and nonmotorized recreation within 4 miles of leks. These restrictions may impose some limitations on permittees' and lessees' ability to access allotments for management.

Impacts from Travel Management

Impacts would be similar to those described under Alternative B. Restrictions on construction of new roads within 4 miles of active leks and to upgrades on existing routes could reduce potential disturbance.

Impacts from Lands and Realty Management

Under Alternative F, GRSG habitat would be an exclusion area for ROW authorizations; PPMA exclusion areas would be as described for Alternative B and PGMA exclusion areas would be the same as described in Alternative C. As a result, impacts on livestock grazing management from development are likely to be reduced across the planning area in the long term compared to Alternative A.

Impacts from Energy and Mineral Development

As described in **Section 4.7.3**, Impacts Common to All Alternatives, the potential for development and related impacts would be minimal for most of the energy and minerals resources. Under Alternative F, impacts from mineral materials would be as described for Alternative B.

4.8 Recreation

4.8.1 Methods and Assumptions

Indicators

Indicators of impacts on recreation are as follows:

- Changes to patterns or levels of visitor use
- Increases in requests for SRPs between March 1 and June 30
- Management actions that result in long-term elimination or reduction of basic recreation and visitor services and resource stewardship needs

Assumptions

The analysis includes the following assumptions:

- The demand for general recreation on BLM-administered and Forest Service-administered lands would continue to increase over the life of the Resource Management Plan and the Land and Resource Management Plan.
- Outdoor recreation will continue to be an important component of the local economy.
- Management actions to preserve GRSG habitat would affect a variety of resources and uses, which would generally improve recreation opportunities and experiences.
- Outside of SRMAs, the BLM will manage for recreation that consists mostly of dispersed activities, where users informally participate in activities individually or in small groups.
- Demand for SRPs will remain steady or gradually increase over time.
- The BLM will continue to issue SRPs on a discretionary basis.

4.8.2 Nature and Type of Effects

This section analyzes potential impacts on recreation resources from proposed management actions of other resources and resource uses. Existing conditions concerning recreation are described in **Section 3.4.5**, Recreation.

Direct impacts on recreation are those that affect opportunity, including the opportunity for access and to engage in specific activities. Indirect impacts are those that alter the physical, social, or administrative settings. Impacts on settings can either be the achievement of a desired setting or the unwanted shift in setting, such as to either a more primitive or urban environment. Physical, social, and administrative settings are not specifically managed for in areas not designated as Recreation Management Areas, although these areas do still provide intrinsic recreation values and opportunities.

The indicator typically used to describe impacts is the availability of opportunities, as described by either acreage restrictions or specific activity prohibitions. This applies to the SRP program, where an indicator of impacts is any change in how and whether SRPs are issued.

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

Implementing management for the following resources would have negligible or no impact on recreation for all alternatives; therefore, they are not discussed in detail:

- Special Status Species – Greater Sage-Grouse
- Vegetation
- Wild horses and burros
- Wildland fire management
- Livestock grazing/range management
- Lands and realty
- Coal
- Leasable minerals
- Locatable minerals
- Mineral materials (salables)
- Nonenergy leasable minerals
- Mineral split-estate
- Special designations
- Air quality and climate change
- Special status plants

4.8.3 Impacts Common to All Alternatives

All alternatives involve controlling major ground disturbances, such as livestock grazing, mining, and ROWs. Due to the limited scale of rockhounding ground disturbing activities, limitations on major surface disturbing activities would not diminish opportunities for rockhounding activities to continue. There would be no impacts on rockhounding.

4.8.4 Alternative A

Impacts from Recreation

Under Alternative A, existing recreation opportunities in the planning area would be maintained over the long term.

Impacts from Travel and Transportation Management

Under Alternative A, existing motorized recreation opportunities in the planning area would be maintained over the long term.

4.8.5 Alternative B

Impacts from Recreation

Restricting issuance of SRPs in PPMA to those activities that have neutral or beneficial impacts on PPMA would likely result in many SRPs being relocated or made subject to conservation measures and seasonal restrictions. This could reduce the types of organized recreation activities allowed via SRPs in PPMA over the long term.

Impacts from Travel and Transportation Management

Limiting motorized travel to existing routes in PPMA and establishing seasonal road closures would reduce the areas available for cross-country motorized exploration in the decision area over the long term. Antler hunters using motorized vehicles would not be able to leave existing routes to search for or retrieve antlers in PPMA. Big game hunters would need to retrieve game by foot or mechanized means (e.g., game carts) instead of using OHVs. Seasonal closures in PPMA would restrict motorized travel on specific roads during the GRSG breeding season.

Limits on road construction in PPMA would result in a long-term reduction in new opportunities for motorized recreation. This could result in localized congestion and user conflicts if motorized travel were to increase in popularity.

4.8.6 Alternative C

Impacts from Recreation

Impacts are the same as those under Alternative A.

Impacts from Travel and Transportation Management

Impacts are the same as those under Alternative A.

4.8.7 Alternative D

Impacts from Recreation

Adding stipulations to SRPs to protect GRSG and their habitat would likely result in many SRPs being relocated or made subject to conservation measures and seasonal restrictions. This would result in a long-term shift in the way SRPs are issued in the planning area. SRPs most likely to be affected are those for wilderness therapy, outdoor education, equestrian events, and organized motor vehicle events. It also includes other activities that occur during spring and summer, when they would need to avoid GRSG nesting and lekking. Hunting outfitters may be less affected because there are fewer sensitive concerns for GRSG during the fall hunting season.

Impacts from Travel and Transportation Management
Impacts are the same as those under Alternative B.

4.8.8 Alternative E

Impacts from Recreation
The BLM would attempt to reduce seasonal disturbances to GRSG and their habitat through a variety of means, including implementing conservation measures, establishing seasonal restrictions, and relocating activities subject to SRPs. This would likely result in limited impacts on recreation because activities would not be prohibited. However, if alternative means of protecting GRSG and their habitat were ineffective, the BLM may implement seasonal closures of roads and areas; this would limit recreation opportunities to other parts of the decision area.

Impacts from Travel and Transportation Management
Restricting motorized use near leks during breeding season (approximately March 1 through July 15) would seasonally limit opportunities for motorized recreation in certain parts of the decision area. Hunting would be largely unaffected because the restrictions would not overlap big game hunting season.

4.8.9 Alternative F

Impacts from Recreation
Impacts from SRP management are the same as those under Alternative B. Seasonally prohibiting camping and other nonmotorized recreation within four miles of a lek would force those activities to be moved elsewhere in the decision area.

Impacts from Travel and Transportation Management
Prohibitions on new road construction and road upgrades in occupied GRSG habitat would result in a long-term reduction in new opportunities for motorized recreation.

4.9 TRAVEL MANAGEMENT

4.9.1 Methods and Assumptions

Indicators
Indicators of impacts on travel management are as follows:

- Change in the types of transportation activities occurring on routes that would impact GRSG or its habitat
- Change in the acreages designated as open, limited, or closed to motorized travel
- Change in the number of acres where new authorized road development would be allowed

Assumptions

The analysis includes the following assumptions:

- The demand for general access to travel routes would continue to increase over the life of the RMP.
- Administration of updated agency travel management policy, rules, and planning and design guidelines will change public land travel systems through planning and design, making them more sustainable and minimizing potential impacts on resources.
- The designation of individual routes is an implementation-level process and is not considered as part of a planning level process.
- Travel management planning can be carried out in conjunction with an RMP process or it can be deferred.
- Travel systems are dynamic and will be changed through subsequent implementation level planning efforts in order to respond to the needs of the BLM multiple-use mission.
- Implementation of a travel management plan includes: increased public education, notification by use of signs, enforcement, resource monitoring in regard to travel management, and the designation of roads, primitive roads, and trails

4.9.2 Nature and Type of Effects

This section discusses impacts on travel and transportation management from proposed BLM management actions. (Existing conditions concerning travel and transportation management are described in **Section 3.4.4**, Travel and Transportation Management.) Travel and transportation management supports and helps achieve the objectives of other resource programs. Consequently, the travel designations would adhere to the management prescriptions included under each alternative, while following the theme of each alternative.

At the resource management planning level, impacts on travel and transportation management are those that restrict travel, such as managing areas as closed or limited to motorized travel and limiting seasonal travel. New travel and transportation management actions in response to GRSG habitat protection strategies would impact the number of acres where motorized travel is allowed.

Travel management decisions impact other resources and uses, such as closing routes or limiting travel to protect sensitive resources. As such, impacts of travel management actions on other resources and uses are discussed in the respective resource sections of this chapter. Impacts on travel and transportation management from other program areas do occur and are considered a part of implementation level transportation management planning.

Implementing management for the following resources would have negligible or no impact on travel management for all alternatives; therefore, they are not discussed in detail:

- Vegetation
- Wild horses and burros
- Wildland fire management
- Livestock grazing/range management
- Recreation
- Lands and realty
- Coal
- Leasable minerals
- Locatable minerals
- Mineral materials (salables)
- Nonenergy leasable minerals
- Mineral split-estate
- Special designations
- Air quality and climate change
- Special status plants

4.9.3 Impacts Common to All Alternatives

Impacts from Travel Management

The BLM will complete a travel management plan within 5 years or as funding allows. Until that time the public may access existing routes as described in **Chapter 3**. The decision to create new routes or close existing routes will occur during the travel management plan stage and will be subject to NEPA analysis.

Routine maintenance is conducted on all roads, routes, and trails. This would continue under all of the alternatives. There would be no impacts on travel management from routine maintenance.

4.9.4 Alternative A

Impacts from Travel Management

Under Alternative A, existing travel opportunities in the planning area would be maintained over the long term. Approximately 6,811,900 acres in the planning area would remain open to unrestricted cross-county motorized travel; approximately 5,325,400 acres would remain limited to existing routes; and approximately 300,300 acres would remain closed to motorized use.

4.9.5 Alternative B

Impacts from Travel Management

A shift in OHV designations would reduce cross-country motorized travel opportunities. Compared to Alternative A, there would be 2,670,400 fewer acres open to cross-country motorized travel and in these areas motorized travel would be limited to existing routes. However, this is not expected to noticeably increase congestion or conflict over the long term. This is because the existing route network is well dispersed throughout the decision area.

There would be no new limits on new road construction in PPMA, meaning the BLM would have more flexibility to respond to any localized congestion and user conflicts if motorized travel were to increase in popularity.

4.9.6 Alternative C

Impacts from Travel Management

Designations of acres open, closed, and limited for motorized travel would be the most restrictive of any alternative. Compared to Alternative A, there would be 5,609,196 fewer acres open to cross-country motorized travel, and motorized travel would be limited to existing routes in these areas. However, this is not expected to noticeably increase congestion or conflict over the long term. This is because the existing route network is well dispersed throughout the decision area.

There would be no new limits on new road construction in PPMA, meaning the BLM would have more flexibility to respond to any localized congestion and user conflicts if motorized travel were to increase in popularity.

4.9.7 Alternative D

Impacts from Travel Management

Impacts are the same as those under Alternative B.

4.9.8 Alternative E

Impacts from Travel Management

Compared to Alternative A, there would be 2,899,200 fewer acres open to cross-country motorized travel. While there would be 25,400 fewer acres closed to motorized travel than under Alternative A, there would also be 2,899,200 fewer acres open to cross-country motorized travel. This would result in more acres where motorized travel is limited to existing routes. This change in motorized travel designations is not expected to noticeably increase congestion or conflict over the long term because the existing route network is well dispersed throughout the decision area.

Prohibiting motorized use within 2 miles of leks during breeding season (approximately March 1 through July 15) would seasonally limit access in certain parts of the decision area. Because the restrictions would be localized and temporary, long-term impacts on travel management would be negligible. Recommending no new development in Core Area habitat where there is evidence of GRSG presence would result in fewer expansions and upgrades to the transportation system in those parts of the decision area. Because the existing route network is well dispersed throughout the decision area, impacts are negligible.

4.9.9 Alternative F

Impacts from Travel Management

Impacts from open, closed, and limited designations for motorized travel would be the same as under Alternative B. Prohibiting new road construction within 4 miles of active GRSG leks could result in localized congestion and user conflicts if motorized travel were to increase in popularity.

4.10 LANDS AND REALTY

BLM-administered lands are used for a variety of purposes. Major focus areas for the lands and realty program include land use authorizations, land tenure adjustments, and land withdrawals.

This section discusses impacts on lands and realty from proposed management actions of other resources and resource uses. Existing conditions concerning lands and realty are described in **Section 3.10**.

4.10.1 Methods and Assumptions

Indicators

Indicators of impacts on lands and realty are as follows:

- Acres of surface ownership, which includes federal surface with private minerals, in the planning area

- Acres of surface ownership affected by ROW restrictions (e.g., avoidance or exclusion areas)
- Number and type of land tenure adjustments (i.e., lands identified as suitable for disposal, withdrawal, or acquisition)
- Number and types of surface-disturbing ROWs and leases, including communication sites

Assumptions

The analysis includes the following assumptions:

- Authorized ROWs and communication sites would be managed to protect valid existing rights, as long as those ROWs are in compliance with the terms and conditions of their grant.
- On renewal, assignment, or amendment of existing ROWs, permits, and leases, additional stipulations could be included in the land use authorization.
- Activities on dispersed private parcels within the planning area would continue to require new or upgraded services for small distribution facilities, including communication sites, roads, and utilities.
- Power lines and other vertical structures located in areas naturally devoid of perching opportunities provide a perch for raptors and subsequently increase the potential for GRSG to abandon leks (Ellis 1984). Mitigation in the form of burying lines or including nonperching design features on lines would reduce perching opportunities and subsequent impacts on GRSG (Connelly et al. 2000b).
- The demand for both energy and nonenergy types of ROWs (including communication sites) is anticipated to remain steady or to gradually increase over time.
- Little to no solar energy ROWs are anticipated due to low solar energy potential.
- The number of ROW authorizations related to geothermal energy is anticipated to be less than those for wind.
- Maintaining and upgrading utilities, communication sites, and other ROWs is preferred before the construction of new facilities, but only if the upgrading can be accommodated within or directly adjacent to the existing ROW.
- Demand for small distribution facilities to extend and upgrade services, such as communication sites and utilities, is anticipated to increase as rural development occurs on dispersed private parcels within the planning area.

- The number of ROW applications for new communication and computer technology, such as fiber optic cable, is anticipated to continue to increase.
- Demand for both regional and interstate transmission lines is anticipated to increase as population and urban areas grow and as new energy generation facilities, such as wind, are developed throughout Oregon.
- Collocation of new infrastructure in existing ROWs is preferred over creating a new ROW. The BLM recognizes that collocation does not eliminate the likelihood for new temporary or permanent surface disturbance.
- The BLM would continue to manage all previously withdrawn lands as withdrawn from entry, appropriation, or disposal under the public land laws. Withdrawals would be reviewed as needed and recommended for extensions, modifications, revocations, or terminations. All existing withdrawals initiated by other agencies, such as the Bureau of Reclamation or the Department of Energy, would be continued consistent with existing terms.
- Any lands that become unencumbered by withdrawals or classifications will be managed according to the decisions made in this RMPA. If the RMPA has not identified management prescriptions for these lands, they will be managed in a manner consistent with adjacent or comparable public lands within the decision area. If the unencumbered lands fall within two or more management scenarios where future planning criteria may not be clear, a plan amendment may be required.
- The existing designated ROW corridors within the decision area include the Western Utility Group updates to the Western Regional Corridor Study, Section 368 Energy Policy Act of 2005, and Westwide Energy Corridor Programmatic EIS. All of these are adopted and carried out under BLM IM-2013-118 (dated April 12, 2013). Designated transportation and utility corridors include linear ROWs, such as electric transmission facilities, pipelines, communication lines, and transportation systems.

4.10.2 Nature and Type of Effects

Resources and resource uses affect the lands and realty program by prescribing ROW exclusion and avoidance areas and stipulations in order to protect resources. A ROW exclusion area is one that is not available for a new ROW under any conditions. In ROW avoidance areas, ROW applications could be submitted, but a project proposed in these areas would be subject to additional requirements. Examples of the additional requirements are resource surveys and reports, construction and reclamation engineering, long-term monitoring, special design features, special siting requirements, timing limitations, and rerouting. Such requirements could restrict project location, delay availability, limit future access, or increase the cost of energy supply or communications service availability (by delaying or restricting construction of pipelines, transmission lines, communication infrastructure, or renewable energy projects). As a result of special surveys and reports, alternative routes may need to be identified and selected to protect sensitive resources, such as GRSG habitat.

Unless specific management is proposed for renewable energy ROWs, the management of GRSG habitat as ROW exclusion and avoidance areas would decrease the BLM's ability to accommodate new wind and solar energy development. Since much of Oregon's wind energy resource potential is in GRSG habitat (NREL 2009a), ROW restrictions would decrease wind energy development potential statewide. Impacts on industrial-scale solar energy development would be less than on wind due to lower solar energy potential in the planning area (NREL 2005).

Collocating transmission and mineral development infrastructure in existing ROWs and disturbed areas reduces land use conflicts and additional land disturbance. Collocation policies also clarify the preferred locations for utilities and simplify processing on BLM-administered lands. However, collocating can limit options for mineral development and selection of more preferable locations for ROWs. In addition, collocation may not always be feasible, such as in the situation where the safety clearances needed by previously constructed energy transmission infrastructure are such that no further room is available within the footprint of the existing ROW.

Resource management planning can involve closing areas to motorized or mechanized travel and limiting the construction of new routes. Travel management planning can result in more specific route closures, seasonal restrictions, and travel mode limitations. Area closures and limitations on new route construction would make certain areas impractical for some types of land uses, such as transmission lines or communication sites, where access is necessary to serve the land use.

Land tenure and landownership adjustments are intended to maintain or improve the efficiency of BLM management, including management of GRSG habitat. Land tenure adjustments can result in a more contiguous decision area, thus increasing the efficiency of BLM management. However, while consolidation would be beneficial for certain resources and uses, it would not necessarily reduce effects on GRSG habitat.

Implementing management for the following resources would have negligible or no impact on lands and realty for all alternatives; therefore, they are not discussed in detail:

- Vegetation

- Wild horses and burros
- Wildland fire management
- Livestock grazing/range management
- Coal
- Leasable minerals
- Locatable minerals
- Mineral materials (salables)
- Nonenergy leasable minerals
- Mineral split-estate

4.10.3 Impacts Common to All Alternatives

Impacts from Recreation

Under all alternatives, BLM management goals and objectives would continue to preserve a desired setting and recreation experience for users within special recreation management areas (SRMAs). Land uses in SRMAs and developed recreation sites should not conflict with recreation uses. Under all alternatives, the BLM would continue to evaluate land use authorizations on a case-by-case basis in the special recreation areas and near recreation sites, so as to avoid conflicting uses.

4.10.4 Alternative A

Impacts from Special Status Species—Greater Sage-Grouse Management

Existing land use plans do not contain GRSG management actions; therefore, there would be no impacts on lands and realty under Alternative A from GRSG management.

Impacts from Travel Management

Under Alternative A, existing transportation routes would continue to provide motorized access to ROW infrastructure and communication sites for construction and maintenance. Refer to **Section 4.9**, Travel Management, for further analysis.

Impacts from Lands and Realty

Land Use Authorizations

Under Alternative A, 3,445,700 acres in the planning area would continue to be managed as ROW avoidance areas, and 857,600 acres would continue to be designated as ROW exclusion. Within exclusion areas, new ROW development would continue to be prohibited, which would prevent the lands and realty program from approving new applications within these areas. Within avoidance areas, the BLM would require ROW applicants to adhere to special conditions, such as siting criteria and design requirements. These requirements would discourage new ROW development in avoidance areas. All other lands within the planning area would continue to be open for ROW development. Alternative A would allow the BLM to accommodate future demand for ROW development within the planning area over the long term.

BLM-administered lands would continue to be available for multiple-use and single-use communication sites, utilities, and road access ROW authorizations on a case-by-case basis (Title V of FLPMA and 43 CFR, Part 2800). All ROW applications would be reviewed using the criteria of collocating new ROWs within or next to existing ROWs wherever practical to avoid the proliferation of separate ROWs.

Therefore, there would be little to no short- or long-term impacts on ROW development under Alternative A.

Land Tenure

Under Alternative A, the BLM would continue to manage 12,618,000 surface acres in the planning area. This includes 9,170,900 acres in Zone I (areas with high resource values and identified for retention); 3,299,200 acres in Zone II (areas with moderate resource value and areas identified for retention or possible exchange); and 138,800 acres in Zone III (areas identified for possible disposal due to lesser resource values or scattered ownership). Land tenure management under Alternative A would allow the BLM to dispose of lands as necessary to improve management efficiency. Land tenure adjustments would continue to be subject to the disposal and acquisition criteria in the existing resource management plans.

Withdrawals

There would continue to be 550,100 acres of land withdrawals in the planning area.

Impacts from Special Designations

Under Alternative A, 715,049 acres would be managed as ACECs. Those applying for ROWs proposed within ACECs could experience longer processing times, stipulations on available development locations, and additional design standards. Refer to **Section 4.12**, Special Designations, for further analysis.

4.10.5 Alternative B

Impacts from Special Status Species—Greater Sage-Grouse Management

Management actions under Alternative B to protect GRSG habitat would impact the lands and realty program. Primary impacts under Alternative B would result from the designation of additional ROW exclusion areas, compared to Alternative A. In exclusion areas, the BLM would be prohibited from approving new ROW development. In avoidance areas, development would be allowed only if certain siting and design requirements could be met. ROW restrictions under Alternative B would substantially reduce the ability of the BLM to accommodate demand for the following:

- Interstate and intrastate gas pipelines and electric transmission lines
- Wind and solar energy development
- Fiber optic lines
- Communication sites
- Local electric distribution and fiber optic/cable lines
- Residential and farm access ROWs

Impacts from Travel Management

Alternative B would limit motorized travel to existing roads and trails in PPMAs (4,498,600 acres) and PGMAs (2,576,800 acres). This could result in additional time of use or vehicle restrictions on certain routes. The BLM would continue to manage 48,500 acres in PPMAs and 143,600 acres in PGMAs as closed to motorized travel. Restrictions on travel access could complicate maintenance on existing ROW infrastructure during certain times of the year. Restrictions also could discourage ROW development where access would be limited. Any restrictions would be subject to valid existing rights. The Lands and Realty program could see an increase in ROW applications with road closures. Refer to **Section 4.9**, Travel Management, for further analysis.

Impacts from Lands and Realty Management

Land Use Authorizations

Under Alternative B, PPMAs (4,547,000 acres) would be designated as ROW exclusion. The BLM would not authorize new ROWs in PPMAs unless the infrastructure could be located entirely within an existing ROW footprint. Additionally, PGMAs (5,662,600 acres) would be designated as ROW avoidance areas. As noted in **Section 4.10.2**, Nature and Types of Effects, managing GRSG habitat as ROW exclusion would prevent the BLM from accommodating new ROW development in those areas.

There is a continuing demand for new ROWs in the planning area, including major interstate and intrastate electrical transmission, gas pipelines, industrial-scale wind energy development, and communication ROWs. Because of restrictions on BLM-administered lands, developments would be diverted to adjacent nonfederal lands or they would be prevented altogether. Development on adjacent lands could result in long-term direct and indirect impacts on the BLM Lands and Realty program (e.g., increased interest in collocating infrastructure in existing ROWs crossing BLM-administered lands). This would be the case especially if the development were close to GRSG habitat on BLM-administered lands. If new linear ROW development, particularly interstate electrical transmission, fiber optic, and gas pipelines, could not be feasibly developed due to ROW exclusions on BLM-administered lands in the planning area, then energy and communication developers would need to seek alternative routes or technologies.

Within avoidance areas, the BLM would continue to process ROW applications but would apply supplemental design criteria or siting limitations to any new ROW authorizations in these areas. Conditions on new ROW authorizations in avoidance areas would decrease the amount of future ROW development. Conditions and limitations on ROWs in PPMA and PGMA could result in an increase in trespass.

Additionally, under Alternative B, the BLM would take advantage of opportunities to remove, bury, or modify existing power lines. Limitations on new ROWs and aboveground linear features, such as transmission lines and pipelines, could restrict energy or service availability and reliability for communication systems.

Land Tenure

Under Alternative B, the BLM would designate 10,220,400 acres as Zone I, or lands identified for retention. Retention lands in PPMAs would increase by 1,049,500 acres, compared to Alternative A. The BLM would retain ownership of public land in GRSG habitat, except where land exchanges would result in more contiguous federal ownership patterns or where disposal accompanied by a habitat mitigation agreement or conservation easement would result in more effective management of GRSG habitat. Impacts would be consistent with those described in **Section 4.10.2**.

Withdrawals

Under Alternative B, the BLM would not recommend land withdrawals for reasons other than mineral activity. Impacts on mineral development are described in Section 4.11, Minerals.

Impacts from Special Designations

Impacts from ACECs on lands and realty are the same as those for Alternative A.

4.10.6 Alternative C

Impacts from Special Status Species—Greater Sage-Grouse Management

Management actions under Alternative C to protect GRSG habitat would impact lands and realty through the designation of all PPMAs and PGMAs (10,682,100 acres) as ROW exclusion. Compared to Alternative A, Alternative C would result in a 1,100 percent (9,824,600-acre) increase in ROW exclusion area. It would entail the most ROW restrictions of any alternative, preventing the BLM from accommodating demand for new transmission lines, gas pipelines, communication sites, wind energy facilities, and other types of ROWs. Additional management prescriptions for land tenure and road construction would further constrain BLM lands and realty program functions in GRSG habitat.

Impacts from Travel Management

Impacts from travel and transportation management under Alternative C are the same as those under Alternative A. Refer to **Section 4.9**, Travel and Transportation Management, for further analysis.

Impacts from Lands and Realty Management

Land Use Authorizations

Under Alternative C, 10,682,100 acres in the planning area would be designated as ROW exclusion area. The BLM would not authorize new ROWs in PPMAs or PGMAs unless the infrastructure could be located in an existing ROW. Alternative C would eliminate opportunities for communication facilities, gas pipelines, fiber optic cables, electrical transmission lines, access roads, wind and solar energy production facilities, and similar ROW development in GRSG habitat. There is a continuing demand for many of these ROWs in the planning area to meet energy and communication needs within and outside the planning area. Alternative C would reduce or eliminate the ability of the BLM lands and realty program to meet those needs. An indirect long-term effect could be an increase in trespass.

Designation of all GRSG habitat as exclusion for wind and solar energy ROWs would eliminate the BLM's ability to accommodate new renewable energy development in the planning area. It would hinder the BLM's ability to meet President Obama's energy goal of 10 gigawatts of new renewable energy permitted on DOI lands by 2020 (The White House 2013). ROW exclusions would also inhibit wind energy development on adjacent nonfederal land where transmission infrastructure would be needed across BLM-administered lands.

Land Tenure

Under Alternative C, all PPMAs and PGMAs would be designated as Zone I; therefore, the BLM would retain public ownership of 11,757,100 acres in GRSG habitat with no exceptions. While land tenure management under Alternative C would improve management of GRSG habitat, it would prevent the BLM from disposing of lands (e.g., isolated parcels) to improve management efficiency. Designating land as Zone 1 also eliminates the ability to resolve any trespass on such land by means of a sale by the BLM of the affected land. Impacts would be consistent with those described in **Section 4.10.2**.

Withdrawals

Impacts on lands and realty from land withdrawals are the same as under Alternative A.

Impacts from Special Designations

Under Alternative C, the BLM would manage all PPMAs as new ACECs, equivalent to 4,547,000 acres. Management for the ACECs would be tailored to protect the relevant and important values (i.e., GRSG habitat) for which the ACECs would be designated. Since BLM management for lands and realty under Alternative C would exclude ROW development in PPMAs and PGMAs, the designation of PPMAs as ACECs would not add further ROW restrictions. Under Alternative C, infrastructure development and other ROWs would be directed to adjacent BLM-administered lands or to private lands, resulting in an overall reduction in new land use authorizations. New land use authorizations would be further reduced if ROW applicants could not find suitable alternative development locations outside ACECs. Refer to **Section 4.12**, Special Designations, for further analysis.

4.10.7 Alternative D

Impacts from Special Status Species—Greater Sage-Grouse Management

Management proposed under Alternative D would enable the BLM to accommodate ROW development in PGMAs. It would allow opportunities for new ROWs in PPMAs subject to avoidance criteria. Although the BLM would consider new applications for ROWs in avoidance areas, a 200 percent increase in avoidance areas, when compared to Alternative A, would limit the BLM's ability to grant certain ROWs. This would reduce the total number of ROWs authorized in GRSG habitat over the long term.

Impacts from Travel Management

Impacts from travel and transportation management under Alternative D are the same as those under Alternative B. Refer to **Section 4.9**, Travel Management, for further analysis.

Impacts from Lands and Realty Management

Land Use Authorizations

ROW exclusion areas in PPMAs and PGMAs under Alternative D would be the same as under Alternative A. In PPMAs, 4,289,900 acres, including areas within existing corridors, would be managed as ROW avoidance for all ROW types unless new disturbance falls under the 3 percent disturbance cap or as a result of mitigation results in no net loss of GRSG habitat. Examples of mitigation include burying electrical transmission lines and revegetating a decommissioned roadway. While burying an electrical transmission line creates short-term surface disturbance, the long-term direct (e.g. surface disturbance) and indirect (e.g. vehicle use on adjacent roads for maintenance) effects of a buried line on GRSG habitat and populations are less compared with impacts from an overhead line.

ROW avoidance areas in PGMAs would be the same as under Alternative A.

Alternative D would directly impact the lands and realty program by reducing the BLM's ability to authorize new ROWs in PPMAs that would not be able to meet specified criteria (e.g. the 3 percent disturbance cap threshold). Within avoidance areas, additional stipulations for the development of electrical transmission lines could result in the denial of projects that cannot meet ROW grant requirements for the protection of GRSG habitat. Limitations on electrical transmission line development and new roadways under Alternative D would be similar to Alternative C and would be consistent with **Section 4.10.2**.

Impacts on other types of ROWs, such as communication sites, fiber optic lines, gas pipelines, wind and solar energy generation facilities, and water infrastructure, would result only in the following cases:

- When a ROW applicant could not find a suitable location outside avoidance or exclusion areas
- When a ROW applicant could not meet the ROW grant requirements if proposed within avoidance areas

For communication facilities, stipulations in avoidance areas could diminish the effectiveness of the communication infrastructure to the point where the development would not be practical. This would result in a direct impact on that type of infrastructure development and would reduce overall communication services. Reducing overall communication services could also have an adverse impact on public health and safety.

Land Tenure
Management and associated impacts would be the same as Alternative B.

Withdrawals
There would be no impacts from withdrawals under Alternative D.

Impacts from Special Designations Management
Management and associated impacts would be the same as Alternative A.

4.10.8 Alternative E

Impacts from Special Status Species—Greater Sage-Grouse Management
Impacts on lands and realty under Alternative E from management actions to protect GRSG are the same as Alternative B.

Impacts from Travel Management
Impacts from travel and transportation management under Alternative E are the same as Alternative B, except Alternative E provides more spatial definition of seasonal road closures. Specifically, roads within 2 miles of an active lek would be subject to seasonal closures. Seasonal limitations on access in the 2-mile lek buffer areas would make certain ROW development impractical in those areas. This would reduce new ROW development in or next to buffer areas. Any

restrictions would be subject to valid existing rights. Refer to **Section 4.9**, Travel and Transportation Management, for further analysis.

Impacts from Lands and Realty Management

Land Use Authorizations

Under Alternative E, Core Area habitat (4,547,000 acres) would be designated as ROW exclusion. New infrastructure would be prohibited in Core Area habitat unless the infrastructure could be collocated in an existing ROW. Limitations on new infrastructure outside existing ROWs and ROW stipulations for avoidance areas would prevent the BLM from accommodating additional demand for ROW development within GRSG habitat. With the expected demand for new ROWs in the planning area, particularly interstate and intrastate electrical transmission lines, wind energy facilities, and gas pipelines, new ROW development could be diverted to adjacent nonfederal lands, increasing sagebrush cover loss and habitat fragmentation on nonfederal land within GRSG habitat. The BLM Lands and Realty program would be indirectly impacted by ROW congestion from collocation of ROWs on BLM-administered lands. If new ROW development could not be feasibly developed, there would be a reduction in energy and communication development opportunities needed to meet growing demand.

Land Tenure/Landownership

Management and associated impacts would be the same as Alternative A.

Withdrawals

Management and associated impacts would be the same as Alternative A.

Impacts from Special Designations Management

Management and associated impacts would be the same as Alternative A.

4.10.9 Alternative F

Impacts from Special Status Species—Greater Sage-Grouse Management

Management actions under Alternative F to protect GRSG habitat would be similar to Alternative B and consistent with **Section 4.10.2**. ROW exclusion areas under Alternative F would restrict the BLM from accommodating demand for new transmission lines, gas pipelines, communication sites, wind energy facilities, and other types of ROWs. This could result in ROW applications being denied. With the expected ongoing demand for new ROWs in the planning area, particularly interstate and intrastate electrical transmission and gas pipeline ROW developments, new ROW development could be diverted to adjacent nonfederal lands. If new ROW development could not be feasibly developed, there would be a reduction in energy and communication development opportunities needed to meet growing demand.

Impacts from Travel Management

Impacts from travel and transportation management under Alternative F are similar to Alternative B, except that Alternative F prohibits new road construction within 4 miles of active GRSG leks and avoids any new construction within occupied habitat. Limitations on new road construction within GRSG habitat would make certain ROW development (e.g. communication sites, pipelines, and transmission lines) impractical. This would reduce new ROW development in GRSG habitat. Any restrictions would be subject to valid existing rights and travel management planning would be subject to NEPA. Refer to **Section 4.9**, Travel Management, for further analysis.

Impacts from Lands and Realty Management

Impacts under Alternative F are similar to Alternative C, except that wind energy development would be prohibited within 5 miles of active leks. In areas where the 5 mile lek buffer would extend beyond GRSG habitat areas, ROW exclusion for wind and the associated impacts described under Alternative C would apply to non-habitat areas. The result of management actions under Alternative F would be an overall decline in energy or service availability and reliability over the long-term, compared to Alternative A.

Restrictions on wind energy development would hinder the BLM's ability to meet President Obama's renewable energy goal of 10 gigawatts of new renewable energy permitted on DOI lands by 2020 (The White House 2013). With demand for new ROWs, including wind energy developments, expected to continue and increase, new ROW development would be diverted to adjacent nonfederal lands resulting in indirect impacts on BLM-administered lands (e.g. ROW congestion from collocation of ROWs on BLM-administered lands), or would not occur at all.

Land Tenure/Landownership

Management and associated impacts would be the same as Alternative B.

Withdrawals

Management and associated impacts would be the same as Alternative B.

Impacts from Special Designations Management

Under Alternative F, the BLM would manage 4,755,200 acres as 17 new ACECs, including 2,760,800 acres in PPMAs and 1,492,800 acres in PGMAs. Management for the new ACECs would be tailored to protect the relevant and important values (i.e., GRSG habitat) for which the ACECs would be designated. All lands within the ACECs would be managed as ROW exclusion, which would prohibit new ROW development in those areas. Under Alternative F, infrastructure development and other ROWs would be directed to adjacent BLM-administered lands or to private lands. Alternative F would result in an overall reduction in new land use authorizations. New land use authorizations would be further reduced if ROW applicants were not able to find suitable alternative development locations outside ACECs. Any restrictions would be subject to valid existing rights. Refer to **Section 4.12**, Special Designations, for further analysis.

4.11 Fluid Leasable Minerals

4.11.1 Methods and Assumptions

Indicators

Indicators of impacts on fluid leasable minerals are as follows:

- The amount of unleased land identified as closed to fluid mineral exploration and development
- The amount of land open to leasing subject to NSO stipulations
- The amount of land open to leasing subject to CSU or TL stipulations
- Application of COAs on fluid mineral development on leased parcels for the protection of GRSG
- Restrictions on geophysical exploration in GRSG habitat
- The amount of land managed as ROW avoidance areas
- The amount of land managed as ROW exclusion areas

Assumptions

The analysis includes the following assumptions:

- Existing fluid mineral leases would not be affected by the closures proposed under this RMPA.
- Fluid mineral operations on existing federal leases, regardless of surface ownership, would be subject to COAs by the authorizing officer. The BLM can deny surface occupancy on portions of leases with COAs to avoid or minimize resource conflicts if this action does not eliminate reasonable opportunities to develop the lease or does not affect lease rights.
- Existing leases would be managed under the stipulations in effect when the leases were issued; new stipulations proposed under this RMPA would apply only to new leases. (See the glossary for definitions of stipulations versus COAs.)
- New information may lead to changes in delineated GRSG habitat. New habitat areas, or areas that are no longer habitat, may be identified. This adjustment would typically result in small changes to areas requiring the stipulations or management actions stated in this plan. Existing leases in these areas would not be subject to the new stipulations but could be subject to RDFs. Modifications to GRSG habitat would be updated in the data inventory through plan

maintenance. In areas that are no longer habitat, the waiver/exception/modification process would be used to remove stipulations or management actions that were no longer needed.

- If an area is leased, it could be developed; however, not all leases would be developed within the life of this RMPA.
- As the demand for energy increases, so will the demand for extracting energy resources in areas with potential.
- Technological advancements, such as directional drilling, could lead to changes in levels of fluid mineral development potential throughout the planning area, as additional resources become more easily accessible.
- Stipulations also apply to fluid mineral leasing on lands overlying federal mineral estate. This includes federal mineral estate underlying BLM-administered lands and lands not administered by the BLM. There are 15,257,000 acres of federal mineral estate within the decision area (12,618,000 acres of BLM-administered surface with federal minerals and 2,639,000 acres of private, state, or other federal surface with federal minerals).
- Oregon is considered a "pioneering" area for oil and gas resources. This means that development is not likely to occur in the planning area until the market for these resources changes. No wells have been developed in the planning area, and the current decline in oil and gas leases in Oregon is expected to continue in the near future.
- The 2008 Programmatic EIS for Geothermal Leasing in the Western United States estimated that Oregon would have 1,090 megawatts of geothermal development by 2025.
- Geothermal resource exploration and development in Oregon will continue to rise, particularly with the introduction of new technologies, such as engineered and enhanced geothermal systems.

4.11.2 Nature and Type of Effects

The following analysis describes the nature and type of impacts that could affect fluid minerals in the Oregon planning area. Details on how the occurrence of each impact would vary by alternative are described under the various subheadings.

Closing unleased areas within GRSG habitat to fluid mineral leasing would directly impact the fluid minerals program by removing the possibility of fluid mineral resources in that area to be accessed and extracted or used. Fluid mineral operations may move to nearby private lands if similar geologic conditions exist, thereby reducing the number of operations on federal mineral estate. Existing leases within areas closed to leasing would remain valid through their term but could not be renewed. Once these leases expire, the fluid minerals covered by them could not be developed.

Existing oil and gas leases in the Oregon planning area are likely to expire before being developed. However, oil and gas resources in the planning area are unlikely to be developed even in areas open to fluid mineral development. This is due to the lack of anticipated future demand for oil and gas resources in the planning area in the near future.

Unlike oil and gas trends, interest in geothermal resources in the decision area has increased in recent years. Geothermal exploration for commercial production is expected on lands within the planning area over the next 10 to 15 years. Therefore, existing geothermal leases are more likely to be developed within their lease terms than existing oil and gas leases. Additionally, closures or stipulations in unleased areas would have a greater impact on geothermal development than on oil and gas or other fluid mineral development. See **Section 3.11.1**, Trends – Fluid Leasable Minerals, for more information on fluid mineral trends in the planning area.

Management actions that prohibit or restrict surface occupancy or disturbance overlying federal fluid mineral resources would also directly impact the development of those resources by restricting the availability of mineral resources to be developed or extracted. Examples of these management actions are TLs, NSO and CSU stipulations, and limitations on the total amount of surface disturbance in areas (such as the 3 percent disturbance cap). Surface-disturbing activities could be shifted, additional protective measures would be required, and extraction delays could occur.

Applying the 3 percent cumulative disturbance cap would directly impact fluid minerals by limiting the amount of disturbance from various activities, including fluid mineral development. If total disturbance in GRSG habitat reached 3 percent, no additional disturbance from fluid mineral activities could occur. Because fluid mineral exploration and development involves surface disturbance, new exploration and development would essentially be shut down once the 3 percent cap was reached.

In areas where NSO stipulations are applied, federal fluid minerals could be leased; however, the leaseholder/operator would have to use off-site methods, such as directional drilling, to access the mineral resource. The area where directional drilling could be effectively used is limited. This means that some minerals would be inaccessible in areas where an NSO stipulation covers a large area or where no leasing is allowed on surrounding lands. Additionally, because it is not feasible to use directional drilling for wildcat wells, an NSO stipulation would preclude drilling of such wells. Because the Oregon planning area is a pioneering area, where precise locations of fluid mineral resources are unknown, wildcat wells are necessary to identify resource areas. Therefore, applying an NSO stipulation to GRSG habitat in the planning area would effectively preclude development of fluid mineral resources in that habitat.

Applying CSU stipulations allows some use and occupancy of the surface. While less restrictive than an NSO stipulation, a CSU stipulation allows the BLM the following actions:

- To require special operational constraints
- To shift the surface-disturbing activity associated with fluid mineral leasing more than the standard 200 meters (656 feet)
- To require additional protective measures (e.g., restrictions on noise levels) to protect GRSG

For example, a CSU stipulation might apply limitations on noise levels during certain times of day. While not prohibiting surface-disturbing activities, a CSU stipulation can influence the location and level of operations within the subject area.

TL stipulations may be necessary to protect GRSG from impacts of development. These stipulations are necessary if impacts cannot be mitigated within the standard 60-day suspension of operation period afforded by regulation. Areas where TL stipulations are applied would be temporarily closed to fluid mineral exploration and development, surface-disturbing activities, and intensive human activity during identified time frames based on seasons or GRSG breeding times. Some operations would be allowed at all times (e.g., vehicle travel and maintenance); however, construction, drilling, completions, and other operations considered to be intensive would not be allowed during the restricted time frame. Most activities, however, could be initiated and completed outside of the restricted dates specified in the TL stipulation.

Applying COAs to existing leases would directly impact fluid mineral operations. This includes RDFs and conservation measures outlined in **Chapter 2**. These RDFs and conservation measures also include such standards as noise restrictions, height limitations on structures, design requirements, water development standards, and remote monitoring requirements. Additional site-specific planning (i.e., master development plans and unitization) may also be included.

Applying all of these requirements through COAs would impact fluid mineral operations by restricting the development or extraction of mineral resources. To avoid these restrictions, operators may relocate to nearby state or private lands (where resources, geology, and topography permit), thereby decreasing the number of oil, gas, and geothermal operations on federal mineral estate.

Placing limits on geophysical exploration would reduce the availability of data on fluid mineral resources on federal mineral estate. Because there is little existing data on fluid mineral resources in the decision area, the development potential for oil, gas, and geothermal resources in areas where geophysical exploration was limited could remain unknown. Timing limitations on geophysical exploration could also lead to extraction and utilization delays.

Buying out or cancelling leases in GRSG habitat would prevent future development of existing fluid mineral leases. However, in accordance with 43 CFR, Part 3108.3, leases may only be cancelled by the Secretary of the Interior when (1) the lessee has a nonproducing well and fails to comply with the provisions of the law, regulations, or lease; or (2) the lease was improperly issued. Cancellation of a lease with a producing well requires a judicial proceeding.

Management actions creating ROW exclusion or avoidance areas would indirectly impact fluid mineral extraction by limiting the available means for transporting fluid minerals to processing facilities and markets, for oil and gas, or for transmitting produced geothermal-sourced electricity to the power grid. For example, new natural gas pipelines could not be built in a ROW exclusion area. Oil, gas, and geothermal operations may be moved to nearby private lands where transport and transmission is easier, thereby reducing the number of operations on federal mineral estate. Because ROW avoidance areas would allow for limited ROW development, impacts of avoidance areas would be less severe than those of ROW exclusion areas. Impacts would be mitigated where exceptions were allowed for collocation of new ROWs within existing ROWs to satisfy valid existing rights. Existing leases in areas managed as ROW avoidance or exclusion would also be impacted, as described above.

Closing areas to mineral material disposal would indirectly impact fluid minerals in the areas by reducing the amount of readily available material for road and pipeline construction. This would limit the available means for accessing fluid mineral resources and transporting those resources to processing facilities and markets.

Implementing management for the following resources to protect GRSG would have negligible or no impact on mineral resources under all alternatives; therefore, they not discussed in detail:

- Vegetation
- Wild horses and burros
- Wildland fire management
- Livestock grazing/range management
- Recreation
- Travel management
- Coal

- Locatable minerals
- Nonenergy leasable minerals
- Special designations
- Air quality and climate change
- Special status plants

4.11.3 Impacts Common to All Alternatives

Impacts from Leasable Minerals Management

Under all alternatives, reclamation bonds would be required, pursuant to 43 CFR, Part 3104. The amount of the bond would need to be sufficient to ensure full restoration of lands to the condition in which they were found. In addition, applications for permits to drill, including drilling plans and surface use plans of operations, would be required under all alternatives, in accordance with 43 CFR, Part 3162.

4.11.4 Alternative A

Impacts from Lands and Realty Management

Under Alternative A, 857,600 acres (7 percent of BLM-administered surface in the decision area) would continue to be managed as ROW exclusion areas. Another 3,445,700 acres (27 percent of BLM-administered surface in the decision area) would continue to be managed as ROW avoidance areas. This management would continue to impact the fluid minerals program as described under **Section 4.11.2**, Nature and Type of Effects.

Impacts from Leasable Minerals Management

Under Alternative A, fluid mineral resources in the planning area would continue to be managed according to any closures, stipulations, or BMPs in the governing RMPs.

Table 4-45, Fluid Mineral Leasing Categories in the Decision Area, Alternative A, breaks down the acres within the decision area by whether they would be open or closed to leasing and what stipulations would be applied.

Table 4-45
Fluid Mineral Leasing Categories in the Decision Area, Alternative A

Leasing Category	Acres
Closed to Leasing	3,134,200
Leased	*0*
Unleased	*3,134,200*
Open Subject to NSO Stipulations	906,000
Leased	*10,600*
Unleased	*895,400*

Table 4-45
Fluid Mineral Leasing Categories in the Decision Area, Alternative A

Leasing Category	Acres
Open Subject to CSU/TL Stipulations	2,703,000
Leased	*114,900*
Unleased	*2,588,100*
Open Subject to Standard Terms and Conditions	8,513,900
Leased	*34,200*
Unleased	*8,479,700*

Source: Oregon/Washington BLM. 2013.

Under Alternative A, 3,134,200 acres (21 percent) of federal mineral estate within the decision area would remain closed to fluid mineral leasing. All of these acres are unleased. Impacts of closing these areas would be the same type as those described under **Section 4.11.2**. Actions applicable to unleased acres have a greater impact on the fluid minerals program than actions applicable to leased acres because existing leases would not be subject to new stipulations or closures unless the leases expired and were reissued. An additional 906,000 acres (6 percent) of federal mineral estate in the decision area would remain subject to NSO stipulations. Of the acres subject to NSO stipulations, 895,400 acres (99 percent) are unleased.

Geophysical exploration would continue to be allowed throughout the planning area under Alternative A. Existing leases would continue to be subject to any stipulations or COAs that applied at the time the lease was issued.

Impacts from Mineral Materials (Salables) Management

Approximately 11,665,000 acres (76 percent) of federal mineral estate within the decision area would remain open to mineral material disposal under Alternative A. Approximately 2,752,500 acres (18 percent) of federal mineral estate within the decision area would remain closed to mineral material disposal. Closing these areas to mineral material disposal would indirectly impact fluid minerals as described under **Section 4.11.2**.

4.11.5 Alternative B

Impacts from Lands and Realty Management

Under Alternative B, all BLM-administered surface in PPMAs (totaling 4,547,000 acres, or approximately 36 percent of BLM-administered surface in the decision area) would be managed as ROW exclusion areas. However, because all PPMAs would be closed to fluid mineral leasing under Alternative B, managing PPMAs as ROW exclusion areas would have no impact on fluid minerals.

All BLM-administered surface in PGMAs (totaling 5,662,600 acres, or 45 percent of BLM-administered surface in the decision area) would be managed as ROW avoidance under Alternative B. Fluid minerals beneath those acres would be impacted by the ROW avoidance area, as described under **Section 4.11.2**. Approximately 288,200 acres in PGMAs would have been managed as ROW exclusion under Alternative A but would be managed as ROW avoidance under Alternative B. While management of these 288,200 acres would be less restrictive under Alternative B than under Alternative A, overall, more acres would be managed as ROW avoidance under Alternative B than under Alternative A; therefore, impacts on the fluid minerals program from these ROW avoidance areas would increase under Alternative B.

Impacts from Leasable Minerals Management

Under Alternative B, 6,762,920 acres (44 percent of the federal mineral estate decision area), including all federal mineral estate within PPMAs would be closed to fluid mineral leasing. All acres closed would be unleased; therefore this management would close 54 percent of the 12,408,200 unleased acres in the decision area. Closure of these acres would directly impact the fluid minerals program in the manner described under **Section 4.11.2**. Because twice as many unleased acres in the federal mineral estate decision area would be closed under Alternative B as under Alternative A, impacts would increase compared with Alternative A.

The 5,732,500 acres of federal mineral estate within PGMAs (38 percent of the federal mineral estate decision area), as well as all federal mineral estate outside GRSG habitat in the planning area, would be subject to the same stipulations and management as those under Alternative A.

Table 4-46, Fluid Mineral Leasing Categories in the Decision Area, Alternatives B and E, breaks down the acres within the decision area by whether they would be open or closed to leasing and what stipulations would be applied.

A 3 percent disturbance cap would apply to all human activity in GRSG habitat, including fluid mineral activities. If the cap were reached, it would impact fluid minerals as described under *Nature and Type of Effects*, representing an increase in impacts on fluid minerals compared to Alternative A.

Geophysical exploration would be allowed on the 4,756,900 acres of federal mineral estate within PPMAs but would be subject to TLs and other restrictions. Most notably, geophysical exploration within PPMAs would be allowed only for gathering information about fluid mineral resources outside PPMAs. Because of these limitations and the fact that PPMAs would be closed to fluid mineral leasing, geophysical exploration in PPMAs would decrease under this alternative. Decreases in geophysical exploration in PPMAs would impact the fluid minerals program as described under **Section 4.11.2**.

Under Alternative B, conservation measures in addition to RDFs would be applied as COAs to the 10 existing federal leases in PPMAs. These RDFs and

Table 4-46
Fluid Mineral Leasing Categories in the Decision Area, Alternatives B and E

Leasing Category	Acres
Closed to Leasing	6,762,920
Leased	*2,520*
Unleased	*6,760,400*
Open Subject to NSO Stipulations	796,800
Leased	*10,500*
Unleased	*786,300*
Open Subject to CSU/TL Stipulations	2,464,000
Leased	*113,100*
Unleased	*2,350,900*
Open Subject to Standard Terms and Conditions	5,395,700
Leased	*33,600*
Unleased	*5,362,100*

Source: Oregon/Washington BLM. 2013.

conservation measures would include requirements such as surface disturbance limitations, TLs, noise restrictions, structure height limitations, design requirements, water development standards, remote monitoring requirements, and reclamation standards.

Impacts From Mineral Materials (Salables) Management
Under Alternative B, approximately 7,105,500 acres of federal mineral estate in PPMA (47 percent of the federal mineral estate decision area) would be closed to mineral material disposal. However, because all PPMAs would be closed to fluid mineral leasing under this alternative, closing PPMAs to mineral material disposal would not impact fluid minerals.

4.11.6 Alternative C

Impacts from Lands and Realty Management
Under Alternative C, 10,682,100 acres (85 percent of BLM-administered surface in the decision area), including all occupied habitat would be managed as ROW exclusion areas. However, because all occupied habitat would be closed to fluid mineral leasing under Alternative C, managing occupied habitat as ROW exclusion would have no impact on fluid minerals.

Impacts from Leasable Minerals Management
Under Alternative C, 10,895,300 acres (71 percent of the federal mineral estate decision area), including all federal mineral estate within occupied habitat would be closed to fluid mineral leasing. This closure would include 10,892,780 acres (88 percent) of unleased federal mineral estate in the decision area. Closing these acres would directly impact the fluid minerals program in the manner described under **Section 4.11.2**. Because three times as many unleased acres

in the federal mineral estate decision area would be closed under Alternative C as under Alternative A, impacts would increase compared with Alternative A.

Table 4-47, Fluid Mineral Leasing Categories in the Decision Area, Alternatives C and F, breaks down the acres within the decision area by whether they would be open or closed to leasing and what stipulations would be applied.

Table 4-47
Fluid Mineral Leasing Categories in the Decision Area, Alternatives C and F

Leasing Category	Acres
Closed to Leasing	10,895,300
Leased	*2,520*
Unleased	*10,892,780*
Open Subject to NSO Stipulations	791,800
Leased	*10,500*
Unleased	*781,300*
Open Subject to CSU/TL Stipulations	1,249,500
Leased	*113,100*
Unleased	*1,136,400*
Open Subject to Standard Terms and Conditions	2,328,900
Leased	*33,600*
Unleased	*2,295,300*

Source: Oregon/Washington BLM. 2013.

Under Alternative C, geophysical exploration would be prohibited on the 10,489,400 acres of federal mineral estate within occupied habitat. This prohibition would impact fluid minerals, as described under **Section 4.11.2**. Because geophysical exploration would be unrestricted under Alternative A, impacts would increase under Alternative C.

The 50 existing oil and gas leases in GRSG habitat would be subject to TLs with the types of impacts described under **Section 4.11.2**. Because these timing limitations would be more restrictive than the existing limitations applied under Alternative A, impacts would increase under Alternative C. In addition, these existing leases could be amended, canceled, bought out, or required to be relinquished. Impacts of these changes to existing leases would be the same type as those described under **Section 4.11.2**.

Impacts from Mineral Materials (Salables) Management

Under Alternative C, approximately 11,511,900 acres of federal mineral estate (75 percent of federal mineral estate in the decision area, including all occupied habitat) would be closed to mineral material disposal. However, because all occupied habitat would be closed to fluid mineral leasing under Alternative C, closing occupied habitat to mineral material disposal would not impact fluid minerals.

4.11.7 Alternative D

Impacts from Lands and Realty Management

Like Alternative A, under Alternative D 857,600 acres (7 percent) of BLM-administered surface in the decision area would be managed as ROW exclusion areas. A total of 5,964,800 acres (47 percent), including all PPMAs not already managed as exclusion areas, would be managed as ROW avoidance areas. Where these exclusion or avoidance areas overlapped with areas open to fluid mineral leasing, impacts on the fluid minerals program would occur, as described under **Section 4.11.2**. Because 73 percent more acres would be managed as ROW avoidance under Alternative D compared with Alternative A, the magnitude of impacts would increase.

Impacts from Leasable Minerals Management

Under Alternative D, the BLM would apply a buffer system to manage fluid mineral development in GRSG habitat. Under this system, leks would be surrounded by buffers of varying sizes in which NSO stipulations would apply. In addition, CSU and TL stipulations would apply to all areas within occupied habitat that are outside a lek buffer. The CSU stipulations would include noise and tall structure limitations, a site-specific plan of development to limit habitat fragmentation and, in PPMAs, a three percent disturbance limit and 640-acre spacing requirements. The stipulations that would apply can be summarized as follows:

- Within PPMA, apply a 4-mile NSO buffer from active leks.
- Within PPMA, beyond 4 miles of active leks, apply CSU/TL stipulations.
- Within PGMA, apply a 1-mile NSO buffer from active leks.
- Within PGMA, beyond 1 mile of active leks, apply CSU/TL stipulations.
- Where the 4-mile lek buffer extends outside PPMA to PGMA, apply CSU stipulations.

Application of these surface-disturbance restrictions, TLs, and other operating standards would limit the siting, design, and operations of fluid mineral development projects. This would impact the fluid minerals program in the manner described under **Section 4.11.2**. Because these restrictions and standards would be applied throughout occupied habitat under Alternative D, the magnitude of the impacts would increase, compared with Alternative A. The BLM would also close areas of split-estate under Alternative D to correspond with areas of federal mineral estate beneath BLM-administered surface that would be closed under this alternative.

Table 4-48, Fluid Mineral Leasing Categories in the Decision Area, Alternative D, breaks down the acres within the decision area by whether they would be open or closed to leasing and what stipulations would be applied.

Table 4-48
Fluid Mineral Leasing Categories in the Decision Area, Alternative D

Leasing Category	Acres
Closed to Leasing	3,604,400
Leased	*0*
Unleased	*3,604,400*
Open Subject to NSO Stipulations	3,787,900
Leased	*11,400*
Unleased	*3,776,500*
Open Subject to CSU/TL Stipulations	3,658,600
Leased	*114,700*
Unleased	*3,543,900*
Open Subject to Standard Terms and Conditions	4,206,300
Leased	*33,700*
Unleased	*4,172,600*

Source: Oregon/Washington BLM. 2013.

Under Alternative D, there would be a 15 percent increase in unleased acres closed to fluid mineral leasing compared with Alternative A. Additionally, 3,787,900 acres, or 25 percent of the federal mineral estate decision area would be subject to NSO stipulations. These stipulations would cover 3,776,500 acres (30 percent) of unleased federal mineral estate in the decision area. Applying NSO stipulations to these areas would directly impact the fluid minerals program in the manner described under **Section 4.11.2**. Because four times more acres would be subject to NSO stipulations under Alternative D than under Alternative A, the magnitude of the impacts would increase under Alternative D.

Like under Alternative B, a 3 percent disturbance cap would apply to all anthropogenic activity in GRSG habitat with the same impacts on fluid minerals.

Geophysical exploration would be allowed on the 10,489,400 acres of federal mineral estate within PPMAs and PGMAs, but it would be subject to TLs. The impact of these TLs would be the same type as that described under **Section 4.11.2**. Because no TLs would be applied to geophysical exploration under Alternative A, impacts of these limitations would increase under Alternative D.

In addition to RDFs, conservation measures would be applied as COAs to 10 existing leases overlying federal mineral estate in PPMAs. These RDFs and conservation measures would include such requirements as surface disturbance limitations, TLs, noise restrictions, structure height limitations, design requirements, water development standards, remote monitoring requirements, and reclamation standards. The types of impacts from these COAs would be the same as those described under **Section 4.11.2**, although the impacts would occur only if operators were to develop these leases.

In addition to the requirements described above, the COAs would require or encourage unitization when necessary to minimize harm to GRSG. They also would call for completion of master plans for developing fluid mineral resources instead of processing individual applications for permit to drill. Requiring these plans would result in the impacts described under **Section 4.11.2**.

The BLM could not apply COAs that would eliminate reasonable opportunities to develop the lease. Therefore, although restrictions on development would increase where COAs were applied, fluid mineral development would still be allowed.

Impacts from Mineral Materials (Salable Minerals) Management

Like Alternative B, under Alternative D, the BLM would close all PPMAs to mineral materials disposal. Fluid mineral development on the 819,800 acres within PPMA that would not be closed or subject to NSO stipulations (i.e., areas beyond 4 miles from leks) would be impacted as described under **Section 4.11.2**. Because more areas within PPMA where fluid mineral development might occur would be closed to mineral material disposal under Alternative D than under Alternative A, impacts on fluid minerals from closing these areas to mineral material disposal would increase under Alternative D.

4.11.8 Alternative E

Impacts from Lands and Realty Management

Similar to Alternative B, under Alternative E, all BLM-administered surface in Core Area habitat (totaling 4,547,000 acres, or approximately 36 percent of BLM-administered surface in the decision area) would be managed as ROW exclusion areas. However, because all Core Area habitat would be closed to fluid mineral leasing under Alternative E, managing Core Area habitat as ROW exclusion would have no impact on fluid minerals.

Management of BLM-administered surface in the decision area outside Core Area habitat would be the same as that under Alternative A, with the same impacts on fluid minerals.

Impacts from Leasable Minerals Management

Similar to Alternative B, under Alternative E, all Core Area habitat would be closed to fluid mineral leasing (see **Table 4-46**, Fluid Mineral Leasing Categories in the Decision Area, Alternatives B and E). Impacts would be the same as those under Alternative B.

Fluid mineral management of all federal mineral estate in the decision area outside Core Area habitat would be the same as that under Alternative A, with the same impacts. Management of geophysical exploration under Alternative E would also be the same as that under Alternative A, with the same impacts.

Impacts of fluid mineral management on existing fluid mineral leases in the planning area under Alternative E would be the same as those under Alternative A.

Impacts from Mineral Materials (Salables) Management
Like Alternative B, under Alternative E, all Core Area habitat would be closed to mineral material disposal. However, because all Core Area habitat would be closed to fluid mineral leasing under Alternative E, closing Core Area habitat to mineral material disposal would not impact fluid minerals.

4.11.9 Alternative F

Impacts from Lands and Realty Management
Management of ROW avoidance and exclusion areas would be the same as that under Alternative C. Like Alternative C, all occupied habitat would be closed to fluid mineral leasing under Alternative F. Therefore, ROW management would have no impacts on fluid minerals.

Impacts from Leasable Minerals Management
Like Alternative C, all occupied habitat would be closed to fluid mineral leasing under Alternative F (see **Table 4-47**, Fluid Mineral Leasing Categories in the Decision Area, Alternatives C and F). Impacts of this closure would be the same as those under Alternative C.

A 3 percent disturbance cap would apply to fire disturbance as well as all anthropogenic activity in GRSG habitat, including fluid mineral activities. If the cap were reached, it would impact fluid minerals as described under *Nature and Type of Effects*, representing an increase in impacts on fluid minerals compared to Alternative A. Because fire would be included in the disturbance cap under Alternative F, the 3 percent cap is more likely to be reached, and fluid minerals are more likely to be impacted.

Geophysical exploration would be allowed on the 10,489,400 acres of federal mineral estate within occupied habitat but would be subject to TLs and other restrictions. Most notably, geophysical exploration within occupied habitat would be allowed only for gathering information about fluid mineral resources outside occupied habitat. Because of these limitations and the fact that occupied habitat would be closed to fluid mineral leasing, geophysical exploration in occupied habitat would decrease under this alternative. Decreases in geophysical exploration in occupied habitat would impact the fluid minerals program, as described under **Section 4.11.2**.

Under Alternative F, the 10 existing leases in PPMA would be subject to management similar to that under Alternative B. However, under Alternative F, TLs would prohibit human presence and surface-disturbing activities during the nesting and brood-rearing season. This management would be the most restrictive of all the alternatives.

Impacts from Mineral Materials (Salable Minerals) Management

Like Alternative B, under Alternative F, all PPMA would be closed to mineral material disposal. However, because all PPMA would be closed to fluid mineral leasing under Alternative E, closing PPMA to mineral material disposal would not impact fluid minerals.

4.12 LOCATABLE MINERALS

4.12.1 Methods and Assumptions

Analysis of impacts on locatable minerals from this RMPA focuses on the impacts of conservation measures to protect GRSG. These impacts may be direct or indirect. For example, a direct impact on locatable minerals would result from withdrawing an area from locatable mineral entry. An indirect impact would result from removing a road, which would change the economic feasibility of developing a site. Additional actions or conditions that would cause direct or indirect impacts on locatable minerals are described below.

Indicators

Indicators of impacts on locatable minerals are as follows:

- The amount of land withdrawn from locatable mineral entry
- The amount of land petitioned for withdrawal from locatable mineral entry
- The amount of land under claim and subject to buyout or validity exam
- Application of restrictions, such as required design features (RDFs) and conservation measures, that can be placed on locatable mineral development to prevent unnecessary or undue degradation of GRSG habitat, as the law allows

Assumptions

The analysis includes the following assumptions:

- New information may lead to changes in delineated GRSG habitat. New habitat areas, or areas that are no longer habitat, may be identified. This adjustment would typically result in small changes to areas requiring the stipulations or management actions stated in this plan. Modifications to GRSG habitat would be updated in the data inventory through plan maintenance. In areas that are no longer habitat, the recommended BMPs to protect GRSG would no longer apply.

- Management actions to withdraw areas from locatable mineral entry or to prevent unnecessary or undue degradation also apply to locatable mineral activity on lands overlying federal mineral estate. This includes federal mineral estate underlying BLM-administered lands and lands not administered by the BLM. There are 15,257,000 acres of federal mineral estate within the decision area (12,618,000 acres of BLM-administered surface with federal minerals and 2,639,000 acres of private, state, or other federal surface with federal minerals).
- This analysis assumes that areas recommended for withdrawal would be withdrawn through a Public Land Order issued by the Secretary of the Interior or by Act of Congress.
- Increasing precious metals values are expected to increase interest in location, exploration, and development of locatable minerals claims in the planning area.

4.12.2 Nature and Type of Effects

Withdrawing or closing an area to mining development removes the possibility of mineral resources in that area from being accessed and extracted. This represents an impact on the potential discovery, development, and use of those resources by decreasing the availability of mineral resources on federal mineral estate.

Existing mining claims in areas withdrawn from locatable mineral entry would have to undergo a validity exam in order to be accepted for notices or approved for plans of operations. If claims were found to be invalid, they could not be developed. These exams would also delay mineral extraction. Finally, developers may choose to relocate outside of the decision area where there are fewer requirements.

A validity exam determines whether a valid existing right exists, which must be recognized even in a withdrawn area. In order to have a valid existing right, a claim holder must demonstrate that, as of the date of the withdrawal, the claim contained a discovery of a valuable mineral deposit and/or that the claim was used and occupied properly under the Mining Law of 1872, as amended.

Existing notices or plans of operations would also have to undergo a validity exam before acceptance (for notice) or approval (for plan of operations) of any material change to the operation. The need to perform validity exams in areas withdrawn from locatable mineral entry would also greatly increase the BLM's burden of processing mining claims, notices, and plans of operations.

Management actions creating ROW exclusion or avoidance areas would indirectly impact locatable mineral extraction by limiting the available means for accessing mineral resources and transporting locatable minerals to processing facilities and markets. For example, new roads to access a mine could not be built in a ROW exclusion area. Locatable mineral operations may be moved to nearby private lands where access is easier, thereby reducing the number of operations on federal mineral estate. Because ROW avoidance areas could allow for limited ROW development, impacts of avoidance areas would be less severe than those of ROW exclusion areas. Impacts would be mitigated where exceptions were allowed for collocation of new ROWs within existing ROWs to satisfy valid existing rights.

Designating areas as special management areas, such as ACECs, would trigger requirement of a plan of operation (including NEPA analysis) for any surface-disturbing activities in those areas, regardless of the acreage involved, in accordance with 43 CFR, 3809. The requirement for plans of operations within a special management area would result in longer delays than would be expected if the operation were permitted under a mining notice. Additionally, mitigation measures could be required through the plans of operations, which would further restrict locatable mineral development activities. This would be true even when the surface disturbance proposed is on fewer than 5 acres.

Implementing management for the following resources to protect GRSG would have negligible or no impact on locatable minerals under all alternatives; therefore, they are not discussed in detail:

- Vegetation
- Wild horses and burros
- Wildland fire management
- Livestock grazing/range management
- Recreation
- Travel management
- Coal
- Leasable minerals
- Mineral materials (salables)
- Nonenergy leasable minerals
- Mineral split-estate
- Air quality and climate change
- Special status plants

4.12.3 Impacts Common to All Alternatives

Impacts from Locatable Minerals Management

Under all alternatives, approximately 996,800 acres (7 percent) of the total federal mineral estate for locatable minerals would remain withdrawn from locating mining claims; new exploration and mining would be precluded. **Table 4-49**, Quantitative Impacts on Locatable Minerals, illustrates the change in acres open to locatable mineral entry and to be petitioned for withdrawal from locatable mineral entry across the alternatives.

Table 4-49
Quantitative Impacts on Locatable Minerals

Locatable Minerals	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Total federal mineral estate for locatable minerals	15,257,000	15,257,000	15,257,000	15,257,000	15,257,000	15,257,000
Total acreage withdrawn from locatable mineral entry	996,800	996,800	996,800	996,800	996,800	996,800
Total acreage petitioned for withdrawal from locatable mineral entry	20,500	4,490,500	9,653,400	20,500	4,490,500	4,490,500
Increase from Alternative A	N/A	4,470,000	9,632,900	0	4,470,000	4,470,000
Total acreage open to locatable mineral exploration or development	14,239,700	9,769,700	4,606,800	14,239,700	9,769,700	9,769,700

Source: Oregon/Washington BLM 2013

The management actions being considered in this RMPA could affect both existing and future mining claims. Developers would have to submit a notice to the BLM for exploration and development on mining claims with a cumulative surface disturbance of five or fewer acres. Additionally, they would have to submit a plan of operations for exploration and development for areas of greater than five acres or for any development (regardless of size) within special management areas, as outlined in 43 CFR, Part 3809.

4.12.4 Alternative A

Impacts from Lands and Realty Management

Under Alternative A, 857,600 acres (7 percent of BLM-administered surface in the decision area) would continue to be managed as ROW exclusion areas. Another 3,445,700 acres (27 percent of BLM-administered surface in the decision area) would continue to be managed as ROW avoidance areas. This management would continue to impact the locatable minerals program as described under **Section 4.11.2**, Nature and Type of Effects.

Impacts from Locatable Minerals Management

Under Alternative A, 20,500 acres (less than one percent) of federal mineral estate in the decision area would continue to be petitioned for withdrawal from locatable mineral entry. This would be in addition to the 996,800 acres currently withdrawn (see **Section 4.12.3**, Impacts Common to All Alternatives). If the Secretary of the Interior were to issue a Public Land Order to formally withdraw these lands, subject to valid existing rights, new mining claims would be forbidden, under the Mining Law of 1872. Exploration and mining would be allowed on existing, valid mining claims. Impacts on existing and future mining claims are similar to those described under **Section 4.12.2**, Nature and Type of Effects.

There are 671 locatable mineral claims in occupied habitat, 137 plans of operations (136 authorized and 1 pending) covering 29,400 acres, and 128 notices covering 18,600 acres in occupied habitat. None of these are in areas petitioned for withdrawal.

No additional BMPs to protect GRSG are identified under Alternative A.

Impacts from Special Designations Management

Under Alternative A, 715,049 acres of BLM-administered surface within the decision area would continue to be designated ACECs. A plan of operation would be required for locatable mineral operations within these ACECs, with the type of impacts described under **Section 4.12.2**.

4.12.5 Alternative B

Impacts from Lands and Realty Management

Under Alternative B, all BLM-administered surface in PPMA (totaling 4,547,000 acres, or approximately 36 percent of BLM-administered surface in the decision area) would be managed as ROW exclusion areas. However, because all PPMA would be recommended for withdrawal from locatable mineral entry under Alternative B, managing PPMA as ROW exclusion areas would have no impact on locatable minerals.

Impacts from Locatable Minerals Management

Under Alternative B, 4,490,500 acres of federal mineral estate in the decision area (including all PPMAs) would be petitioned for withdrawal from locatable mineral entry under the Mining Law of 1872. Combined with the additional 996,800 acres previously withdrawn (see **Section 4.12.3**), the availability of locatable minerals would be limited on 5,487,300 acres. This represents 36 percent of the federal mineral estate decision area, or five times the acreage under Alternative A. The types of impacts would be the same as those described under **Section 4.12.2**.

Under this alternative, 293 claims, 45 plans of operations (7,440 acres), and 65 notices (9,550 acres) would be within PPMAs. As such, all would be within the area to be petitioned for withdrawal. This represents 43 percent of the 936 claims, plans, and notices within occupied habitat. The types of impacts on these claims, plans of operations, and notices would be the same as those described under **Section 4.12.2**. Because the number of claims, plans, and notices within areas recommended for withdrawal would increase, impacts of validity exam requirements would increase under Alternative B.

Operators' ability to access and extract locatable minerals on federal mineral estate would not be impacted by applying BMPs listed in **Appendix D**. However, mining operations and practices could be affected if an operator were to agree to apply any of the BMPs on a project-specific basis. Mitigation measures and other mandatory restrictions could be applied through a separate NEPA process for a specific plan of operations.

Impacts from Special Designations Management

Like Alternative A, under Alternative B, 715,049 acres of BLM-administered surface within the decision area would be designated ACECs. A plan of operation would be required for locatable mineral operations within these ACECs, with the type of impacts described under **Section 4.12.2**. However, if all PPMAs were withdrawn as recommended under Alternative B, no new locatable mineral operations would be allowed in these areas; therefore, ACEC designation in PPMAs would not impact locatable minerals.

4.12.6 Alternative C

Impacts from Lands and Realty Management

Under Alternative C, 10,682,100 acres (85 percent of BLM-administered surface in the decision area), including all occupied habitat would be managed as ROW exclusion areas. However, because all occupied habitat would be recommended for withdrawal from locatable mineral entry under Alternative C, managing occupied habitat as ROW exclusion would have no impact on locatable minerals.

Impacts from Locatable Minerals Management

Under Alternative C, areas within GRSG habitat would be petitioned for withdrawal in a manner similar to that under Alternative B; however, a larger number of acres would be petitioned for withdrawal under Alternative C. Under this Alternative, 9,653,400 acres would be petitioned for withdrawal. Combined with the additional 996,800 acres previously withdrawn (see **Section 4.12.3**), the availability of locatable minerals would be limited on 10,650,200 acres. This represents 70 percent of the federal mineral estate decision area, or ten times the acreage under Alternative A. The types of impacts would be the same as those described under **Section 4.12.2**.

Under this alternative, all of the 671 claims, 137 plans of operations (29,400 acres), and 128 notices (18,600 acres) within occupied habitat would be within the area to be petitioned for withdrawal. The types of impacts on these claims, plans of operations, and notices would be the same as those described under **Section 4.12.2**. Because the number of claims, plans, and notices within areas recommended for withdrawal would increase, impacts of validity exam requirements would increase under Alternative C.

Impacts from Special Designations Management

Under Alternative C, 4,348,399 acres of BLM-administered surface within the decision area (all within PPMAs) would be designated as new ACECs, in addition to the 200,399 acres of PPMA in existing ACECs. A plan of operation would be required for locatable mineral operations within these ACECs, with the type of impacts described under **Section 4.12.2**. However, if all occupied habitat were withdrawn as recommended under Alternative C, no new locatable mineral operations would be allowed in these areas; therefore, ACEC designation in PPMAs would not impact locatable minerals.

4.12.7 Alternative D

Impacts from Lands and Realty Management

Like Alternative A, under Alternative D 857,600 acres (7 percent) of BLM-administered surface in the decision area would be managed as ROW exclusion areas. A total of 5,964,800 acres (47 percent), including all PPMAs not already managed as exclusion areas, would be managed as ROW avoidance areas.

Where these exclusion or avoidance areas overlapped with areas open to locatable mineral entry, impacts on the locatable minerals program would occur, as described under **Section 4.11.2**. Because 73 percent more acres would be managed as ROW avoidance under Alternative D compared with Alternative A, the magnitude of impacts would increase.

Impacts from Locatable Minerals Management

Locatable mineral management under Alternative D would be similar to that under Alternative A. The exception is that the new and existing claims, operations, and notices in PPMAs would be requested to change mining operations and practices to limit surface disturbance to three percent of PPMAs and to mitigate impacts on GRSG. Because these actions would not be mandatory, operators' ability to access and extract locatable minerals on federal mineral estate would not be impacted. Mitigation measures and other mandatory restrictions could be applied through a separate NEPA process for a specific plan of operations.

Impacts from Special Designations Management

Special designation management under Alternative D would be the same as that under Alternative A, with the same impacts.

4.12.8 Alternative E

Impacts from Lands and Realty Management

Similar to Alternative B, under Alternative E, all BLM-administered surface in Core Area habitat (totaling 4,547,000 acres, or approximately 36 percent of BLM-administered surface in the decision area) would be managed as ROW exclusion areas. However, because all Core Area habitat would be petitioned for withdrawal from locatable mineral entry under Alternative E, managing Core Area habitat as ROW exclusion would have no impact on locatable minerals.

Management of BLM-administered surface in the decision area outside Core Area habitat would be the same as that under Alternative A, with the same impacts on locatable minerals.

Impacts from Locatable Minerals Management

Similar to Alternative B, 4,490,500 acres of federal mineral estate in the decision area (including all Core Area habitat) would be petitioned for withdrawal from locatable mineral entry under Alternative E. This petitioning for withdrawal would impact locatable minerals, as described under Alternative B and under **Section 4.12.2**.

No additional BMPs to protect GRSG are identified under this alternative.

Impacts from Special Designations Management

Like Alternative A, under Alternative D, 715,049 acres of BLM-administered surface within the decision area would be designated ACECs. A plan of operation would be required for locatable mineral operations within these ACECs, with the type of impacts described under **Section 4.12.2**. However, if all Core Area habitat were withdrawn as recommended under Alternative B, no new locatable mineral operations would be allowed in these areas; therefore, ACEC designation in Core Area habitat would not impact locatable minerals.

4.12.9 Alternative F

Impacts from Lands and Realty Management

Like Alternative C, under Alternative F, all occupied habitat would be managed as ROW exclusion areas. However, under Alternative F, PPMAs would be recommended for withdrawal from locatable mineral entry; therefore, management of PPMAs as ROW exclusion areas would have no impact on locatable minerals.

Locatable mineral operations outside PPMAs would be impacted as described under **Section 4.12.2**. Because more areas would be managed as ROW exclusion areas under Alternative F, impacts would increase compared with Alternative A.

Impacts from Locatable Minerals Management

Locatable mineral management under Alternative F would be the same as that under Alternative B, with the same impacts.

Impacts from Special Designations Management

Under Alternative C, 4,040,200 acres of BLM-administered surface within the decision area would be designated ACECs in addition to the existing ACECs. A plan of operation would be required for locatable mineral operations within these ACECs, with the type of impacts described under **Section 4.12.2**. However, if all PPMAs were withdrawn as recommended under Alternative F, no new locatable mineral operations would be allowed in these areas.

4.13 Mineral Materials (Salable Minerals)

4.13.1 Methods and Assumptions

Indicators

Indicators of impacts on mineral resources are as follows:

- The amount of land closed to (salable) mineral material disposal
- The amount of land managed as ROW avoidance areas
- The amount of land managed as ROW exclusion areas

Assumptions

The analysis includes the following assumptions:

- New information may lead to changes in delineated GRSG habitat. New habitat areas or areas that are no longer habitat may be identified. This adjustment would typically result in small changes to areas requiring the restrictions or management actions stated in this plan. Modifications to GRSG habitat would be updated in the data inventory through plan maintenance.
- Management actions also apply to mineral material development on lands overlying federal mineral estate, which includes federal mineral estate underlying BLM-administered lands and lands not administered by the BLM. There are 15,257,000 acres of federal mineral estate within the decision area (12,618,000 acres of BLM-administered surface with federal minerals and 2,639,000 acres of private, state, or other federal surface with federal minerals).
- It is assumed that areas designated as ACECs under this RMPA would be subject to management plans that would match the actions analyzed in this RMPA for the protection of GRSG.
- As the current recession ends, construction activity is expected to increase and economic conditions to improve, increasing the demand for construction materials, including gravel from areas within the Sage-Grouse planning area. Federal, state, and local governments, along with non-profits and private construction firms, may increasingly look to BLM-administered lands for aggregate sources during the life of this plan. Demand for aggregate sources within the planning area may also increase to support renewable energy development due to promotion of this development in federal policies.

4.13.2 Nature and Type of Effects

The predominant mining methods for mineral materials in the planning area are surface mining of building stone and engineering materials, such as aggregate; therefore, any restrictions on surface-disturbing activities effectively close the subject areas to mineral material mining.

Closing areas to mineral material disposal would directly impact mineral materials by removing the possibility of mineral resources in that area from being accessed and extracted. Where areas are closed, pits would relocate to nearby open areas if feasible. If demand for mineral materials could not be met by pits operated on federal lands, pits could be moved onto private or state lands where resources exist. If no mineral materials were to occur near closed areas, developers would have to transport them to construction sites from farther away. This would alter the location of mineral materials development.

Applying the 3 percent disturbance cap would directly impact mineral materials by limiting the amount of disturbance from various activities, including mineral material development. If total disturbance in GRSG habitat reached 3 percent, no additional disturbance from mineral material activities would be permitted. Because mineral material development involves surface disturbance, new development would essentially be shut down once the 3 percent cap was reached.

Managing areas as ROW avoidance or exclusion would decrease new construction (e.g., roads) and thereby decrease demand for mineral materials in those areas. This, in turn, could decrease the number of mineral material pits on federal mineral estate. In addition, new mineral material pits may not be able to be developed in areas managed as ROW avoidance or exclusion because new roads to these pits could not be constructed in exclusion areas and would be difficult to construct in avoidance areas.

Implementing management for the following resources to protect GRSG would have negligible or no impact on mineral resources for all alternatives; therefore, these resources are not discussed in detail:

- Vegetation
- Wild horses and burros
- Wildland fire management
- Livestock grazing/range management
- Recreation
- Travel management
- Coal
- Leasable minerals
- Locatable minerals
- Nonenergy leasable minerals
- Mineral split-estate
- Special designations
- Air quality and climate change
- Special status plants

4.13.3 Alternative A

Impacts from Lands and Realty Management

Under Alternative A, 8,314,700 acres (66 percent) of BLM-administered surface within the decision area would continue to be open to ROW location. However, construction of new roads would likely decrease on the 4,303,300 acres (34 percent) of BLM-administered surface in the decision area that would continue to be managed as ROW avoidance or exclusion under this alternative. Impacts of this management would be the same type as those described under

Section 4.13.2, Nature and Type of Effects. Impacts from this decrease in demand would be mitigated where new ROWs could be collocated within existing ROWs to satisfy valid existing rights.

Impacts from Mineral Materials (Salables) Management

Under Alternative A, mineral materials in the planning area would continue to be managed according to the allocations in the governing RMPs. A total of 2,752,500 acres (18 percent) of federal mineral estate in the decision area would continue to be closed to mineral material disposal. Impacts of these closures would be the same type as those described under **Section 4.13.2**. The remainder of the decision area (12,504,500 acres, or 82 percent) would remain open to mineral material disposal.

4.13.4 Alternative B

Impacts from Lands and Realty Management

Under Alternative B, all BLM-administered surface in PPMAs (totaling 4,547,000 acres, or approximately 36 percent of BLM-administered surface in the decision area) would be managed as ROW exclusion areas. However, because all PPMAs would be closed to mineral materials disposal under Alternative B, managing PPMAs as ROW exclusion would have no impact on mineral materials.

All BLM-administered surface in PGMAs (totaling 5,662,600 acres, or 45 percent of BLM-administered surface in the decision area) would be managed as ROW avoidance under Alternative B. Mineral materials beneath those acres of BLM-administered surface in PGMAs would be impacted by the ROW avoidance area described under **Section 4.13.2**. Because 288,200 acres in PGMAs would have been managed as ROW exclusion under Alternative A but would be managed as ROW avoidance under Alternative B, impacts on mineral materials would be reduced in these areas compared with Alternative A. Overall, more acres would be managed as ROW avoidance under Alternative B than under Alternative A, so impacts on the mineral materials program from these ROW avoidance areas would increase under Alternative B.

Impacts from Mineral Materials (Salables) Management

Under Alternative B, approximately 7,105,500 acres of federal mineral estate in PPMAs (47 percent of the federal mineral estate decision area) would be closed to mineral material disposal. The types of impacts from these closures are the same as those discussed under **Section 4.13.2**. Because three times more acres of federal mineral estate would be closed under Alternative B compared with Alternative A, the magnitude of these impacts would increase.

Management of mineral materials on federal mineral estate outside of PPMAs would be the same as that under Alternative A except that a 3 percent disturbance cap would apply to all anthropogenic activity in GRSG habitat, including mineral material activities. If the cap were reached, it would impact mineral materials in GRSG habitat as described under *Nature and Type of Effects*, resulting in an increase in impacts on mineral materials compared to Alternative A.

4.13.5 Alternative C

Impacts from Lands and Realty Management

Under Alternative C, all BLM-administered surface in occupied habitat (totaling 10,682,100 acres, or approximately 85 percent of BLM-administered surface in the decision area) would be managed as ROW exclusion areas. These areas would impact mineral materials as described under **Section 4.13.2**. Because 12 times more acres would be managed as ROW exclusion under Alternative C compared with Alternative A, impacts on mineral materials would greatly increase.

Impacts from Mineral Materials (Salables) Management

Under Alternative C, approximately 11,511,900 acres (75 percent) of federal mineral estate in the decision area (including all occupied habitat) would be closed to mineral material disposal. The types of impacts from these closures are the same as those discussed under **Section 4.13.2**. Because four times more acres of federal mineral estate would be closed under Alternative B compared with Alternative A, the magnitude of these impacts would increase.

4.13.6 Alternative D

Impacts from Lands and Realty Management

Like Alternative A, under Alternative D, 857,600 acres (7 percent of BLM-administered surface in the decision area) would be managed as ROW exclusion areas. A total of 5,964,800 acres (47 percent), including all PPMAs not already managed as exclusion areas, would be managed as ROW avoidance areas. However, because all PPMAs would be closed to mineral materials disposal under Alternative D, management of ROW exclusion or avoidance areas within PPMAs would not impact new mineral materials disposal. Existing permitted sites would be impacted by decreases in demand as described under **Section 4.13.2**. These impacts on existing sites would increase compared with Alternative A because more acres would be managed as ROW avoidance under Alternative D.

Management of areas outside PPMAs would be the same as that under Alternative A, including 1,960,200 acres managed as ROW exclusion or avoidance in PGMAs. Where these ROW exclusion or avoidance areas outside PPMAs were to overlap with areas open to mineral materials disposal, impacts would be the type as those described under **Section 4.13.2**.

Impacts from Mineral Materials (Salables) Management

Management of mineral materials under Alternative D would be the same as that under Alternative B, with the same impacts.

4.13.7 Alternative E

Impacts from Lands and Realty Management

Similar to Alternative B, under Alternative E, all BLM-administered surface in Core Area habitat (totaling 4,547,000 acres, or approximately 36 percent of BLM-administered surface in the decision area) would be managed as ROW exclusion areas. However, because all Core Area habitat would be closed to mineral material disposal under Alternative E, managing Core Area habitat as ROW exclusion would have no impact on mineral materials.

Management of BLM-administered surface in the decision area outside Core Area habitat would be the same as that under Alternative A, with the same impacts on mineral materials.

Impacts from Mineral Materials (Salables) Management

Under Alternative E, all Core Area habitat would be closed to mineral materials disposal. The acres impacted by these closures, and the impacts themselves, would be the same as those under Alternative B.

4.13.8 Alternative F

Impacts from Lands and Realty Management

Like Alternative C, under Alternative F, all occupied habitat would be managed as ROW exclusion areas. However, because PGMAs would be open to mineral materials disposal under Alternative F, these areas would be impacted by ROW exclusion areas as described under **Section 4.13.2**. Demand for mineral materials in PGMAs would greatly decrease because all PGMAs would be managed as ROW exclusion.

Impacts from Mineral Materials (Salables) Management

Management of mineral materials under Alternative F would be the same as that under Alternative B, with the same impacts, except that the 3 percent disturbance cap would apply to fire disturbance as well as all anthropogenic activity in GRSG habitat, including mineral material activities. If the cap were reached, it would impact mineral materials as described under *Nature and Type of Effects*, resulting in an increase in impacts on mineral materials compared to Alternative A. Because fire would be included in the disturbance cap under Alternative F, the 3 percent disturbance cap is more likely to be reached, and mineral materials are more likely to be impacted.

4.14 NONENERGY LEASABLE MINERALS

4.14.1 Methods and Assumptions

Indicators

Indicators of impacts on nonenergy leasable minerals are as follows:

- The amount of land closed to nonenergy solid mineral leasing
- The amount of land subject to NSO stipulations on nonenergy solid mineral leasing

Assumptions

The analysis includes the following assumptions:

- New information may lead to changes in delineated GRSG habitat. New habitat areas, or areas that are no longer habitat, may be identified. This adjustment would typically result in small changes to areas, requiring the stipulations or management actions stated in this plan. Modifications to GRSG habitat would be updated in the existing data inventory through plan maintenance. In areas that are no longer habitat, the waiver/exception/modification process would be used to remove stipulations or management actions that were no longer needed.
- Management actions and conservation measures also apply to nonenergy solid leasable mineral activity on lands overlying federal mineral estate. This includes federal mineral estate underlying BLM-administered lands and lands not administered by the BLM. There are 15,257,000 acres of federal mineral estate within the decision area (12,618,000 acres of BLM-administered surface with federal minerals and 2,639,000 acres of private, state, or other federal surface with federal minerals).
- Development of traditional solid leasable minerals within the planning area is unlikely. There are no existing nonenergy solid mineral leases in the decision area. However, hardrock minerals exist beneath acquired lands in the planning area. Similar to locatable minerals, interest in developing these leasable minerals is expected to increase as precious metal values increase.
- The acreage calculations used in this analysis is the entire federal mineral estate decision area. This includes acquired lands and other lands overlying federal mineral estate. Although interest in nonenergy leasable minerals is expected only on hardrock minerals beneath acquired lands, it is possible that sodium deposits could be discovered and developed in the future on other federal mineral estate.

4.14.2 Nature and Type of Effects

Closing an area to nonenergy solid mineral leasing would directly impact nonenergy leasable minerals. This would be the result of removing the possibility of minerals resources in that area from being accessed and extracted. Mining operations may move to nearby private lands, thereby reducing the number of operations on federal mineral estate. In areas open to leasing, applying NSO stipulations would restrict the ability of nonenergy leasable mineral resources to be developed or extracted. To avoid these restrictions, operators may relocate to nearby state or private minerals, which would reduce nonenergy leasable mineral development on federal mineral estate.

Applying the 3 percent disturbance cap would directly impact nonenergy leasable minerals by limiting the amount of disturbance from various activities, including nonenergy leasable mineral development. If total disturbance in GRSG habitat reached 3 percent, no additional disturbance from nonenergy leasable mineral activities would be permitted. Because nonenergy leasable mineral development involves surface disturbance, new development would essentially be shut down once the 3 percent cap was reached.

Management actions creating ROW exclusion or avoidance areas would indirectly impact nonenergy solid leasable mineral extraction by limiting the available means for accessing mineral resources and transporting nonenergy solid leasable minerals to processing facilities and markets. For example, new roads to access a mine could not be built in a ROW exclusion area. Nonenergy solid leasable mineral operations may be moved to nearby private lands where access is easier, thereby reducing the number of operations on federal mineral estate. Because ROW avoidance areas could allow for limited ROW development, impacts of avoidance areas would be less severe than those of ROW exclusion areas. Impacts would be mitigated where exceptions were allowed for collocation of new ROWs within existing ROWs to satisfy valid existing rights.

Implementing management for the following resources to protect GRSG would have negligible or no impact on nonenergy leasable minerals for all alternatives; therefore, they are not discussed in detail:

- Vegetation
- Wild horses and burros
- Wildland fire management
- Livestock grazing/range management
- Recreation
- Travel management
- Coal
- Leasable minerals
- Locatable minerals
- Mineral materials (salables)
- Mineral split-estate
- Special designations

- Air quality and climate change
- Special status plants

4.14.3 Alternative A

Impacts from Lands and Realty Management

Under Alternative A, 857,600 acres (7 percent of BLM-administered surface in the decision area) would continue to be managed as ROW exclusion areas. Another 3,445,700 acres (27 percent of BLM-administered surface in the the decision area) would continue to be managed as ROW avoidance areas. This management would continue to impact the nonenergy solid leasable minerals program as described under **Section 4.14.2**, Nature and Type of Effects.

Impacts from Nonenergy Leasable Minerals Management

Under Alternative A, 12,122,900 acres (62 percent) of federal mineral estate in the decision area would remain open to nonenergy solid mineral prospecting and leasing; 3,134,200 acres (21 percent) would remain closed to prospecting and leasing. These closures would impact nonenergy leasable minerals as described under **Section 4.14.2**, Nature and Type of Effects.

4.14.4 Alternative B

Impacts from Lands and Realty Management

Under Alternative B, all BLM-administered surface in PPMA (totaling 4,547,000 acres, or approximately 36 percent of BLM-administered surface in the decision area) would be managed as ROW exclusion areas. However, because all PPMA would be closed to nonenergy solid mineral leasing under Alternative B, managing PPMA as ROW exclusion areas would have no impact on nonenergy solid leasable minerals.

Impacts from Nonenergy Leasable Minerals Management

The BLM would close all PPMA to nonenergy solid mineral leasing under Alternative B. This would result in 7,157,800 acres (47 percent) of federal mineral estate in the decision area being closed to prospecting and leasing. Alternative B would close twice the acreage, compared to Alternative A. The types of impacts from these closures described under **Section 4.14.2** would increase under Alternative B.

A 3 percent disturbance cap would apply to all anthropogenic activity in GRSG habitat, including nonenergy leasable mineral activities. If the cap were reached, it would impact nonenergy leasable minerals in GRSG habitat as described under *Nature and Type of Effects*, resulting in an increase in impacts on nonenergy leasable minerals compared to Alternative A.

4.14.5 Alternative C

Impacts from Lands and Realty Management

Under Alternative C, 10,682,100 acres (85 percent of BLM-administered surface in the decision area), including all occupied habitat would be managed as ROW exclusion areas. However, because all occupied habitat would be closed to nonenergy solid mineral leasing under Alternative C, managing occupied habitat as ROW exclusion would have no impact on nonenergy solid leasable minerals.

Impacts from Nonenergy Leasable Minerals Management

The BLM would close all occupied habitat to nonenergy solid mineral leasing under Alternative C. This would result in 11,085,800 acres (73 percent) of federal mineral estate in the decision area being closed to prospecting and leasing. Alternative C would close four times the acreage, compared to Alternative A. The types of impacts from these closures described under **Section 4.14.2** would increase under Alternative C.

4.14.6 Alternative D

Impacts from Lands and Realty Management

Like Alternative A, under Alternative D 857,600 acres (7 percent) of BLM-administered surface in the decision area would be managed as ROW exclusion areas. A total of 5,964,800 acres (47 percent), including all PPMA not already managed as exclusion areas, would be managed as ROW avoidance areas. Where these exclusion or avoidance areas overlapped with areas open to nonenergy solid mineral leasing, impacts on the nonenergy solid leasable minerals program would occur, as described under **Section 4.14.2**. Because 73 percent more acres would be managed as ROW avoidance under Alternative D compared with Alternative A, the magnitude of impacts would increase.

PGMA would be open to new ROWs with each individual application being analyzed to avoid impacts on occupied habitat and minimize impacts on potential or suitable habitat within PGMA. This could increase stipulations and mitigation that applicants have to apply to ROWs located within PGMA, making them less likely to locate ROWs in PGMA. Impacts on nonenergy leasable minerals would increase compared to Alternative A; however, this management of PGMAs would be less restrictive than that for other action alternatives that designate PGMA avoidance areas.

Impacts from Nonenergy Leasable Minerals Management

Under Alternative D, the BLM would apply NSO stipulations to nonenergy solid mineral leases in PPMA. These stipulations would apply on 4,756,900 acres (31 percent) of the federal mineral estate decision area. Like Alternative A, 3,134,200 acres (21 percent) of the decision area would remain closed to nonenergy solid mineral leasing. The remaining 7,365,900 acres (48 percent) of federal mineral estate in the decision area would remain open to nonenergy solid mineral leasing. Because acres would be subject to NSO stipulations under Alternative D but not under Alternative A, the impacts described under **Section 4.14.2** would increase under Alternative D.

Like under Alternative B, a 3 percent disturbance cap would apply to all anthropogenic activity in GRSG habitat with the same impacts on nonenergy leasable minerals.

4.14.7 Alternative E

Impacts from Lands and Realty Management

Similar to Alternative B, under Alternative E, all BLM-administered surface in Core Area habitat (totaling 4,547,000 acres, or approximately 36 percent of BLM-administered surface in the decision area) would be managed as ROW exclusion areas. However, because all Core Area habitat would be closed to nonenergy solid mineral leasing under Alternative E, managing Core Area habitat as ROW exclusion would have no impact on nonenergy solid leasable minerals.

Management of BLM-administered surface in the decision area outside Core Area habitat would be the same as that under Alternative A, with the same impacts on nonenergy leasable minerals.

Impacts from Nonenergy Leasable Minerals Management

Management of nonenergy leasable minerals under Alternative E would be the same as that under Alternative B and with the same impacts.

4.14.8 Alternative F

Impacts from Lands and Realty Management

Like Alternative C, under Alternative F, all occupied habitat would be managed as ROW exclusion areas. However, under Alternative F, PPMA would be closed to nonenergy solid mineral leasing; therefore, management of PPMA as ROW exclusion areas would have no impact on nonenergy solid leasable minerals.

Nonenergy solid leasable mineral operations outside PPMA would be impacted as described under **Section 4.14.2**. Because more areas would be managed as ROW exclusion areas under Alternative F, impacts would increase compared with Alternative A.

Impacts from Nonenergy Leasable Minerals Management

Management of nonenergy leasable minerals under Alternative F would be the same as that under Alternative B and with the same impacts, except that the 3 percent disturbance cap would apply to fire disturbance as well as all anthropogenic activity in GRSG habitat, including nonenergy leasable mineral activities. If the cap were reached, it would impact nonenergy leasable minerals as described under *Nature and Type of Effects*, resulting in an increase in impacts on nonenergy leasable minerals compared to Alternative A. Because fire would be included in the disturbance cap under Alternative F, the 3 percent disturbance cap is more likely to be reached, and nonenergy leasable minerals are more likely to be impacted.

4.15 Special Designations

4.15.1 Methods and Assumptions

Indicators

Indicators of impacts on special designations are as follows:

Wilderness Areas

- Potential changes in wilderness characteristics (untrammeled, natural, undeveloped outstanding opportunities for solitude or primitive and unconfined recreation, and unique or supplemental values) within the wilderness (Landres et al. 2008)
  - Untrammeled—Number of authorized actions and persistent structures designed to manipulate plants, animals, pathogens, soil, water, or fire; percent of natural fire starts that are manipulated within the boundaries of the wilderness; number of unauthorized actions by agencies, citizen groups, or individuals that manipulate plants, animals, pathogens, soil, water, or fire
  - Natural—Status of native biological communities (defined by priority habitat indicators and standards); abundance and distribution of nonindigenous species; presence of structures and development related to livestock grazing
  - Undeveloped—Index of physical development for authorized or designated structures and developments (e.g., buildings, fences, and livestock water developments); existing or potential impact of inholdings; type and amount of administrative use of motor vehicles
  - Outstanding opportunities for solitude or primitive and unconfined recreation—Level of visitor use; area of wilderness affected by travel routes; type and number of agency-provided and user-created recreation facilities; type and extent of management restrictions
  - Unique and supplemental values—Severity of disturbances of cultural resources; status of indigenous species that are listed, or are candidates for listing, as threatened or endangered

Wilderness Study Areas

- Potential changes in the inventoried wilderness characteristics (naturally appearing, opportunities for solitude or primitive and unconfined recreation, and unique or supplemental values) within the WSA
  - Naturally appearing—Status of native biological communities (defined by priority habitat indicators and standards) and abundance and distribution of nonindigenous species.
  - Opportunities for solitude or primitive and unconfined recreation—Level of visitor use; area of WSA affected by travel routes; type and number of agency-provided and user-created recreation facilities; type and extent of management restrictions
  - Unique and supplemental values—Severity of disturbances of cultural resources; status of indigenous species that are listed, or are candidates for listing, as threatened or endangered

Cooperative Management and Protection Areas

- Substantial interference of the values for which the Cooperative Management and Protection Area was designated

National Trails

- Substantial interference of the values for which the components of the National Trail System were designated

Areas of Critical Environmental Concern

- ACECs within GRSG PPMA, PGMA, and non-habitat

Wild and Scenic Rivers

- For eligible and suitable rivers, any potential change to the ORVs, tentative classification (i.e., wild, scenic, recreational), water quality, or free-flowing condition of the river segment or corridor area from its current state
- For designated rivers, any potential change to the free-flowing river that would fail to protect and enhance the values that caused it to be designated, including its aesthetic, scenic, historic, archaeological, and scientific features

Assumptions

The analysis includes the following assumptions:

Wilderness Areas

- Wilderness Areas would continue to be managed according to the following:
  - Wilderness Act of 1964, the legislation designating them as Wilderness
  - 43 CFR 6300, Management of Designated Wilderness Areas
  - Appendix A of the Committee on Interior and Insular Affairs of the House of Representatives accompanying HR 2570 of the 101st Congress (commonly called the Congressional Wilderness Grazing Guidelines)
  - BLM Manual 6340, Management of Designated Wilderness Areas (BLM 2012p)
  - Any subsequent wilderness legislation
  - As such, implementing management proposed in the various alternatives would not impair wilderness characteristics.

Wilderness Study Areas

- The WSAs in the planning area would continue to be managed according to Section 603(c) of FLPMA, BLM Manual 6330, Management of Wilderness Study Areas (BLM 2012c), and any applicable land use plan until Congress either designates or releases all or portions of the WSAs from further consideration.
- Managing the WSAs according to BLM Manual 6330, Management of Wilderness Study Areas (BLM 2012c), would protect their wilderness characteristics in a manner that would not "impair the suitability of WSAs for preservation as wilderness" (FLPMA, Section 603[c]). This is known as the nonimpairment standard.
- Actions that would "impair the suitability of WSAs for preservation as wilderness" would not be permitted unless they were to meet one of the exception criteria described in BLM Manual 6330, Management of Wilderness Study Areas (BLM 2012c) and listed in Chapter 3.
- As a grandfathered use, livestock grazing managed in accordance with BLM regulations does not impact wilderness characteristics. However, new grazing management is not a grandfathered use and in all cases may only be established if it meets the nonimpairment standard or one of the exception criteria described in BLM Manual 6330, Management of Wilderness Study Areas (BLM 2012c) and listed in Chapter 3.

Cooperative Management and Protection Areas

- The Cooperative Management and Protection Area in the planning area would continue to be managed according to BLM Manual 6220, National Monuments, National Conservation Areas, and Similar Designations (BLM 2012t). This policy will be adhered to during any site-specific project NEPA analyses that are conducted in the planning area.

National Trails

- The National Historic Trail in the planning area would continue to be managed according to BLM Manual 6280, Management of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation (BLM 2012s). This policy will be adhered to during any site-specific project NEPA analyses that are conducted in the planning area.

Areas of Critical Environmental Concern

- Management for existing ACECs was determined in the applicable RMPs to be adequate to support the relevant and important values at the time of their designation. Impacts on these ACECs are not further discussed because the BLM would continue to manage these ACECs to protect their relevant and important values.
- Although management actions for most resources and resource uses have decision area-wide application, ACEC management prescriptions apply only to those lands within each specific ACEC.
- Permitted activities would not be allowed to impair the relevant and important values for which the ACECs are designated. Locatable mineral development in ACECs is regulated through 43 CFR 3809.11. Mineral development would require a plan of operations aimed at reducing impacts on ACECs. Impacts from new locatable mineral development in ACECs would be eliminated if these areas were withdrawn.
- ACEC designation provides protection and focused management for relevant values beyond that provided through general management of the relevant and important values elsewhere in the decision area.

Wild and Scenic Rivers

- All eligible and suitable stream segments under consideration for WSR designation would be managed under interim protective measures required by the WSR Act and BLM Manual 6400, Wild and Scenic Rivers – Policy and Program Direction for Identification, Evaluation, Planning, and Management (BLM 2012q). This policy will be adhered to during any site-specific project NEPA analyses that are conducted in the planning area. 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 WSR designation.

- The BLM would not permit any actions that would adversely affect the free-flowing condition, water quality, ORVs, or tentative classification of any eligible or suitable segments. As such, implementing management actions in this RMPA/EIS would not adversely impact these segments; adverse impacts are not discussed for any of the alternatives.

4.15.2 Nature and Type of Effects

Implementing management to protect GRSG generally involves reducing or otherwise restricting land uses and activities that disturb the surface or could otherwise threaten the values for which special designations are managed. Energy development, livestock grazing, travel, mineral extraction, wildland fires, and construction within ROW grants are all actions that could reduce the quality of the values for which special designations are managed.

Protecting areas from these activities to protect GRSG would also protect special designations from disturbance.

Wilderness Areas

Implementing management proposed in the various alternatives would not impair wilderness characteristics. This is because these wilderness characteristics are protected and managed according to the legislation, regulation, and policy listed under **Section 4.15.1**, Methods and Assumptions. Management to protect GRSG could enhance naturalness, or, at a minimum, be complementary to management in Wilderness Areas.

Wilderness Study Areas

Due to the requirement that any activity in WSAs meet the nonimpairment standard described in BLM Manual 6330, Management of Wilderness Study Areas (BLM 2012c), implementing management proposed in the various alternatives would not impair wilderness characteristics. Management to protect GRSG could enhance naturalness, or, at a minimum, be complementary to management in WSAs.

Cooperative Management and Protection Areas

Implementing management proposed in the various alternatives would have no or negligible effects on the Steens Mountain Cooperative Management and Protection Area. This is because the area is managed according to the policy listed under **Section 4.15.1**, Methods and Assumptions.

National Trails

Implementing management proposed in the various alternatives would have no or negligible effects on National Historic Trail resources, qualities, values, and associated settings, and the primary use or uses. This is because the National Trail is managed according to the policy listed under **Section 4.15.1**, Methods and Assumptions.

ACECs

Impacts on the relevant and important values of ACECs would mainly be from surface-disturbing activities. Specifically, these are the activities that cause direct damage to the values, introduce modifications to the landscape that affect the area's scenic quality or historical or cultural context, or that result in erosion, sedimentation, or increased runoff.

Special status species management objectives would prevent degradation of, and could improve, relevant and important values where an ACEC is designated to protect such values. The BLM management could protect the relevant and important values in ACECs independent of an ACEC designation. Refer to **Section 4.2**, Special Status Species – Greater Sage-Grouse, for a discussion of impacts on GRSG habitat.

In general, management actions that protect resources (such as surface-disturbance restrictions, management for desired habitats, travel restrictions and closures, and recreation restrictions) would help maintain and improve the important and relevant values within ACECs. Management actions that create the potential for resource degradation (such as mineral development, livestock grazing, and infrastructure development) could impact the relevant and important values for which an ACEC is designated. Recreation and travel within ACECs could impact their values. Limiting motorized travel to existing routes and trails would reduce surface disturbance and the potential for related GRSG habitat loss.

Identifying ACECs as ROW exclusion or avoidance areas would protect relevant and important values by reducing (for avoidance areas) or eliminating (for exclusion areas) impacts from development requiring a ROW permit. Such developments include utilities, access roads, and renewable energy projects. Impacts from ROW development on GRSG habitat include compaction, erosion, and potentially habitat fragmentation

Energy and mineral development could impact ACEC values by increasing soil erosion potential and by removing or disrupting unique vegetation. Where GRSG habitat exists, energy and mineral development could degrade and fragment habitat. Construction, operation, and maintenance could disturb GRSG populations. However, the protections and limitations needed to maintain the relevant and important values of each ACEC are included in the plans that manage those ACECs. Additionally, closing ACECs to fluid mineral leasing or applying NSO stipulations would help protect relevant and important values by eliminating surface-disturbance associated with such development.

Depending on their extent, location, and severity, wildfires could cause short- and long-term damage to ACEC values, particularly by removing critical sagebrush habitats. Emergency stabilization and restoration would be applied to minimize impacts where special values are at risk. If these techniques are successful, wildfires could also improve ACEC values in the long term by maintaining natural vegetative ecosystem cycles. Additionally, prescribed fuels treatments could protect ACEC values if these treatments were to reduce the risk of future wildfire damage to ACEC values.

Livestock grazing could impact ACEC values by increasing the potential for soil erosion, increasing annual grasses, reducing understory plant species, and affecting the plant communities that are the values for which the ACEC was designated. Closing ACECs to livestock grazing would help protect relevant and important values by eliminating soil and vegetation disturbance associated with livestock grazing; however, this could also increase the risk for fire due to increased fuel loads.

Management to protect GRSG under the various alternatives would likely provide additional protections for existing ACECs and, at a minimum, would provide complementary management. This would be particularly true in ACECs where GRSG conservation was identified as a value. Additionally, RNAs would not experience impacts due to the restrictions and limitations on uses in place to protect RNAs. Impacts would not be expected to vary greatly between the alternatives.

Wild and Scenic Rivers

Stream segments eligible or suitable for inclusion in the National Wild and Scenic Rivers System are contained within an interim boundary within which resources are managed to protect the segments' free-flowing condition, water quality, ORVs, and tentative classification. Unless a detailed river boundary is established, the interim boundary of the WSRs is one quarter-mile from the ordinary high water mark on either side of the river (BLM 2012q). Greater Sage-Grouse could use wet meadows within the interim boundary of these rivers during the summer; however, management for the species will not adversely impact the free-flowing condition, water quality, ORVs, or tentative classifications of the segments.

Implementing management for the following resources would have negligible or no impact on special designations for all alternatives; therefore, they are not discussed in detail:

- Special status species – Greater Sage-Grouse
- Vegetation
- Wild horses and burros
- Wildland fire management
- Livestock grazing/range management
- Recreation
- Travel Management
- Lands and realty

- Coal
- Leasable minerals
- Locatable minerals
- Mineral materials (salables)
- Nonenergy leasable minerals
- Mineral split-estate
- Air quality and climate change
- Special status plants

4.15.3 Impacts Common to All Alternatives

All of the action alternatives (B through F) would result in greater restrictions on resource uses and surface-disturbing activities than would Alternative A. These restrictions could result in impacts on special designations by providing additional protection of the values for which the special designations are managed. All special designations would likely be enhanced by or would not experience impacts from GRSG management and restrictions.

Implementing management proposed in the various alternatives would have no or negligible effects on Wilderness Areas, WSAs, Cooperative Management and Protection Areas, National Historic Trails, and Wild and Scenic Rivers. This is because the BLM will adhere to the applicable laws, regulations, policy, and guidance for those areas, as described in **Section 4.15.2**, Nature and Types of Effects.

Under all alternatives, the 92 existing ACECs and RNAs would continue to be managed for the values for which they were designated. Of those 92 existing ACECs, 76 ACECs occur wholly or partially within GRSG habitat (See **Appendix I**, Greater Sage-Grouse Habitat Density in Areas of Critical Environmental Concern). The 76 ACECs occurring in GRSG habitat would likely experience indirect protections from GRSG management actions. Additionally, 59 of these ACECs (42 of which are RNAs) have been identified as having large amounts of GRSG habitat and/or active leks. These ACECs would receive special management protection under all alternatives. This special management attention is described in **Appendix I**. Under all alternatives, the 92 existing ACECs would be managed to protect the relevant and important values from irreparable damage.

ACECs would experience some variation in impacts across alternatives due to impacts from the management of other resources. Some alternatives would also designate additional ACECs, or change the degree of protection placed on existing ACECs, which would result in variation in impacts across the alternatives.

These variations are described in **Section 4.15.4**, Alternative A, through **Section 4.15.9**, Alternative F.

4.15.4 Alternative A

The existing ACECs experience varying degrees of protection under the current management. As noted in **Table 2-6**, Detailed Comparison of Alternatives by BLM Resource Program, most of the existing ACECs are identified as ROW avoidance areas, most are recommended for withdrawal for locatable minerals, and most are closed or withdrawn from salable and leasable mineral development.

These actions under the current management provide protection to the 92 existing ACECs. The seven ACECs in PPH or PGH that include GRSG among the relevant and important values for which they were designated are included within the 59 ACECs identified in **Appendix I** and would be most likely to experience supplementary protection under the action alternatives from management actions related to GRSG protection. However, all of the ACECs that contain PPH or PGH are likely to experience some degree of supplemental protection under the action alternatives. The action alternatives would be more restrictive than Alternative A in dealing with resources such as livestock grazing and ROW management.

There are more acres of PPMA and PGMA open to livestock grazing (12,121,600 acres) under Alternatives A and B than under any of the other alternatives. Therefore, compared to the other alternatives, ACECs would experience fewer of the incidental protections resulting from closing acres to livestock grazing under these alternatives. Additionally, Alternatives A and D have fewer acres of ROW exclusion areas (545,300 acres) in PPMA and PGMA than the other alternatives. This would likely result in fewer indirect protections of ACECs.

Alternative A is the only alternative that allows cross-country motorized travel in PPH. It also manages more acres (2,940,000) as open to cross-country motorized travel in PGH than any of the other alternatives. ACECs are least likely to experience protection from the impacts of motorized travel under Alternative A.

The effects of having more acres open to livestock grazing and motorized travel, and fewer ROW exclusion areas are described in **Section 4.15.2**, Nature and Type of Effects.

4.15.5 Alternative B

The same number of acres is open to livestock grazing under Alternative B as under Alternative A; thus, impacts on ACECs are similar.

Under Alternative B, cross-country motorized travel would not be permitted in PPMA. This would result in indirect protections to ACECs that contain PPMA.

These ACECs would experience protections from the types of impacts caused by motorized travel that are described in **Section 4.15.2**, Nature and Type of Effects.

4.15.6 Alternative C

Under Alternative C the most acres are closed to livestock grazing (11,686,800 acres). This would likely result in more indirect protections of ACECs than under the other alternatives. The effects of closing acres to livestock grazing on ACECs are described in **Section 4.15.2**, Nature and Type of Effects.

All PPMA would be closed to cross-country motorized travel. Impacts would be the same as those described under Alternative B.

Under Alternative C all PPMA would be designated as new ACECs designated for GRSG conservation. Information on the additional ACECs under Alternative C is available in **Appendix J**, Areas of Critical Environmental Concern Evaluation for Greater Sage-Grouse.

4.15.7 Alternative D

Alternative D has the same number of acres of ROW exclusion areas (545,300 acres) in PPMA and PGMA as Alternative A. Therefore, impacts on ACECs are similar as those described under Alternative A. All PPMA under this alternative would be closed to cross-country motorized travel. Impacts would be the same as those described under Alternative B.

Additionally, under Alternative D, ACECs and RNAs with large proportions of GRSG habitat (ACECs and RNAs occurring in over 30 percent PPMA and 50 percent PGMA) would be managed for GRSG conservation. The ACECs also would be managed for the existing values for which they were designated. This would likely increase resource use restrictions and surface-disturbance within those ACECs; consequently, it would provide the ACECs with more protections, such as those discussed under **Section 4.15.2**, Nature and Type of Effects.

Unlike the other action alternatives, Alternative D includes specific management actions for RNAs, a unique type of ACEC managed for minimum human disturbance. This would result in increased protections to RNAs through management actions that would prohibit OHV use in identified RNAs, work with livestock grazing permit holders to reduce livestock grazing, remove unnecessary infrastructure, work with public holders of existing valid rights and ROW holders to address RNA plant community protection, and use minimally disturbing fire suppression tactics. Additionally, under Alternative D, RNAs can be closed to public use if the BLM determines public use is incompatible with the values of the RNA.

These management actions could enhance the values of the RNAs and would minimize the risk that GRSG management actions would damage RNAs in the planning area.

4.15.8 Alternative E

Under Alternative E, 124,400 acres of PPMA and PGMA would be closed to livestock grazing. This is the fewest acres out of all the alternatives and would likely result in fewer incidental protections of ACECs. The effects of keeping acres open to livestock grazing are described in **Section 4.15.2**, Nature and Type of Effects.

Additionally, all PPMA would be closed to cross-country motorized travel, resulting in indirect protections to ACECs that contain PPMA. Impacts would be the same as those described under Alternative B.

4.15.9 Alternative F

Alternative F would designate 17 new ACECs to conserve GRSG. Additional information on these ACECs and the values for which they would be designated is available in **Appendix J**, Areas of Critical Environmental Concern Evaluation for Greater Sage-Grouse.

All PPMA would be closed to cross-country motorized travel under this alternative, resulting in indirect protections to ACECs that contain PPMA. Impacts would be the same as those described under Alternative B.

4.16 Soil Resources

4.16.1 Methods and Assumptions

Indicators

Indicators of impacts on soil resources are as follows:

- Declining soil surface health, as expressed through physical or chemical degradation, either with soils that are unable to support vegetation or soils that are not up to the potential for a particular ecological site (e.g., vegetation type, diversity, density, and vigor)
- Acres of BLM-administered land added to or removed from specific grazing practices
- Acres of BLM-administered land protected from or open to surface-disturbing activities
- Acres of invasive plant species that intrude during ground disturbing activities or after instances of fire

Land uses strive to conform to Standards for Public Land Health (described in Section 3.13, Soil Resources), which describe conditions needed to sustain public land health and relate to all uses of the public lands.

Assumptions

The analysis includes the following assumptions:

- Soils on BLM-administered lands will be managed to maintain inherent productivity and promote sustained yields, while keeping erosional mechanism at minimal/acceptable levels thus preventing physical or chemical degradation. Proposed surface-disturbing projects will be analyzed to determine suitability of soils to support or sustain such projects and will be designed to minimize soil loss.
- Achieving or maintaining Standards for Rangeland Health and Guidelines for Livestock Grazing Management (described in **Section 3.7**, Livestock Grazing/Range Management) generally are effective in managing the effects on soils from livestock grazing. Grazing authorizations will be adjusted on a case-by-case basis when site-specific studies indicate changes in management are needed.
- BLM management actions and objectives will be consistent with soil resource capabilities.
- Fuels projects and planned or unplanned fires that contribute to establishing a more natural fire regime would have long-term benefits to soil health.

4.16.2 Nature and Type of Effects

Activities that displace or mix soil horizons, compact, or contaminate soils, or that remove vegetation from soils are generally considered to negatively affect soil health. Impacts on soil resources from surface disturbing activities can result from a number of causes, including improper livestock grazing, some allowed forms of recreation, mineral resource activities, and road improvement or construction. The intensity and extent of impacts on soil resources are determined in part by the type and location of the surface-disturbing activities and surface occupancy. Impacts on soil resources can also be affected by any applicable stipulations and plans of operation. Examples are those that address site-specific environmental concerns and require mitigation to stabilize soil, to prevent unnecessary erosion, and to revegetate disturbed surfaces. Land management actions that prohibit surfaces disturbance, such as areas closed to mineral entry, are more protective of soil resources than land management that allows surface disturbing activities.

Management to protect GRSG involves reducing or otherwise restricting land uses and activities that remove vegetation, disturb the upper soil horizons, or that may compact the surface and thus erode the soil. Livestock grazing, mineral extraction, recreation, and construction within ROW grants have all been identified as having compaction and erosion effects on soils. Designations such as ROW exclusion and avoidance areas and stipulations such as NSO and CSU mitigate compaction and erosion effects on soils. Protecting areas from these activities for the benefit GRSG would also protect soils from disturbance, compaction, and the removal of vegetation.

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

Travel across land by any means can result in vegetation loss, loss of biotic crusts, soil compaction, and soil erosion. Management approaches that designate travel to specified routes can result in more predictable, localized and manageable impacts. Selectively locating travel routes away from areas of sensitive soil conditions can minimize the extent of these effects, ideally limiting them to the footprint of the trail itself.

Recreation on BLM-administered lands may result in vegetation loss, soil compaction, and soil erosion. There are a number of activities that have minimal impacts. The effects of recreation on soil resources are determined by the severity and intensity of the recreation taking place. Areas with large number of visitors and/or mechanized recreation have a greater chance of resulting in some of the detrimental effects than lower impact, lower number recreation areas. Lands and realty management decisions affect where ground-disturbing activities can and cannot occur. Ground-disturbing activities could result in the compaction of soils, the erosion of soils, or vegetation loss, all of which reduce soil stability. In areas with NSO stipulations and managed as ROW exclusion, soil quality would be protected since ground disturbance would be prohibited and soil erosion would be limited to natural processes. In areas managed as ROW avoidance, soil quality would receive some protection since ground disturbance would often be limited. ROW avoidance areas would generally result in lower impacts on soil resources due to more restrictive conditions of use associated with ROW authorization compared to areas not managed as ROW avoidance.

Improper livestock and wild horse and burro management can affect soil resources, especially in wet areas, around springs, and near salt blocks. Wild horses and burros and domesticated livestock often use riparian and wetland areas for water and shade, and may congregate around water developments which results in compacted soil and trampled nearby vegetation. At unsustainable levels, grazing from livestock or wild horses can lead to loss of vegetative cover, reduced water infiltration rates and nutrient cycling, decreased plant litter and water quality, and increased bare ground and soil erosion (Manier et al. 2013). Land health evaluations, appropriate management levels, rangeland monitoring studies, and rangeland health standards are used to assess rangeland condition and help to identify where a change in livestock grazing wild horse and burro management would be beneficial. Fluid mineral development generally requires both permanent and temporary roads, drilled wells, and associated well pads. In addition, fluid mineral development may require associated pipelines and transmission lines, along with the construction of necessary service roads for these facilities. Local soil health and characteristics within project footprints are typically impacted by compaction and vegetation clearing. Effects or impacts from mineral activity is regulated and mitigated through federal and state laws, as well as handbooks, stipulations, and conditions of approval which have reduced the amount of soil disturbance on a case-by-case basis.

Locatable minerals, mineral materials, and nonenergy leasable mineral activities require road construction and large areas of soil excavation. Local soil health and characteristics within project footprints are typically negatively impacted by excavation, compaction, erosion, and vegetation clearing. Restoration and restoring vegetation may return a lower level of soil health over the long term, once mineral extraction is complete; however, landscapes are often permanently changed as areas of prior soil cover are often permanently altered through such features as open pits.

Implementing management for the following resources would have negligible or no impact on soil resources for all alternatives; therefore, they are not discussed in detail:

- Special status species—Greater Sage-Grouse
- Recreation
- Coal
- Special designations
- Air quality and climate change
- Special status plants

4.16.3 Impacts Common to All Alternatives

Impacts from Vegetation Management

Habitat restoration would occur under all alternatives and would be implemented based on environmental variables that indicate areas most likely to succeed in restoration and therefore benefit GRSG. Restoring habitat has a beneficial effect on soils over the long term. Vegetation management is initially disturbing to soils as undesirable vegetation is removed through cutting or burning, and as native seed is planted, at times using heavy equipment. Success of vegetation management may not result in soil health improvements for years after initial disturbance. Soils that have a high restoration potential value would tend to support restorative vegetation activities due to proper soil conditions, such as low salt content, adequate water retention, and available rooting depth. High potential restoration soil must combine with favorable environmental conditions such as precipitation and temperatures to be successful. If success is not obtained then reintroducing plantings or seeding must reoccur for success to occur.

Vegetation management would also aim to reduce and prevent the spread of invasive species under all alternatives. Displacement of native plants by invasive species results in changes in the soil properties, such as soil temperatures and soil water distribution, which may result in bare ground or the inability to support the ecological site. Quick growing weeds like cheatgrass and medusahead increase the likelihood of wildfires by drying out earlier and remaining dry longer than other plants in the vegetation community, resulting in an excessive buildup of extremely flammable standing cheatgrass and litter. Areas heavily infested with cheatgrass have a rapid fire regime when compared to areas composed of native vegetation. Increased fire patterns results in further changes to soil properties and increased soil erosion rates.

Impacts from Leasable Minerals Management

While there is potential for development, there have been no wells developed on the leases issued on occupied GRSG habitat in the planning area. Under all alternatives, the potential for development is estimated to be low; therefore, impacts on soil resources from development would be limited.

Impacts from Locatable Minerals Management

All locatable minerals could exist within the planning area, but exploration has been minimal and the potential is unknown across all alternatives.

Impacts from Nonenergy Leasable Minerals Management

While there is potential for development, there have been no wells developed on the leases issued on occupied GRSG habitat in the planning area. Under all alternatives, the potential for development is estimated to be low; thus, impacts on soil resources from development would likely be limited and occur independent of areas available for leasing or stipulations applied.

Impacts from Mineral Split-Estate Management

For the purposes of impacts on soil resources, split-estate minerals would be similar to that described above by category of minerals.

Wild Horses and Burros

Under all alternatives, unsustainable levels of wild horse management results in impacts on soil resources through the overgrazing, resulting in bare ground, and through trampling or removing vegetation and compacting soils near water resources around which wild horses may congregate for water and shade. AMLs of wild horse and burro populations and land health evaluations to assess rangeland health would be utilized under all alternatives to reduce and minimize these impacts.

Wildland Fire Management

Under all alternatives, wildland or prescribed fire will affect soil resources depending on the severity, intensity, and regime of the fire and on how much heat is transferred to the soil during a fire event. Short term effects after a fire include the loss of vegetation cover resulting in increased susceptibility of soil erosion. Long term effects of fire result from the process of soil heating, which can cause significant changes in the physical, chemical, and biological properties that are relevant to the future productivity and sustainability of wildland sites, and may increase the soils susceptibility to invasive weeds until native vegetation reestablishes (Forest Service 2005). Conversely, managing for the suppression of wildfires results in soil disturbance and compaction during the removal of excess vegetation.

4.16.4 Alternative A

Impacts from Livestock Grazing/Range Management

Under Alternative A, 12,122,000 acres, or 96 percent of the planning area is open to livestock grazing; 346,000 acres or 3 percent of the planning area is closed to livestock grazing. Of the acres open to livestock grazing, 4,492,000 acres are within PPH and 5,502,000 acres are within PGH on BLM-administered lands.

All permits and leases under Alternative A would continue to be required to meet or make progress toward meeting standards defined in the Oregon and Washington Public Land Health Standards (described in **Section 3.7**, Livestock Grazing/Range Management). Grazing permits, including grazing systems, permitted AUMs, and allotment boundaries would be modified as necessary to conform to Standards and Guidelines for Livestock Grazing Management. Changes to rangeland management would be directed first to allotments not meeting land health standards, which may include changes in number of permitted AUMs, or current timing, duration, or frequency of permitted used, including temporary closures.

Alternative A, B, and E have the most acreage that would be managed as open to livestock grazing. This would subject the most acreage of soil resources to the possible impacts of livestock grazing as outline in **Section 4.16.2**, including potential loss of vegetative cover, and increased bare ground and soil erosion.

Impacts from Travel Management

Alternative A would manage 6,812,000 acres (54 percent) of the planning area as open to cross-country motorized travel, 300,300 acres (2 percent) of the planning area as closed to cross-country motorized travel, and 5,325,000 acres (42 percent) as limited to existing roads and trails, with possible additional seasonal or vehicle type restrictions. Alternative A would manage the largest amount of acreage as open to cross-country motorized travel, which subjects the most acreage of soil resources to the possible impacts caused by overland travel. Potential effects of travel management on soil resources include vegetation loss, loss of biotic crusts, soil compaction, or soil erosion.

Impacts from Lands and Realty Management

Under Alternative A, 857,600 acres (7 percent of the planning area) would continue to be managed as ROW exclusion areas, and 3,446,000 acres (27 percent) would continue to be managed as ROW avoidance areas. Alternative A would manage 8,314,000 acres (66 percent) of the planning area as open to potential ROW authorizations. Of the acres managed as ROW exclusion areas, 257,200 acres are located within PPH and 288,200 acres are located within PGH. Of the acres managed as ROW avoidance areas, 1,336,000 acres are located within PPH and 1,672,000 acres are managed within PGH.

Within exclusion areas, new ROW development would continue to be prohibited. This would prevent surface disturbance from ROW development within these areas. Within avoidance areas, the BLM would require ROW applicants to observe additional conditions, such as siting criteria and design requirements. This could discourage new ROW development in these areas. Within areas open to ROW authorization, soil resources may be affected by ROW development, including potential vegetation loss and soil compaction. However, any effects on soil resources from ROW authorizations would be limited to the footprint of the disturbance area within the ROW. The BLM would analyze impacts from individual ROW authorizations upon receipt of applications and as part of subsequent implementation-level environmental analyses.

Impacts from Energy and Mineral Development

Under Alternative A, 997,000 of BLM-administered acres (8 percent of the planning area) are managed as withdrawn from locatable mineral entry and 11,601,000 acres (92 percent) are managed as open to locatable mineral exploration or development. An additional 21,000 acres would be recommended for withdrawal. Mineral material disposal would manage 2,753,000 of BLM-administered acres (22 percent) as closed to mineral material disposal consideration, and 9,026,000 acres (72 percent) would be managed as open for mineral material disposal consideration. 3,134,000 BLM-administered acres (25 percent) would be managed as closed to nonenergy solid leasable mineral exploration or development, and 9,484,000 acres (75 percent) would be managed as open to nonenergy solid leasable mineral exploration or development.

On BLM-administered lands, 3,134,000 acres (25 percent of the planning area) would be closed to fluid mineral leasing, of which 2,728,000 are located on PPH or PGH. 9,484,000 acres (75 percent) would be managed as open to fluid mineral leasing, of which 7,481,000 are located on PPH and PGH. Of the acres open to fluid mineral leasing, 906,000 would be subjected to NSO stipulations, and 2,703,000 would be subjected to CSU stipulations.

Alternative A is the least restrictive on energy and mineral development of all the alternatives. As a result, the indirect impacts of development on soil resources as discussed in **Section 4.16.2** (including soil compaction and excavation, and the clearing of vegetation) would be the greatest under this alternative.

4.16.5 Alternative B

Impacts from Livestock Grazing/Range Management

Under Alternative B, management actions would not result in direct changes to the amount of acres open or closed to livestock grazing. Potential effects on soil resources from livestock grazing would remain the same as those under Alternative A.

Impacts from Travel Management

Under Alternative B, 4,142,000 acres (33 percent of the planning area) would be managed as open to unrestricted cross-country motorized travel, 300,300 acres (2 percent) would be managed as closed to cross-country motorized travel, and 7,996,000 acres (63 percent) would be limited to existing roads and trails. Additionally, route construction would be limited to realigning existing routes, new roads would be built to the absolute minimum standard necessary, and roads and trails not designated in travel management plans would be restored using appropriate seed mixes. Restoration of roads would benefit soil resources by reducing total overall acres of soils affected by travel management through replacing cleared vegetation, and correcting areas where soils are compacted or eroding beyond natural levels.

Alternative B would managed the same amount of acreage as closed to cross-county motorized travel as Alternative A, would managed 2,670,000 less acres as open to travel management than Alternative A, and 2,671,000 more acres as limited to existing roads and trails. This equates to a 21 percent reduction in lands open to cross-country motorized travel, and a 21 percent increase in lands managed as limited to existing roads and trails, which would be more protective of soil resources from the potential effects of cross country motorized travel than Alternative A.

Impacts from Lands and Realty Management

Alternative B would manage 4,866,000 acres (39 percent of the planning area) as ROW exclusion areas, 6,107,000 acres (48 percent) as ROW avoidance areas, and 1,645,000 acres (13 percent) as open to ROW authorizations. PGMA would be managed as a ROW avoidance area on 5,663,000 acres and PPMA would be managed as a ROW exclusion area on 4,547,000 acres. Compared to Alternative A, Alternative B would be more protective of soil resources from potential impacts from ROW authorizations due to greater acreage of exclusion areas. Alternative B would increase the acreage managed as ROW exclusion areas by 4,008,000 acres or 32 percent, would increase the acreage managed as ROW avoidance areas by 2,661,000 acres or 21 percent, and would decrease the acreage open to ROW authorizations by 6,669,000 acres, or 53 percent compared to Alternative A. ROW avoidance and exclusion designations have more restrictive conditions of use than areas open to ROW authorization which reduces the amount of vegetation clearing and soil compaction occurring within a ROW authorization. Regardless of ROW designation, any authorized ROW effects on soil resources would be limited to the footprint of the disturbance area within the ROW. The BLM would analyze impacts from individual ROW authorizations upon receipt of applications and as part of subsequent implementation-level environmental analyses.

Alternative B would also remove power lines and reclaim ROW sites that are no longer in use, which would restore the surrounding habitat and reverse the vegetation clearing and soil compaction effects of ROW authorizations.

Impacts from Energy and Mineral Development

Alternative B would have the same number of acreage closed to locatable mineral entry as Alternative A, would increase the number of acres recommended for withdrawal from locatable mineral entry from 21,000 acres under Alternative A to 4,292,000 acres, and would reduce the amount of acreage open to locatable mineral entry from 11,601,000 to 7,321,000. Alternative B would also have a greater number of acres closed to mineral material disposal consideration, nonenergy solid leasable mineral entry, and areas available for fluid mineral leasing. The greater amount of acreage closed to mineral entry under Alternative B equates to a smaller amount of acreage open and available for potential impacts on soil resources from mineral exploration and development. Alternative B would be more protective of soil resources from vegetation clearing, soil compaction, and soil excavation than Alternative A. Specific acreage differences under the various mineral resources are detailed below.

Availability for locatable mineral entry would be withdrawn on 997,000 of BLM-administered acres and would be open for mineral exploration or development on 7,321,000 acres. This is the same acreage of current withdrawal from locatable mineral entry as Alternative A, and a decrease of acreage open to locatable mineral entry by 4,280,000 acres.

Mineral material disposal would be managed as closed to mineral material disposal on 6,373,000 BLM-administered acres, and open for mineral material disposal consideration on 6,245,000 acres. This is a 3,620,000 acre increase in areas closed to mineral material disposal over Alternative A, and a 2,781,000 acre decrease in lands available for mineral material disposal consideration, compared to Alternative A.

Nonenergy solid leasables would be managed as closed to mineral exploration and development on 6,531,000 BLM-administered acres, and open to mineral entry exploration and development on 6,087,000 acres. This is a 3,397,000 acre increase in areas closed to nonenergy solid leasable exploration and development and a 3,397,000 acre decrease in areas open to nonenergy solid leasable exploration and development compared to Alternative A.

On BLM-administered lands, 6,531,000 acres would be closed to fluid mineral leasing, of which 6,125,000 acres are located on PPMA or PGMA. 6,087,000 acres would be managed as open to fluid mineral leasing, of which 4,085,000 are located on PGMA. Of the acres open to fluid mineral leasing, 600,700 would be subjected to NSO stipulations, and 1,830,000 acres would be subjected to CSU stipulations. This is a 3,397,000 acre increase in acres closed to fluid mineral leasing over Alternative A, and a 3,397,000 decrease in acres open to fluid mineral leasing.

4.16.6 Alternative C

Impacts from Livestock Grazing/Range Management

Alternative C would close all acres to livestock grazing and would remove all allotments from the planning area. This would include any allotments completely or partially within occupied GRSG habitat. This would completely remove the potential for improper livestock grazing and the associated impacts on soil resources, including vegetation clearing, and soil trampling or compaction.

Impacts from Travel Management

Under Alternative C, 1,203,000 acres (9 percent of the planning area) would be managed as open to cross-country motorized travel, 300,300 acres (3 percent) would be managed as closed to cross-country motorized travel, and 10,937,000 acres (87 percent) would be managed as limited to existing roads and trails.

Alternative C would managed the same amount of acreages as closed to cross-county motorized travel as Alternative A, would managed 5,609,000 less acres as open to travel management than Alternative A, and 5,612,000 more acres as limited to existing roads and trails. This equates to a 45 percent reduction in lands open to cross-country motorized travel, and a 45 percent increase in lands managed as limited to existing roads and trails, which would be more protective of soil resources from the potential effects of cross country motorized travel than Alternative A and B.

Impacts from Lands and Realty Management

Alternative C would manage 10,682,000 acres as ROW exclusion areas (85 percent of the planning area), 293,000 acres (2 percent) as ROW avoidance areas, and 1,643,000 acres (13 percent) as open to ROW authorizations. This includes managing 4,547,000 acres of PPMA and 5,669,000 acres of PGMA as ROW exclusion areas. Compared to Alternative A, Alternative C would be more protective of soil resources from potential impacts from ROW authorizations due to a greater amount of acreage designated as ROW exclusion areas.

Alternative C would increase the acreage managed as ROW exclusion areas by 9,825,000 acres (78 percent), but would decrease the acreage managed as ROW avoidance areas by 3,153,000 acres (25 percent), and would decrease the acreage open to ROW authorizations by 6,671,000 acres (52 percent) compared to Alternative A. ROW avoidance and exclusion designations have more restrictive conditions of use than areas open to ROW authorization which reduces the amount of vegetation clearing and soil compaction occurring within a ROW authorization. Regardless of ROW designation, any authorized ROW effects on soil resources would be limited to the footprint of the disturbance area within the ROW. The BLM would analyze impacts from individual ROW authorizations upon receipt of applications and as part of subsequent implementation-level environmental analyses.

Impacts from Mineral and Energy Development

Availability for locatable mineral entry would be withdrawn on 997,000 acres of BLM-administered lands and would be open for mineral exploration or development on 2,229,000 acres. An additional 9,392,000 acres would be recommended for withdrawal, which would protect soil resources from potential effects of locatable mineral development in these areas once the petition is complete. This is the same acreage of current withdrawal from locatable mineral entry as Alternative A, and a decrease of acreage open to locatable mineral entry by 9,372,000 acres. Alternative C would prevent the most potential soil impacts from locatable mineral management of all the alternatives.

Mineral material disposal would be managed as closed to mineral material disposal on 10,726,000 BLM-administered acres, and open for mineral material disposal consideration on 1,891,843 acres. This is a 7,973,000 acre increase in areas closed to mineral material disposal over Alternative A, and a 7,134,000 acre decrease in lands available for mineral material disposal consideration. Alternative C would prevent the most potential soil impacts from mineral material disposal of all the alternatives.

Nonenergy solid leasables would be managed as closed to mineral exploration and development on 10,616,000 BLM-administered acres, and open to mineral entry exploration and development on 2,002,000 acres. This is a 7,482,000 acre increase in areas closed to nonenergy solid leasable exploration and development and a 7,482,000 acre decrease in areas open to nonenergy solid leasable exploration and development. Alternative C would prevent the most potential soil impacts from nonenergy solid leasables of all the alternatives.

On BLM-administered lands, 10,616,000 acres would be closed to fluid mineral leasing, of which 10,210,000 acres are located on PPMA or PGMA. 2,002,000 acres would be managed as open to fluid mineral leasing. No acres within PPMA and PGMA would be open to fluid mineral leasing. Of the acres open to fluid mineral leasing, 195,000 would be subjected to NSO stipulations, and 631,000 acres would be subjected to CSU stipulations. This is a 7,482,000 acre increase in acres closed to fluid mineral leasing over Alternative A, and a 7,481,000 acre decrease in acres open to fluid mineral leasing. Alternative C would prevent the most potential soil impacts from fluid mineral leasing of all the alternatives.

Alternative C has the most acres closed to, and is the most restrictive of mineral development of all the alternatives. As such, due to the amount of acreage closed, Alternative C would provide the most protection for soil resources from disturbance from mineral exploration and development.

4.16.7 Alternative D

Impacts from Livestock Grazing/Range Management

Under Alternative D, 12,022,000 acres or 95 percent of the planning area would be managed as open to livestock grazing and 445,000 acres or 4 percent of the planning area would be managed as closed to livestock grazing. Of the acres open to livestock grazing, 4,418,000 acres are located within PPMA and 5,480,000 acres are located within PGMA. This is a 22,000 acre reduction in acres open to livestock grazing within PGMA, and a 75,000 acre reduction in acres open to livestock grazing within PPMA in comparison with Alternative A. Alternative D would be slightly more protective of soil resources from the potential effects of livestock grazing than Alterative A due to the reduction of acres open to livestock grazing in PGMA and PPMA and an additional closure of 99,000 acres of non-habitat lands to livestock grazing.

Impacts from Travel Management

Alternative D would manage the same number of acres as open, limited, or closed to cross-country motorized travel as Alternative B, and would therefore have similar effects on soil resources as Alternative B. However, Alternative D would provide fewer restrictions on route construction and maintenance, which may lead to more dispersed construction and therefore more dispersed impacts on soil resources.

Alternative D would managed the same amount of acreage as closed to cross-county motorized travel as Alternative A, would managed 2,670,000 less acres as open to travel management than Alternative A, and 2,671,000 more acres as limited to existing roads and trails. This equates to a 21 percent reduction in lands open to cross-country motorized travel, and a 21 percent increase in lands managed as limited to existing roads and trails, which would be more protective of soil resources from the potential effects of cross country motorized travel than Alternative A.

Impacts from Lands and Realty Management

Alternative D would manage 857,600 acres as ROW avoidance areas and 5,965,000 acres as ROW exclusion areas. This includes managing 257,000 acres of PPMA and 288,000 acres of PGMA as ROW exclusion areas and managing 4,290,000 acres of PPMA and 1,672,000 acres of PGMA as ROW avoidance areas. ROW exclusion areas under Alternative D would be the same as Alternative A, and ROW avoidance areas would increase by 2,519,000 acres. Overall effects of lands and realty management would be very similar to Alternative A as an increase in ROW avoidance areas does not restrict ROW authorizations. Exceptions could be made for some development, so disturbance from ROW development could still affect soil resources.

Impacts from Mineral and Energy Development

Under Alternative D, mineral and energy development management would be similar to that described under Alternative A.

Acres withdrawn from, open to, and will be recommended for withdrawal from locatable mineral entry under Alternative B are the same as under Alternative A, therefore potential effects on soil resources from locatable mineral entry would be the same.

Mineral material disposal management under Alternative D would be the same as Alternative B. Alternative D and B would manage 6,373,000 acres as closed to mineral material disposal, and 6,245,000 acres as open for mineral material disposal consideration. This is a 3,620,000 acre increase in areas closed to mineral material disposal over Alternative A, and a 2,781,000 acre decrease in lands available for mineral material disposal consideration.

Nonenergy solid leasable mineral management is the same under Alternative B as Alternative A. Therefore, the potential effects on soil resources from locatable mineral entry would be the same.

Acres open and closed to fluid mineral leasing under Alternative D would be the same as under Alternative A. Acres open to fluid mineral leasing, but subject to NSO or CSU increase under Alternative D. Under Alternative D, 3,463,000 acres open to fluid mineral leasing would be managed as NSO, which is a 2,557,000 acre increase over Alternative A. Alternative D would also manage 2,990,000 acres open to fluid mineral leasing as CSU, which is a 287,000 acre increase over Alternative A.

Due to increased acres closed and decreased acres open for mineral material disposal consideration, and due to more acreage open to fluid mineral leasing subject to NSO and CSU, Alternative D would provide for more protection from the potential effects to soil resources from mineral development than Alternative A.

4.16.8 Alternative E

Impacts from Livestock Grazing/Range Management

Alternative E would have the same amount of acreage open and closed to livestock grazing as Alternative A. Alternative E would also manage the same amount of acreage of GRSG Core Area habitat as open or closed to livestock grazing as Alternative A would manage PPH. Alternative E would manage 3,824,000 acres as open to livestock grazing, which is a 1,678,000 acre reduction in lands open to livestock grazing in Low Density habitat compared to Alternative A, which would manage 5,502,000 acres as open to livestock grazing within PGH. Effects of livestock grazing on soil resources under Alternative E would be the similar to those expected under Alternative A, with potential impacts reduced in Low Density habitat due to greater closure to livestock grazing.

Impacts from Travel Management

Alternative E would manage 3,914,000 acres (31 percent of the planning area) as open to cross-country motorized travel, 275,000 acres (2 percent) as closed to cross-country motorized travel, and 6,044,000 acres (48 percent) as limited to existing road and trails. This would be a 2,898,000 acre or 23 percent reduction in acres open to cross-country travel, a 25,400 acre or 0.2 reduction in acres closed to cross-county travel, and a 718,000 acre or 6 percent increase in acres managed as limited to existing roads and trails. Due to the 23 percent reduction in acres open to cross county travel, Alternative E would be more protective of soil resources than Alternative A, due to less acreage open and available for soil compaction caused by overland travel. Also, Alternative E would seasonally restrict OHV use to areas greater than 2 miles from leks during the GRSG breeding season (approximately March 1 through July 15), which would reduce the potential for effects on soil resources from overland travel during this time.

Impacts from Lands and Realty Management

Under Alternative E, 4,547,000 acres of Core Area habitat would be managed as ROW exclusion areas and 1,336,000 acres of Core Area habitat would be managed as ROW avoidance areas. In addition, 157,000 acres of Low Density habitat would be managed as ROW exclusion areas and 1,384,000 acres of Low Density habitat would be managed as ROW avoidance areas. Alternative E would manage more acres as ROW exclusion areas than Alternatives A, B, and D, and would manage more acres as ROW exclusion areas than Alternatives C and F, and less than Alternatives B and D.

Impacts from Energy and Mineral Development

Acres withdrawn from and open to locatable mineral entry under Alternative E are the same as under Alternative A. Under Alternative E, 4,292,000 acres open to locatable mineral entry would be recommended for withdrawal, which would reduce the potential for impacts on soil resources from locatable mineral exploration and development once the withdrawals are complete. Alternative E would provide more protection to soil resources than Alternative A.

Under Alternative E mineral material disposal would be managed as closed to mineral material disposal on 6,373,000 BLM-administered acres, and open for mineral material disposal consideration on 6,245,000 acres, which is the same as Alternative B. This is a 3,620,000 acre increase in areas closed to mineral material disposal over Alternative A, and a 2,781,000 acre decrease in lands available for mineral material disposal consideration, compared to Alternative A.

Nonenergy solid leasables would be managed as closed to mineral exploration and development on 6,531,000 BLM-administered acres, and open to mineral entry exploration and development on 6,087,000 acres, which is the same as Alternative B. This is a 3,397,000 acre increase in areas closed to nonenergy solid leasable exploration and development and a 3,397,000 acre decrease in areas open to nonenergy solid leasable exploration and development compared to Alternative A.

Under Alternative E, on BLM-administered lands, 6,531,000 acres would be closed to fluid mineral leasing, of which 5,810,00 acres are located on Core Area or Low Density habitat. 6,087,000 acres would be managed as open to fluid mineral leasing, of which 4,085,000 are located within Low Density habitat. Of the acres open to fluid mineral leasing, 600,700 would be subjected to NSO stipulations, and 1,830,000 acres would be subjected to CSU stipulations. This is a 3,397,000 acre increase in acres closed to fluid mineral leasing over Alternative A, and a 3,397,000 decrease in acres open to fluid mineral leasing.

Alternative E would have a greater number of acres closed to mineral material disposal consideration, nonenergy solid leasable mineral entry, and areas available for fluid mineral leasing. The greater amount of acreage closed to mineral entry under Alternative E equates to a smaller amount of acreage open and available for potential impacts on soil resources from mineral exploration and development. Alternative E would be more protective of soil resources from vegetation clearing, soil compaction, and soil excavation than Alternative A.

4.16.9 Alternative F

Impacts from Livestock Grazing/Range Management

Under Alternative F 7,496,000 acres, or 59 percent, of the planning area would be managed as open to livestock grazing; 2,499,000 acres, or 20 percent, of the planning area would be managed as closed to livestock grazing. Alternative F would result in a 4,627,000 acreage reduction, or a 37 percent decrease in lands open to grazing over Alternative A. Alternative F would also result in a 2,153,000 acre or 17 percent increase in lands managed as closed to livestock grazing. Of the acres closed to livestock grazing, 1,123,000 acres are located in PPMA and 1,375,000 acres are located in PGMA. Alternative F is the second most restrictive alternative for livestock grazing, behind Alternative C, and would therefore be the second most protective of soil resources from potential effects of improper livestock grazing.

Impacts from Travel Management
Alternative F would manage the same number of acres as open, limited, or closed to cross-country motorized travel as Alternative B. Additionally, Alternative F would prohibit road construction and upgrades within 4 miles of active leks, and would avoid road construction and upgrades within occupied habitat. This would further limit the potential effects of travel management on soils, as described under **Section 4.16.2**.

Alternative F would manage the same amount of acreage as closed to cross-county motorized travel as Alternative A, 2,670,000 less acres as open to travel management than Alternative A, and 2,671,000 more acres as limited to existing roads and trails. This equates to a 21 percent reduction in lands open to cross-country motorized travel, and a 21 percent increase in lands managed as limited to existing roads and trails, which would be more protective of soil resources from the potential effects of cross country motorized travel than Alternative A.

Impacts from Lands and Realty Management
Alternative F would have the same potential for impacts on soil resources as Alternative C, and manage the same acreage as ROW exclusion (10,682,000 acres) and ROW avoidance (293,000 acres) areas. Alternative F would increase the acreage managed as ROW exclusion areas by 9,825,000 acres (78 percent), but would decrease the acreage managed as ROW avoidance areas by 3,153,000 acres (25 percent), and would decrease the acreage open to ROW authorizations by 6,671,000 acres (52 percent) compared to Alternative A. Of the acres managed as ROW exclusion areas, 4,547,000 acres are located within PPMA and 5,669,000 are located in PGMA.

Impacts from Energy and Mineral Development
Acres withdrawn from and open to locatable mineral entry under Alternative F are the same as under Alternative B. Alternative F and B would have the 997,000 number of acreage withdrawn from locatable mineral entry, which is the same as Alternative A. Alternative F would increase the number of acres recommended for withdrawal from locatable mineral entry from 21,000 acres under Alternative A to 4,292,000 acres, which would protect soil resources from potential effects of mineral resources in these areas once the petition is complete. Under Alternative F, 7,321,000 acres would be opened to locatable mineral exploration, which is a 4,280,000 acre reduction in acres open to locatable mineral exploration compared with Alternative A. Due to less acres open for mineral entry, and more acres recommended for withdrawal,

Alternative F would provide more protection to soil resources from locatable mineral activity than Alternative A.

Under Alternative F, mineral material disposal would be managed as closed to mineral material disposal on 6,373,000 BLM-administered acres, and open for mineral material disposal consideration on 6,245,000 acres, which is the same as Alternative B and E. This is a 3,620,000 acre increase in areas closed to mineral material disposal over Alternative A, and a 2,781,000 acre decrease in lands available for mineral material disposal consideration, compared to Alternative A.

Nonenergy solid leasables would be managed as closed to mineral exploration and development on 6,531,000 BLM-administered acres, and open to mineral entry exploration and development on 6,087,000 acres, which is the same as Alternative B and E. This is a 3,397,000 acre increase in areas closed to nonenergy solid leasable exploration and development and a 3,397,000 acre decrease in areas open to nonenergy solid leasable exploration and development compared to Alternative A.

Under Alternative F, on BLM-administered lands, 10,615,593 acres would be closed to fluid mineral leasing, of which 10,210,000 acres are located within PPMA or PGMA. 2,002,000 acres would be managed as open to fluid mineral leasing, of which 0 are located within PPMA or PGMA. Of the acres open to fluid mineral leasing, 195,000 would be subjected to NSO stipulations, and 631,000 acres would be subjected to CSU stipulations. This is a 7,482,000 acre increase in acres closed to fluid mineral leasing over Alternative A, and a 7,482,000 decrease in acres open to fluid mineral leasing.

Alternative F would have a greater number of acres recommended for withdrawal from locatable mineral entry, and a greater number of acres closed to mineral material disposal consideration, nonenergy solid leasable mineral entry, and areas available for fluid mineral leasing. The greater amount of acreage closed to mineral entry under Alternative F equates to a smaller amount of acreage open and available for potential impacts on soil resources from mineral exploration and development. Alternative F would be more protective of soil resources from vegetation clearing, soil compaction, and soil excavation than Alternative A.

4.17 WATER RESOURCES

4.17.1 Methods and Assumptions

Indicators

Indicators of impacts on water resources are as follows:

- Alter land open or closed to surface disturbing-activities

- Alter the characteristics of water sources that influence GRSG to a point at which these resources are not properly functioning or sustainable
- Restore water sources for GRSG
- Alter water resources for mosquito-breeding habitat
- Alter the condition of riparian and wetland vegetation

Assumptions

The analysis includes the following assumptions:

- Projects that help restore watersheds, desirable vegetation communities, or wildlife habitats (including surface disturbance associated with these efforts) would benefit water resources over the long term.
- The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors. These are proximity to running streams, drainages and groundwater wells, location within the watershed, time and degree of disturbance, reclamation potential of the affected area, vegetation present, precipitation, and mitigating actions applied to the disturbance.
- Surface-disturbing actions related to fluid mineral development would comply with Gold Book surface operating standards (and subsequent updates), and all federal and state water quality standards.
- Fluid mineral operations on existing federal leases, regardless of surface ownership, would be subject to COAs by the authorizing officer. The BLM can deny surface occupancy on portions of leases with COAs to avoid or minimize resource conflicts if this action does not eliminate reasonable opportunities to develop the lease or does not affect lease rights.

4.17.2 Nature and Type of Effects

Surface water quality is influenced by both natural and human factors. Aside from the natural factors of weather-related erosion of soils into waterways, surface water quality can be temporarily affected by the additional transport of eroded soils into streams due to improperly managed recreational activities or livestock grazing, introduction of waste matter into streams from domestic livestock, and low-water crossing points of roads, routes, and ways used by motorized vehicles. Activities that introduce chemicals into the natural environment also have the potential to degrade surface and water quality through leaks, accidents, and broken well casings. All of these activities have appropriate regulation and mitigation measures in place to reduce and, in most cases, eliminate these risks.

Surface-disturbing activities under certain circumstances can also lead to soil compaction, which decreases infiltration rates and elevates the potential for overland flow. Overland flow can increase erosion and sediment delivery potential to area surface water bodies, leading to surface water quality degradation.

Surface-disturbing activities within stream channels, floodplains, and riparian habitats are more likely to alter natural morphologic stability and floodplain function. Morphologic destabilization and loss of floodplain function accelerate stream channel and bank erosion, increase sediment supply, dewater near-stream alluvium, cause the loss of riparian and fish habitat, and deteriorate water quality (Rosgen 1996). Altering or removing riparian habitats can reduce the hydraulic roughness of the bank and increase flow velocities near the bank, which can also lead to accelerated erosion and possibly decrease water quality (National Research Council 2002).

Management to protect GRSG generally involves reducing or otherwise restricting land uses and activities that disturb the surface. Therefore, the greater the amount of acreage restricted from a land disturbing use, the greater the protection of impacts from surface disturbing active afforded to water resources.

Lands and realty management decisions effect where ground-disturbing activities can and cannot occur. The use of ROW exclusion and ROW avoidance designations limit the amount of human-made runoff of soils and chemicals into waterways within those areas and are generally considered to be protective of water quality. ROW exclusion and avoidance are also seen to reduce the likelihood of chemical spills onto the ground, which can then sink into the earth and contaminate groundwater. Areas where ROWs are authorized are permitted with COAs which include that the holder of the rights comply with the Water Quality Act and other federal and state laws, which would protect water resources from degradation.

In areas with NSO stipulations and managed as ROW exclusion, the potential for effects on water quality would be reduced since new ground disturbances would be prohibited. In areas managed as ROW avoidance, water quality would receive some protection since ground disturbance would often be limited. ROW avoidance areas would generally result in lower impacts on water quality, compared with areas not managed as ROW avoidance.

Livestock and wild horses often use riparian and wetland areas for water and shade and may congregate around water developments which results in compacted soil, decreased water quality due to fecal coliforms, trampled nearby vegetation, and can reduce riparian community conditions and hydrologic functionality. At unsustainable levels, grazing from livestock or wild horses can lead to loss of vegetative cover, reduced water infiltration rates and nutrient cycling, decreased plant litter and water quality, and increased bare ground and soil erosion (Manier et al. 2013). Land health evaluations, appropriate management levels, rangeland monitoring studies, and rangeland health standards are used to assess rangeland condition and help to identify where a change in livestock grazing or wild horse and burro management would be beneficial. Drought management is also available during drought years to respond to specific environmental needs during drought, including maintaining the water quality of lower water levels in ponds, lakes, and streams, and assessing for appropriate recommendations concerning instream flows for water management and use (State of Oregon EOP 2002).

At the same time, water supply structures throughout the landscape that have been established for the benefit of livestock also often provide drinking water sources for GRSG. GRSG will use free water, but they do not require is since they obtain their water needs from the food they eat. Information on the extent of habitat influenced by produced water and the net effects on GRSG is unknown (USFWS 2010a). Range improvements that increase drinking water sources can also increase competition from other species, add new water sources for mosquitoes carrying West Nile virus, and attract predators and subsequently increase predation risks to GRSG. Management actions could also change the availability of water sources to serve as mosquito breeding habitat. This could in turn change the risk of West Nile virus transmission to GRSG.

Travel across land by any means can result in vegetation loss, loss of biotic crusts, soil compaction, and soil erosion, which may increase soil deposition into waterways. Management approaches that designate travel to specified routes can result in more predictable, localized, and manageable impacts. Selectively locating travel routes away from areas where water resources exist can minimize the extent of these effects.

Recreation on BLM-administered lands may result in temporary and localized increased soil deposition into waterways, and temporary decreases in water quality from recreational uses such as camping and river floating. There are a number of activities that have minimal impacts. The effects of recreation on water resources are determined by the proximity of the recreation to waterways, and the severity and intensity of the recreation taking place. Areas with large number of visitors have a greater chance of resulting in some of the detrimental effects than lower impact, lower number recreation areas.

Potential impacts from locatable mineral, mineral material, nonenergy leasable, and fluid leasable mineral activity often result from violation of mineral regulations and can include the release of pollutants capable of contaminating surface water or aquifers during groundwater recharge as a result of use, storage, and transportation of hazardous fluids and compounds. Mining activities and developments could alter drainage patterns which would affect stream hydrographs and water supplies, and unintended discharge of mine water could alter water chemistry and impair natural stream morphologic conditions. Effects or impacts from mineral activity is regulated and mitigated through federal and state laws, as well as handbooks, stipulations, and conditions of approval which have effectively reduced the potential of surface or groundwater contamination. However, areas managed as closed to mineral entry would eliminate any potential for impacts on water resources, and therefore be more protective of water resources than areas open to mineral entry.

Implementing management for the following resources would have negligible impact or no impact on water resources for all alternatives; therefore, they are not discussed in detail:

- Special status species – Greater Sage-Grouse
- Coal
- Recreation management
- Special designations
- Air quality and climate change
- Special status plants

4.17.3 Impacts Common to All Alternatives

Impacts from Vegetation Management

Under all alternatives, habitat restoration would occur. It would be implemented based on environmental variables that indicate areas most likely to succeed in restoration and therefore benefit GRSG. Restoring habitat has a beneficial effect on water quality over the long term. Direct effects of vegetation management may temporarily decrease water quality through increased sedimentation into water ways from undesirable vegetation clearing or burning. Long term effects of vegetation management would in protect water quality by reducing runoff and sedimentation into surface waters through stabilizing soils with vegetation.

Vegetation management would also aim to reduce and prevent the spread of invasive species under all alternatives. Displacement of native plants by invasive species results in changes in the soil properties such as soil water distribution, which may result in bare ground or the inability to support the ecological site, which may affect water resources by increasing sediment deposition into waterways and decreasing overall water availability. Quick growing weeds like cheatgrass and medusa head increase the likelihood of wildfires by drying out earlier and remaining dry longer than other plants in the vegetation community, resulting in an excessive buildup of extremely flammable standing cheatgrass and litter. Areas heavily infested with cheatgrass have a rapid fire regime when compared to areas composed of native vegetation. Increased fire patterns may result in frequent short term decreases in water quality due to increase particulate loads, and increased streamflow and average stormflow discharge as a result of lower vegetation density and reduction in litter cover.

Impacts from Leasable Minerals Management

While there is potential for development, there have been no wells developed on these leases issued on occupied GRSG habitat in the planning area. Under all alternatives, the potential for development is estimated to be low; therefore, impacts on water resources from development would be limited. The differences in potential management effects to water resources from leasable minerals management under each alternative are the amount of acreage that would be closed to leasing. The greater the amount of land closed to leasing, the more protective of water resources the alternative is due to eliminating potential for impact.

Impacts from Locatable Minerals Management and Mineral Materials

All locatable minerals and mineral materials have potential to exist within the planning area, but exploration efforts have been minimal and the potential is unknown across all alternatives. The differences in potential management effects to water resources from locatable mineral entry and mineral material disposal under each alternative are the amount of acreage that would be recommended for withdrawal or closed from mineral entry. The greater the amount of land withdrawn from locatable mineral entry, the more protective of water resources the alternative is due to eliminating potential for impact.

Impacts from Nonenergy Leasable Minerals Management

As mineral potential reports are not completed, and there is currently no commercial interest in solid leasables, the potential for nonenergy leasable minerals is unknown. Impacts on water resources are likely to be minimal across all alternatives. The differences in potential management effects to water resources from nonenergy leasable minerals management under each alternative are the amount of acreage that would be closed to leasing. The greater the amount of land closed to leasing, the more protective of water resources the alternative is due to eliminating potential for impact.

Impacts from Mineral Split-Estate Management

For the purposes of impacts on water resources, split-estate minerals would be similar to that described above by category of minerals.

Wild Horses and Burros

Under all alternatives unsustainable levels of wild horse and burro management can result in impacts on riparian and wetland areas used for water and shade, which can reduce riparian community conditions and hydrologic functionality. Horses and burros may also congregate around water developments which results in compacted soil, decreased water quality due to fecal coliforms, and trampled nearby vegetation. Appropriate management levels of wild horse and burro populations and land health evaluations to assess rangeland health would be utilized under all alternatives to reduce and minimize these impacts.

Wildland Fire Management

Effects of fire on water resources are determined largely by the severity of the fire, decisions made relative to any suppression activities, and the immediate post-fire precipitation regime. Effects of fire on water resources can occur under all alternatives and can include short term decrease in water quality due to increase particulate loads, and increased streamflow and average stormflow discharge as a result of lower vegetation density and reduction in litter cover (Forest Service 2005).

4.17.4 Alternative A

Impacts from Livestock Grazing/Range Management

Under Alternative A, 12,122,000 acres, or 96 percent of the planning area is open to livestock grazing; 346,000 acres or 3 percent of the planning area is closed to livestock grazing. Of the acres open to livestock grazing 4,492,000 acres are within PPH and 5,502,000 acres are within PGH on BLM-administered lands.

All permits and leases under Alternative A would continue to be required to meet or make progress toward meeting standards defined in the Oregon and Washington Public Land Health Standards (described in **Section 3.7**, Livestock Grazing/Range Management). Grazing permits, including grazing systems, permitted AUMs, and allotment boundaries would be modified as necessary to conform to Standards and Guidelines for Livestock Grazing Management. Changes to rangeland management would be directed first to allotments not meeting land health standards, which may include changes in number of permitted AUMs, or current timing, duration or frequency of permitted used, including temporary closures.

Alternative A, B, and E have the most acreage that would be managed as open to livestock grazing. This would subject the most acreage of water resources to the possible impacts of livestock grazing as outline in **Section 4.16.2**, including compacted soil, decreased water quality due to fecal coliforms, trampled nearby vegetation, and reduce riparian community conditions and hydrologic functionality.

Impacts from Travel Management

Alternative A would manage 6,812,000 acres (54 percent) of the planning area as open to cross-country motorized travel, 300,300 acres (2 percent) of the planning area as closed to cross-country motorized travel, and 5,325,000 acres (42 percent) as limited to existing roads and trails, with possible additional seasonal or vehicle type restrictions. Alternative A would manage the largest amount of acreage as open to cross-country motorized travel, which subjects the most water body resources to the possible impacts caused by overland travel. Potential effects of travel management on water resources include point source temporary degradation from stream crossing and increased soil deposition into waterways.

Impacts from Lands and Realty Management

Under Alternative A, 857,600 acres (7 percent of the planning area) would continue to be managed as ROW exclusion areas, and 3,446,000 acres (27 percent) would continue to be managed as ROW avoidance areas. Alternative A would manage 8,314,000 acres (66 percent) of the planning area as open to potential ROW authorizations. Of the acres managed as ROW exclusion areas, 257,200 acres are located within PPH and 288,200 acres are located within PGH. Of the acres managed as ROW avoidance areas, 1,336,000 acres are located within PPH and 1,672,000 acres are managed within PGH.

Within exclusion areas, new ROW development would continue to be prohibited. This would prevent surface disturbance from ROW development within these areas. Within avoidance areas, the BLM would require ROW applicants to observe additional conditions, such as location criteria and design requirements. This could discourage new ROW development in these areas. Within areas open to ROW authorization, water resources may be affected by ROW development, including potential for vegetation loss, soil compaction and erosion. However, any effects on water resources from ROW authorizations would be limited to the footprint of the disturbance area within the ROW. The BLM would analyze impacts from individual ROW authorizations upon receipt of applications and as part of subsequent implementation-level environmental analyses.

4.17.5 Alternative B

Impacts from Livestock Grazing/Range Management

Under Alternative B, management actions would not result in direct changes to the amount of acres open or closed to livestock grazing. Potential effects on water resources from livestock grazing would remain the same as those under Alternative A.

Alternative B would provide for range improvements including developing new water diversions from springs and seeps only if the water developments would benefit PPMA and improve GRSG habitat.

Impacts from Travel Management

Under Alternative B, 4,142,000 acres (33 percent of the planning area) would be managed as open to unrestricted cross-country motorized travel, 300,300 acres (2 percent) would be managed as closed to cross-country motorized travel, and 7,996,000 acres (63 percent) would be limited to existing roads and trails. Additionally, route construction would be limited to realigning existing routes, new roads would be built to the absolute minimum standard necessary, and roads and trails not designated in travel management plans would be restored using appropriate seed mixes. Restoration of roads would benefit water resources by reducing total overall acres of cleared vegetation and increased soil erosion affected by travel management through replacing vegetation communities, stabilizing soils and reducing the potential for increased run off through wind and water erosion.

Alternative B would managed the same amount of acreage as closed to cross-county motorized travel as Alternative A, would managed 2,670,000 less acres as open to travel management than Alternative A, and 2,671,000 more acres as limited to existing roads and trails. This equates to a 21 percent reduction in lands open to cross-country motorized travel, and a 21 percent increase in lands managed as limited to existing roads and trails, which would be more protective of water resources from the potential effects of cross country motorized travel than Alternative A.

Impacts from Lands and Realty Management

Alternative B would manage 4,866,000 acres (39 percent of the planning area) as ROW exclusion areas, 6,107,000 acres (48 percent) as ROW avoidance areas, and 1,645,000 acres (13 percent) as open to ROW authorizations. PGMA would be managed as a ROW avoidance area on 5,663,000 acres and PPMA would be managed as a ROW exclusion area on 4,547,000 acres. Compared to Alternative A, Alternative B would be more protective of water resources from potential impacts from ROW authorizations due to greater acreage of exclusion areas. Alternative B would increase the acreage managed as ROW exclusion areas by 4,008,000 acres or 32 percent, would increase the acreage managed as ROW avoidance areas by 2,661,000 acres or 21 percent, and would decrease the acreage open to ROW authorizations by 6,669,000 acres, or 53 percent compared to Alternative A. ROW avoidance and exclusion designations have more restrictive conditions of use than areas open to ROW authorization which reduces the amount of vegetation clearing, soil compaction, and potential for increased erosion into waterways occurring within a ROW authorization. Regardless of ROW designation, any authorized ROW effects on water resources would be limited to the footprint of the disturbance area within the ROW. The BLM would analyze impacts from individual ROW authorizations upon receipt of applications and as part of subsequent implementation-level environmental analyses.

Alternative B would also remove power lines and would reclaim ROW sites that are no longer in use. This would restore the surrounding habitat and would reduce the potential for soil erosion and runoff into water ways.

4.17.6 Alternative C

Impacts from Livestock Grazing/Range Management

Alternative C would close all acres to livestock grazing and would remove all allotments from the planning area. This would include any allotments completely or partially within occupied GRSG habitat This would completely remove the potential for improper livestock grazing and the associated impacts on water resources.; Alternative C would also reduce the amount of water resources available to GRSG due to active restoration and removal of water developments for livestock, which may also reduce the amount of mosquito habitat and the potential for West Nile virus transfer.

Impacts from Travel Management

Under Alternative C, 1,203,000 acres (9 percent of the planning area) would be managed as open to cross-country motorized travel, 300,300 acres (3 percent) would be managed as closed to cross-country motorized travel, and 10,937,000 acres (87 percent) would be managed as limited to existing roads and trails.

Alternative C would manage the same amount of acreages as closed to cross-county motorized travel as Alternative A, 5,609,000 less acres as open to travel management than Alternative A, and 5,612,000 more acres as limited to existing roads and trails. This equates to a 45 percent reduction in lands open to cross-country motorized travel, and a 45 percent increase in lands managed as limited to existing roads and trails, which would be more protective of water resources from the potential effects of cross country motorized travel than Alternative A and B.

Impacts from Lands and Realty Management

Alternative C would manage 10,682,000 acres as ROW exclusion areas (85 percent of the planning area), 293,000 acres (2 percent) as ROW avoidance areas, and 1,643,000 acres (13 percent) as open to ROW authorizations. This includes managing 4,547,000 acres of PPMA and 5,669,000 acres of PGMA as ROW exclusion areas. Compared to Alternative A, Alternative C would be more protective of water resources from potential impacts from ROW authorizations due to a greater amount of acreage designated as ROW exclusion areas.

Alternative C would increase the acreage managed as ROW exclusion areas by 9,825,000 acres (78 percent), but would decrease the acreage managed as ROW avoidance areas by 3,153,000 acres (25 percent), and would decrease the acreage open to ROW authorizations by 6,671,000 acres (52 percent) compared to Alternative A. ROW avoidance and exclusion designations have more restrictive conditions of use than areas open to ROW authorization which reduces the potential of human-made runoff of soils and chemicals into waterways within those areas. Regardless of ROW designation, any authorized ROW effects on water resources would be limited to the footprint of the disturbance area within the ROW. The BLM would analyze impacts from individual ROW authorizations upon receipt of applications and as part of subsequent implementation-level environmental analyses.

4.17.7 Alternative D

Impacts from Livestock Grazing/Range Management

Under Alternative D, 12,022,000 acres or 95 percent of the planning area would be managed as open to livestock grazing and 445,000 acres or 4 percent of the planning area would be managed as closed to livestock grazing. Of the acres open to livestock grazing, 4,418,000 acres are located within PPMA and 5,480,000 acres are located within PGMA. This is a 22,000 acre reduction in acres open to livestock grazing within PGMA, and a 75,000 acre reduction in acres open to livestock grazing within PPMA in comparison with Alternative A. Alternative D would be slightly more protective of water resources from the potential effects of livestock grazing than Alterative A due to the reduction of acres open to livestock grazing in PGMA and PPMA and an additional closure of 99,000 acres of non-habitat lands to livestock grazing. Under Alternative D, new and existing range improvements would be authorized to enhance the functionality of seeps and springs for wildlife within PPMA and PGMA. BMPs would be used to manage for mosquito control by reducing their breeding habitat.

Impacts from Travel Management

Alternative D would manage the same number of acres as open, limited, or closed to cross-country motorized travel as Alternative B, and would therefore have similar effects on water resources as Alternative B. However, Alternative D would provide fewer restrictions on route construction and maintenance, which may lead to more dispersed construction and therefore more dispersed impacts on water resources.

Alternative D would manage the same amount of acreage as closed to cross-county motorized travel as Alternative A, 2,670,000 less acres as open to travel management than Alternative A, and 2,671,000 more acres as limited to existing roads and trails. This equates to a 21 percent reduction in lands open to cross-country motorized travel, and a 21 percent increase in lands managed as limited to existing roads and trails, which would be more protective of water resources from the potential effects of cross country motorized travel than Alternative A.

Impacts from Lands and Realty Management

Alternative D would manage 857,600 acres as ROW avoidance areas and 5,965,000 acres as ROW exclusion areas. ROW exclusion areas under Alternative D would be the same as Alternative A, and ROW avoidance areas would increase by 2,519,000 acres. This includes managing 257,000 acres of PPMA and 288,000 acres of PGMA as ROW exclusion areas and managing 4,290,000 acres of PPMA and 1,672,000 acres of PGMA as ROW avoidance areas. Overall effects of lands and realty management would be very similar to Alternative A as an increase in ROW avoidance areas does not restrict ROW authorizations. Exceptions could be made for some development, so disturbance from ROW development could still affect water resources.

4.17.8 Alternative E

Impacts from Livestock Grazing/Range Management

Alternative E would have the same amount of acreage open and closed to livestock grazing as Alternative A. Alternative E would also manage the same amount of acreage of Core Area habitat as open or closed to livestock grazing as Alternative A would manage PPH. Alternative E would manage 3,824,000 acres as open to livestock grazing, which is a 1,678,000 acre reduction in lands open to livestock grazing in Low Density habitat compared to Alternative A, which would manage 5,502,000 acres as open to livestock grazing within PGH. Effects of livestock grazing on water resources under Alternative E would be the similar to those expected under Alternative A, with potential impacts reduced in Low Density habitat due to greater closure to livestock grazing.

Alternative E would allow for the relocation of existing or development of new water developments within GRSG habitat. These developments would be constructed or modified to maintain their free-flowing and wet meadow characteristics, which would maintain water quality and riparian area functions.

Impacts from Travel Management

Alternative E would manage 3,914,000 acres (31 percent of the planning area) as open to cross-country motorized travel, 275,000 acres (2 percent) as closed to cross-country motorized travel, and 6,044,000 acres (48 percent) as limited to existing road and trails. This would be a 2,898,000 acre or 23 percent reduction in acres open to cross-country travel, a 25,400 acre or 0.2 reduction in acres closed to cross-county travel, and a 718,000 acre or 6 percent increase in acres managed as limited to existing roads and trails. Due to the 23 percent reduction in acres open to cross county travel, Alternative E would be more protective of water resources than Alternative A, due to less acreage open and available for soil compaction caused by overland travel. Also, Alternative E would seasonally restrict OHV use to areas greater than 2 miles from leks during the GRSG breeding season (approximately March 1 through July 15), which would reduce the potential for effects on water resources from overland travel during this time.

Impacts from Lands and Realty Management

Under Alternative E, 4,547,000 acres of Core Area habitat would be managed as ROW exclusion areas and 1,336,000 acres of Core Area habitat would be managed as ROW avoidance areas. In addition, 157,000 acres of Low Density habitat would be managed as ROW exclusion areas and 1,384,000 acres of Low Density habitat would be managed as ROW avoidance areas. Alternative E would manage more acres as ROW exclusion areas than Alternatives A, B, and D, and would manage more acres as ROW exclusion areas than Alternatives C and F, and less than Alternatives B and D.

4.17.9 Alternative F

Impacts from Livestock Grazing/Range Management

Under Alternative F 7,496,000 acres, or 59 percent, of the planning area would be managed as open to livestock grazing; 2,499,000 acres, or 20 percent, of the planning area would be managed as closed to livestock grazing. Alternative F would result in a 4,627,000 acreage reduction, or a 37 percent decrease in lands open to grazing over Alternative A. Alternative F would also result in a 2,153,000 acre or 17 percent increase in lands managed as closed to livestock grazing. Of the acres closed to livestock grazing, 1,123,000 acres are located in PPMA and 1,375,000 acres are located in PGMA. Alternative F is the second most restrictive alternative for livestock grazing, behind Alternative C, and would therefore be the second most protective of water resources from potential effects of improper livestock grazing. Unlike Alternative B, Alternative F would not modify existing water developments or develop new water diversion from springs or seeps within GRSG habitat. This would protect water resources from development, which may alter stream channels that can cause bank erosion. However, it would also prevent the addition of GRSG drinking sources within their habitat.

Impacts from Travel Management

Alternative F would manage the same amount of acres as open, limited, or closed to cross-country motorized travel as Alternative B. Additionally, Alternative F would prohibit new road construction and upgrades within 4 miles of active leks. It would avoid new road construction and upgrades within occupied habitat, which would further limit the potential effects of travel management on water resources, as described under **Section 4.17.2**.

Alternative F would manage the same amount of acreage as closed to cross-county motorized travel as Alternative A, 2,670,000 less acres as open to travel management than Alternative A, and 2,671,000 more acres as limited to existing roads and trails. This equates to a 21 percent reduction in lands open to cross-country motorized travel, and a 21 percent increase in lands managed as limited to existing roads and trails, which would be more protective of water resources from the potential effects of cross country motorized travel than Alternative A.

Impacts from Lands and Realty Management

Alternative F would have the same potential for impacts on water resources as Alternative C, and manage the same acreage as ROW exclusion (10,682,000 acres) and ROW avoidance (293,000 acres) areas. Alternative F would increase the acreage managed as ROW exclusion areas by 9,825,000 acres (78 percent), but would decrease the acreage managed as ROW avoidance areas by 3,153,000 acres (25 percent), and would decrease the acreage open to ROW authorizations by 6,671,000 acres (52 percent) compared to Alternative A. Of the acres managed as ROW exclusion areas, 4,547,000 acres are located within PPMA and 5,669,000 are located in PGMA.

4.18 LANDS WITH WILDERNESS CHARACTERISTICS

4.18.1 Methods and Assumptions

Indicators

Indicators of impacts on lands with wilderness characteristics are protection or 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 inventoried wilderness characteristics 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 recreation opportunities.
- Supplemental values—Impacts would result from any action that degrades the inventoried values.

Assumptions

The analysis includes the following assumptions:

- No available statewide GIS data track whether or not inventoried lands with wilderness characteristics have been assessed in an RMP revision and decisions have been made about whether to protect their wilderness characteristics. As such, all lands with wilderness characteristics are treated as if their wilderness characteristics are not protected, and impacts on them are discussed.
- Management to protect GRSG under Alternatives B through F could provide additional protections of wilderness characteristics and, at a minimum, would provide complementary management.

4.18.2 Nature and Type of Effects

Wilderness characteristics are primarily influenced by actions that impact the undeveloped nature of the area or by activities that increase the sights and sounds of other visitors. These actions and activities could damage the qualities listed in BLM Manual 6310 (naturalness, outstanding opportunities for solitude, and opportunities for primitive and unconfined types of recreation) that make up the criteria for wilderness characteristics (BLM 2012j). Generally, actions that create surface disturbance degrade the naturalness of lands with wilderness characteristics, as well as the setting for experiences of solitude and primitive recreation. In addition, restrictions on dispersed recreation (e.g., prohibiting campfires or permitting camping only in designated sites) diminish the opportunities for unconfined recreation.

Management actions that could impact an area's natural appearance include the following:

- Presence or absence of roads and trails and use of motorized vehicles along those roads and trails
- Fences and other improvements
- The nature and extent of landscape modifications
- Other actions that result in surface-disturbing activities

All of these activities affect the presence of human activity and, therefore, could affect an area's natural appearance. Prohibiting surface-disturbing activities and new developments within lands with wilderness characteristics would protect naturalness.

Two other wilderness characteristics—outstanding opportunities for solitude or primitive and unconfined types of recreation—are related to the human experience in an area. Visitors can have outstanding opportunities for solitude or for primitive, unconfined recreation 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 there are no developed or only minimally developed recreation facilities.

High concentrations of recreation users (large group sizes or frequent group encounters) would decrease outstanding opportunities for solitude. Limiting visitor use to prevent substantial degradation of naturalness and opportunities for solitude would protect opportunities for unconfined recreation.

Allowing travel on existing routes could reduce opportunities for solitude by increasing sights and sounds of other people. Motorized and mechanized access would also reduce opportunities for primitive recreation. The existence of trails open to motorized and mechanized travel could reduce the natural appearance in the vicinity of the trails. Effects would be localized and would not be experienced in the unit as a whole. Prohibiting motorized and mechanized use on lands with wilderness characteristics would protect those characteristics by restricting activities that could impact natural appearance and opportunities for solitude and primitive and unconfined recreation. On a more regular basis, motorized and mechanized use by established livestock grazing permittees would impact opportunities for solitude and naturalness of appearance. Creating new routes would impact naturalness and size, if created by mechanical means.

While vegetation treatments are implemented, both naturalness and solitude experienced by recreational users could be impacted in the short term. The presence of treatment crews would decrease the sense of solitude and the presence of machinery and/or tools necessary for treatments would lessen the sense of naturalness. After the treatment is over, solitude would be restored with the departure of treatment crews. Over the long term, naturalness would likely be enhanced by restoring natural vegetation structures and patterns.

Managing for wildland fire could impact lands with wilderness characteristics. In areas where suppression is a priority, vegetation modification could prevent the spread of fires, potentially reducing the naturalness of appearance. Fire suppression, prescribed burns, and fire breaks could all have short-term impacts on wilderness characteristics by disturbing naturalness.

Allowing any type of energy or mineral development, such as fluid, coal, nonenergy solid, locatable, and salable minerals, as well as renewable energy, would result in surface disturbance that would diminish the area's natural characteristic. Any new roads authorized for access to the development area could eliminate wilderness characteristics of the entire unit. This would be the case if the road were to bisect the unit so that it would no longer be considered a roadless area of adequate size. In addition, allowing developers regular access to the lease area or mine site would reduce opportunities for solitude.

Impacts on lands with wilderness characteristics are possible from livestock grazing, particularly from new developments in these areas (e.g., water developments and fences). This could lessen the naturalness of appearance or could limit unconfined recreation. Existing range improvements used for livestock grazing, such as fences, stock trails, springs, and stock ponds, would continue to be maintained. Structures, as well as livestock grazing itself, could diminish the naturalness characteristic of lands with wilderness characteristics. Maintaining range improvements could result in short-term impacts on solitude and naturalness. Where PPMA and PGMA were closed to livestock grazing, lands with wilderness characteristics that overlapped with PPMA and PGMA would experience protection from these impacts.

ROW exclusion areas provide indirect protection of wilderness characteristics by preserving naturalness and opportunities for solitude and primitive recreation by prohibiting disturbance from transmission lines, roads, and other utility developments.

Implementing management for the following resources would have negligible impact or no impact on lands with wilderness characteristics for all alternatives; therefore, they are not discussed in detail:

- Special status species—Greater Sage-Grouse
- Wild horses and burros
- Wildland fire management
- Air quality and climate change
- Special status plants

4.18.3 Impacts Common to All Alternatives

All of the action alternatives (B through F) would result in greater restrictions on resource uses and surface-disturbing activities than would management under Alternative A. These restrictions could provide incidental protection of lands with wilderness characteristics, and wilderness characteristics in those areas could be maintained. Lands with wilderness characteristics would likely experience either increased protection or no impacts from GRSG management and restrictions. Impacts would vary in degree across alternatives.

4.18.4 Alternative A

Under Alternative A, 192,100 acres of PPMA and PGMA are closed to off-road use under. Alternative A would also limit travel to existing routes on 4,405,800 acres of PPMA and PGMA, the fewest of any of the alternatives. Lands with wilderness characteristics that overlap these areas would experience fewer of the incidental protections resulting from prohibiting or restricting motorized and mechanized use and more of the impacts from such use as discussed in *Nature and Type of Effects*.

Under Alternative A, 2,728,200 acres of PPMA and PGMA are closed to fluid mineral leasing. Closing acres to fluid minerals leasing would protect wilderness characteristics by prohibiting development and infrastructure related to those actions, subject to valid existing rights, as discussed in *Nature and Type of Effects*. Alternative A has the fewest acres closed to oil and gas leasing on BLM-administered lands and consequently offers the least protection of lands with wilderness characteristics.

There would be more acres of PPMA and PGMA open to livestock grazing (9,994,300 acres) under Alternatives A and B than under any of the other alternatives. Therefore, lands with wilderness characteristics that overlap livestock grazing open areas would experience fewer of the incidental protections resulting from closing acres to livestock grazing under Alternatives A and B and more of the impacts from livestock grazing discussed in *Nature and Type of Effects*. Additionally, Alternatives A and D would have fewer acres of ROW exclusion areas (545,300 acres) in PPMA and PGMA than the other alternatives. Where lands with wilderness characteristics overlap ROW exclusion areas, this would likely result in fewer indirect protections of lands with wilderness characteristics than Alternatives B, C, E, and F. The effects of having more acres open to livestock grazing and fewer ROW exclusion areas are described in **Section 4.18.2**, Nature and Types of Effects.

4.18.5 Alternative B

The number of PPMA and PGMA acres closed to off-road use would be the same as under Alternative A, and impacts would be the same as Alternative A. Alternative B would also limit travel to existing routes on 7,075,400 acres of PPMA and PGMA, 61 percent more areas than under Alternative A. Lands with wilderness characteristics that overlap these areas would experience more of the incidental protections resulting from prohibiting or restricting motorized and mechanized use and more of the impacts from such use as discussed in *Nature and Type of Effects*.

Under Alternative B, 6,125,000 acres of PPMA and PGMA are closed to fluid mineral leasing, 125 percent more acres than under Alternative A and the most of the action alternatives. Types of effects are discussed in *Nature and Type of Effects*.

The same number of acres would be open to livestock grazing under Alternative B as under Alternative A, so impacts on lands with wilderness characteristics would be the same.

More than 8 times more acres of PPMA and PGMA would be ROW exclusion areas under Alternative B (4,547,000 acres) than under Alternative A. Where lands with wilderness characteristics overlap ROW exclusion areas, this would likely result in more indirect protection of lands with wilderness characteristics than under Alternative A, as described in *Nature and Type of Effects*.

4.18.6 Alternative C

The number of PPMA and PGMA acres closed to off-road use is the same as under Alternative A; impacts would be the same as Alternative A. Alternative C would also limit travel to existing routes on 10,017,600 acres of PPMA and PGMA, more than double the acres of Alternative A and the most of any of the alternatives. Lands with wilderness characteristics that overlap these areas would experience more of the incidental protections resulting from prohibiting or restricting motorized and mechanized use and more of the impacts from such use as discussed in *Nature and Type of Effects*.

Under Alternative C, 10,209,700 acres of PPMA and PGMA would be closed to fluid mineral leasing, almost three times more acres than Alternative A and the most of all the alternatives. Types of effects are discussed in *Nature and Type of Effects*.

Under Alternative C no areas would be open to livestock grazing. This would result in the most indirect protection of lands with wilderness characteristics of all the other alternatives because lands with wilderness characteristics would not be subject to the types of impacts from livestock grazing that reduce naturalness. The effects of closing acres to livestock grazing on lands with wilderness characteristics are described in *Nature and Type of Effects*.

The same amount of PPMA would be ROW exclusion areas under Alternative C as under Alternative B. In addition, 5,669,400 acres of PGMA would be ROW exclusion areas. Management under Alternative C would have greatest potential to maintain wilderness characteristics on lands with wilderness characteristics. Such allowable uses as livestock grazing and ROWs for corridors and towers would be prohibited in occupied GRSG habitat. These types of activities and associated development can reduce the size of lands with wilderness characteristics and can impair the apparent naturalness of the area and the feeling of solitude, as described in **Section 4.18.2**, Nature and Type of Effects. Precluding these types of activities would help protect wilderness characteristics. In addition, all PPMA would be designated as a new ACEC, which would likely provide incidental protection of the 697,900 acres of PPMA within lands with wilderness characteristics.

4.18.7 Alternative D

The number of PPMA and PGMA acres closed to off-road use would be the same as under Alternative A, and impacts would be the same as Alternative A. The number of PPMA and PGMA acres limited to existing routes would be the same as under Alternative B; impacts would be the same as Alternative B.

The number of PPMA and PGMA acres closed to fluid mineral leasing would be the same as under Alternative A, and impacts would be the same as Alternative A.

There would be slightly fewer acres of PPMA and PGMA open to livestock grazing (9,987,700 acres) under Alternative D than under Alternative A. Effects on lands with wilderness characteristics that overlap livestock grazing open areas would be similar to those described under Alternative A. There would be three times more acres of PPMA and 15 percent more acres of PGMA closed to livestock grazing under Alternative D than under Alternative A, resulting in more indirect protection of lands with wilderness characteristics on these closed lands. The effects of closing acres to livestock grazing on lands with wilderness characteristics are described in *Nature and Type of Effects*.

Alternative D has the same amount of ROW exclusion areas (545,300 acres) in PPMA and PGMA as Alternative A. Therefore, impacts on lands with wilderness characteristics would be the same as those described under Alternative A.

Juniper treatments under Alternatives D and E could temporarily impact lands with wilderness characteristics; however, this could enhance wilderness characteristics in the long term, as discussed in *Nature and Type of Effects*.

4.18.8 Alternative E

There would be 119,000 acres of PPMA and PGMA closed to off-road use under Alternative E, 51 percent fewer acres than under Alternative A and the fewest acres of any of the alternatives. Alternative E would limit travel to existing routes on 6,209,000 acres of PPMA and PGMA, 41 percent more acres than under Alternative A and the fewest acres of any of the actions alternatives. Lands with wilderness characteristics that overlap these areas would experience the least incidental protections resulting from prohibiting or restricting motorized and mechanized use and the most impacts from such use as discussed in *Nature and Type of Effects*.

Under Alternative E, 5,810,100 acres of PPMA and PGMA would be closed to fluid mineral leasing, 113 percent more acres than Alternative A but the least of the action alternatives. Types of effects are discussed in *Nature and Type of Effects*.

There would be the same number of acres of PPMA and 30 percent fewer acres of PGMA open to livestock grazing under Alternative E as under Alternative A. There would be the same acres of PPMA and 38 percent fewer acres of PGMA closed to livestock grazing under Alternative E than under Alternative A. This is the smallest number of acres closed to livestock grazing of all the alternatives and would result in fewer incidental protections of lands with wilderness characteristics.

The same amount of PPMA would be ROW exclusion areas under Alternative E as under Alternative B. In addition, 156,500 acres of PGMA would be ROW exclusion areas. Impacts on lands with wilderness characteristics would be similar to those described under Alternative B.

Additionally, juniper treatments under this alternative could temporarily impact lands with wilderness characteristics, as described under Alternative D.

4.18.9 Alternative F

The number of PPMA and PGMA acres closed to off-road use would be the same as under Alternative A, and impacts would be the same as Alternative A. The number of PPMA and PGMA acres limited to existing routes would be the same as under Alternative B, and impacts would be the same as Alternative B.

The number of PPMA and PGMA acres closed to fluid mineral leasing would be the same as under Alternative C, and impacts would be the same as Alternative C.

There would be 31 times more acres of PPMA and over 9 times more acres of PGMA closed to livestock grazing under Alternative F than under Alternative A. This is the second-largest number of acres closed to livestock grazing of all the action alternatives and would result in more incidental protections of lands with wilderness characteristics than all the other alternatives except Alternative C because lands with wilderness characteristics would not be subject to the types of impacts from livestock grazing that reduce naturalness. The effects of closing acres to livestock grazing on lands with wilderness characteristics are described in **Section 4.18.2**, Nature and Type of Effects.

The same number of acres of PPMA and PGMA would be ROW exclusion areas under Alternative F as under Alternative C, so impacts on lands with wilderness characteristics would be the same.

Under Alternative F, 17 new ACECs would be designated to conserve GRSG and other sagebrush-dependent species. The new ACECs would encompass 1,241,600 additional acres of PGMA and 2,560,400 additional acres of PPMA. The protections and restrictions on uses within these new ACECs could provide indirect protections of lands with wilderness characteristics where they overlap with the new ACECs, and wilderness characteristics in those areas could be maintained.

4.19 Social and Economic Impacts (Including Environmental Justice)

This section discusses social and economic impacts from proposed GRSG management actions related to other resources and resource uses. Existing social and economic conditions are described in **Section 3.18**, 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.

This section is organized slightly differently than the sections for other resource areas. The section is divided in three parts, addressing economic, social, and environmental justice impacts separately. Even though they are interrelated, this analytical separation facilitates discussion of impacts. Rather than discussing all impacts under each alternative, impacts are discussed by type of economic activity or social impact. This facilitates comparison of alternatives.

4.19.1 Methods and Assumptions

Indicators

Conservation measures related to sage-grouse habitat could have impacts on resource uses on BLM-administered lands. Impacts on social and economic conditions could result from these changes in resource uses. Many of the indicators used to characterize social and economic conditions are quantitative, including population, demographics (e.g., age and gender breakouts), local industry (e.g., recreation and mineral development), employment, personal income, and presence of minority and low-income populations. Other indicators, especially for social conditions, are qualitative.

Assumptions

The IMPLAN model, which captures the indirect and induced economic effects of management alternatives in the study area, was used to estimate impacts on outcomes, employment, and earnings in the study area. This includes those impacts derived from the multiplier effect, which captures the impact of several rounds of expenditures that follow an initial direct expenditure in the study area. These additional expenditures are due to income received by suppliers and employees directly benefiting from the initial expenditure, and who go on to spend a share of their income locally. This allows for a more complete picture of the economic impacts of the management alternatives in the planning area.

In the analysis of economic impacts of management alternatives on grazing, billed AUMs were used as a baseline, estimated as a 12-year average share of active AUMs. Active AUMs are the amount of forage from land the BLM has determined are available for livestock grazing; billed AUMs are the amount of forage that the BLM bills for annually. The analysis uses these two scenarios to describe a range of potential economic impacts of management alternatives on economic activity related to livestock grazing.

4.19.2 Nature and Types of Effects

The main economic impacts derived from changes in resource management are reflected in changes in local employment and earnings, costs incurred by the private sector, fiscal revenues, and regional growth prospects.

For the analysis of social impacts, two types of impacts capture the main social effects that can be expected from changes in resource management. The first are derived from migration induced by management actions. These impacts are induced by economic opportunities that drive population into or out of specific areas; they affect population growth as well as the demand for housing and public services. The second group of impacts describes those impacts associated with specific interest groups, community livelihoods, or minority and low-income populations (environmental justice).

Implementing management for the following resources would have negligible or no impact on socioeconomics and environmental justice across alternatives; therefore, they are not discussed in detail:

- Vegetation
- Wild horses and burros management
- Wildland fire management
- Special designations
- Air quality and climate change
- Special status plants

4.19.3 Economic Impacts

Impacts Common to All Alternatives

As described in **Chapter 3**, there have been some claims for the exploration of biomass as a renewable energy source; however, with the possible exception of the Prineville District, the suggestions have not been consistent and the management alternatives would have no impact on existing or developable project areas. There are no existing, proposed, or foreseeable solar energy zones in the primary study area (BLM 2013a).

Impacts from Management Actions Affecting Grazing Allotments

Overall Employment, Earnings, and Output per Job Impacted by Management Alternatives

As discussed in **Section 3.18**, agriculture is an important economic activity in the study area. In 2010, agriculture provided employment for nearly 11 percent of the labor force in the primary socioeconomic study area. This takes into account proprietors and employees but does not include unpaid or paid-in-kind family labor, which is typically not accounted for in labor force statistics. **Table 3-68** shows the relative share of crops and livestock and demonstrates that in Lake, Malheur, and Harney Counties, livestock grazing provides an important share of all earnings.

The potential impacts of management alternatives affecting grazing on output and employment were estimated quantitatively using the IMPLAN economic model. Data from 2011 were used for active AUMs and an average of 2000 to 2011 data for billed AUMs because billed AUMs fluctuate from year to year. The analysis calculated a range of economic impacts. The low impact scenario represents the case where ranchers use as many of the active AUMs in GRSG habitat as possible, using active AUMs that are not currently billed as a buffer to absorb reductions in AUMs imposed by management alternatives.[1] The high impact scenario represents the case where ranchers maintain a constant billed to active AUM ratio and where they reduce billed AUMs in proportion to the reduction in active AUMs. Further details are provided in **Appendix K**, Economic Impact Analysis Methodology. **Table 4-50**, Annual Impact of Management Actions Affecting Livestock AUMs on Output, Employment, and Earnings, Compared to Alternative A, presents this range of estimates. Note that the employment estimates do not include unpaid or paid-in-kind family labor; if such labor were included, then labor use differences among alternatives would be larger.

Alternatives A, B, and E

The estimated economic effects are similar under these alternatives because the expected level of AUMs would be the same. However, under Alternatives B and E, there would be some increase in restrictions on the ability of livestock operators to improve infrastructure or treat vegetation. These restrictions could increase livestock operators' costs or lead to other adverse economic impacts.

Alternative C

There would be a reduction in economic impact of grazing due to the closure of all allotments in PPMA and PGMA. The BLM estimates this loss of AUMs to correspond to approximately $68 million annually in output, $24 million

[1] The low impact scenario does not allow for reallocation of livestock to AUMs outside of GRSG habitat.

Table 4-50
Annual Impact of Management Actions Affecting Livestock AUMs on Output, Employment, and Earnings, Compared to Alternative A

	Alternatives B and E[1]		Alternative C		Alternative D		Alternative F	
	Low	High	Low	High	Low	High	Low	High
Primary Study Area								
Output	See notes	See notes	-$67.5	-$67.5	$0	-$0.8	-$33.8	-$42.4
Employment	See notes	See notes	-746	-746	0	-9	-373	-466
Earnings	See notes	See notes	-$23.5	-$23.5	$0	-$0.3	-$11.8	-$14.7
Primary and Secondary Study Area								
Output	See notes	See notes	-$68.7	-$68.7	$0	-$0.8	-$34.3	-$42.9
Employment	See notes	See notes	-760	-760	0	-9	-380	-475
Earnings	See notes	See notes	-$23.9	-$23.9	$0	-$0.3	-$12.0	-$15.0

Source: Calculated using the IMPLAN model, applied to active AUMs for each alternative (BLM 2013b), as explained in the text and in **Appendix K**, Economic Impact Analysis Methodology.

Note: Output and earnings are in millions of 2010 dollars.

Note: The low impact scenario does not allow for reallocation of livestock to AUMs outside of GRSG habitat.

[1]Based on available AUMs, there would be no change in economic activity from grazing under Alternatives B and E. However, as described in the text, management actions under Alternatives B and E would restrict vegetation treatments and range improvements, which may increase ranch operators' costs or lead to other adverse economic impacts. Restrictions on travel and realty management would limit other uses, potentially benefitting grazing from reduced disturbance.

annually in labor earnings, and 746 in annual jobs in the primary study area. These impacts would likely fall largely on the three counties where livestock is of greater importance: Lake, Malheur, and Harney.

Alternative D

Under Alternative D, RNAs with at least 20 percent PPMA or 50 percent PGMA would be closed to grazing voluntarily or by termination. This would result in loss of AUMs to the extent that livestock operators are unable to reallocate livestock to allotments in GRSG habitat previously not used and still open for grazing. The loss would correspond to up to an estimated $0.8 million annually in output, $0.3 million annually in labor earnings, and 9 annual jobs in the primary study area.

Alternative F

Under Alternative F, at least 25 percent of the area for livestock grazing in GRSG habitat is rested every year and no longer available for grazing. The BLM estimates this loss of AUMs to correspond to between $34 million and $42 million annually in output, between $12 million and $15 million annually in labor earnings, and between 373 and 466 in annual jobs in the primary study area.

Other Values Associated with Livestock Grazing

As described in **Chapter 3**, BLM-administered land managed for livestock grazing provides both market values and nonmarket values. Nonmarket values include open space and western ranch scenery. These provide value to some residents and outside visitors, and ranches may also provide some public value, such as 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, such as property values of ranches adjacent to BLM-administered lands.

The "Other Values" discussion in **Section 3.20** provides additional discussion of these values. Overall, when analyzing net public benefits, the process is uncertain for incorporating potential nonmarket values from managing public land for livestock grazing. The scientific and economic literature on the topic does not provide adequate data or a consensus theoretical framework from which to analyze these values further. Because of this, the BLM did not attempt to quantify these values for this study.

To the degree that there are net benefits of nonmarket values attached to livestock grazing and ranching, these would be greatest under Alternatives A and E. This is because both alternatives are likely to result in similar levels of livestock grazing operations in the study area. If the net nonmarket value of livestock grazing and ranching is positive, then that value would be greatest under Alternative A; it would be slightly lower under Alternatives B and E, lower under Alternative D, lower still under Alternative F, and lowest under Alternative C. This is in line with the expected impacts on market values discussed above.

Impacts from Management Actions Affecting Recreation

Direct Economic Activity Dependent on BLM-Administered Land and Resource Management

As discussed in **Chapter 3**, recreation has become increasingly more important for the economy of various counties in the study area, where other economic activities have grown at a slower pace. Although management activities included in the proposed alternatives could affect recreation, for example, by restricting motorized travel, the effects are not projected to be substantial. Seasonal restrictions, for example, would often not coincide with recreation seasons, such as that for hunting. BLM recreation specialists predict the alternatives will not result in measurable impacts on recreation visitor days.

Under some alternatives, restrictions or modifications would be placed on SRPs during certain times of the year or in certain locations when and where they may be detrimental to GRSG habitat. The BLM does not expect these restrictions to limit recreation use of BLM-administered lands, but rather to relocate use to areas or periods where no conflict with GRSG habitat would exist.

Changes in travel management could also affect recreation and resulting economic activity, with restrictions on motorized travel under certain alternatives, during certain times of the year. Because opportunities for recreation in a more natural or primitive setting could increase, the net economic effect on recreation is not possible to quantify. Also, the net direction (positive or negative economic effect) is uncertain.

Alternative A

Existing recreation opportunities in the study area would be maintained. Alternative A would not result in impacts on revenue of commercial recreation service providers or managing agencies attributable to SRPs. This is because it would result in no changes to current management.

Alternatives B, D, E, and F

Overall visitation levels and the corresponding economic impact of recreation expenditures in the study area would not be substantially different from Alternatives A and C. However, limitations on SRPs and motorized travel restrictions could lead to some added costs to recreational users of BLM-administered lands. This could result from having to circumvent closed areas or adopting less preferred options in certain activities. These include hunting, where ATV use is prevalent for retrieving game, or other activities that make use of motorized travel. Beneficial impacts could arise from enhanced opportunities for recreation, such as backcountry camping or low-density hiking, as well as opportunities for such activities as hiking, horseback riding, and hunting in a more primitive setting. The net economic effect on recreation is not possible to quantify, and the net direction (positive or negative economic effect) is uncertain.

Alternative C

Economic impacts of Alternative C are the same as those of Alternative A. The limitations on SRPs and motorized travel restrictions of Alternatives B, D, E and F would not be implemented in Alternative C and Alternative C would result in no substantial changes to current management that could affect recreation.

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 **Section 3.18**, these nonmarket values are not directly comparable to output, earnings, or jobs associated with various resource uses on BLM-administered lands, which are described elsewhere in this section.

As discussed above, BLM recreation specialists believe none of the alternatives would result in measurable impacts on recreation visitor days. Therefore, there would be no discernible change in nonmarket recreation values.

Impacts from Management Actions Affecting Mining

Direct Economic Activity Dependent on BLM-Administered Land and Resource Management

As described in **Chapter 3**, mining is a relatively minor contributor to the economy of the study area, with approximately 0.4 percent of total private employment, slightly below the national average of 0.5 percent. There is no coal production in the study area, and there is no oil and gas production from federal mineral estate. As described in **Section 3.18**, the average annual wage per job in the mining sector is comparable to the general average for the primary study area, although higher than that of sectors such as grazing or recreation, Reasonably Foreseeable Development Scenarios (RFDs) and Mineral Potential Reports (MPRs) were not completed for this exercise. Therefore, the below assessment of impacts is based on BLM review of current conditions and broad trends.

Any future production of oil and gas in the study area would be most impacted under Alternatives C and F, under which all GRSG habitat would be closed for exploration. Alternatives B and E would impose fewer closures than C and F (all PPMA in the case of Alternative B, Core Area habitat in the case of Alternative E). Alternative D would impose the fewest restrictions on future oil and gas development, after Alternative A, with buffer areas around leks and constraints on surface occupancy. Because no development of oil and gas are projected for the study area, no impacts of alternatives on output, employment, and earnings are expected.

The main locatable mineral produced in the study area is gold in Baker County. According to 2011 County Business Patterns data from the US Census Bureau, employment in gold in Baker County was less than 5 employees (US Census Bureau 2013). The Celatom Mining Complex in Malheur and Harney counties mines Diatomaceous Earth (BLM Undated). There has also been some interest in uranium. Under Alternatives A and C, 96 percent of the federal mineral estate decision area would remain open for development of locatable minerals, with 4 percent petitioned for withdrawal. Petitions for withdrawal require that validity exams be conducted on mining claims when a Notice or Plan of Operation is proposed. This delays the start of mining operations and increases costs.

Alternatives B, E, and F would increase the federal mineral estate petitioned for withdrawal to approximately 24 percent of the area. To the extent that these limitations affect gold or other mining producing areas, they could hamper future mining developments. Alternative D is similar to Alternatives A and C, but it would recommend limits on surface disturbance and mitigation of impacts on GRSG habitat.

Salable minerals in the study area are sand, gravel, limestone, dimension stone, and other crushed and broken stone. Main areas of production are found in Baker, Crook, Lake, and Union Counties. According to 2011 County Business Patterns data from the US Census Bureau, approximate levels of employment in the salable minerals industry ranged from a low of fewer than five people in Lake County to a high of between 100 and 250 people in Baker County; for the seven counties, the total is between 135 and 320 (US Census Bureau 2013).

Under Alternatives A and C, approximately 21 percent of the federal mineral estate would be closed to salable minerals development. This percentage would increase to approximately 44 percent under Alternatives B, D, E, and F. If employment were to fall proportionally to closures of federal mineral estate, the impact on salable minerals-related employment in the study area would be a loss of between 39 and 93 jobs under Alternatives B, D, E, and F. The impacts of Alternative B, D, E, and F would likely be larger, however, for several reasons. ROW avoidance increases in several of these alternatives could further decrease construction and derived demand for mineral materials. Because salable minerals from BLM-administered lands are typically available to local governments free of charge, these alternatives could have a cost impact on public projects in the study area.

Impacts from Management Actions Affecting Geothermal Exploration and Development

Direct Economic Activity Dependent on BLM-Administered Land and Resource Management

As described in the 2008 Geothermal Programmatic EIS (BLM and Forest Service 2008), the entire study area for this EIS has potential for geothermal development. During the PEIS process, the BLM also developed a reasonably foreseeable development scenario over 20 years for the development of federal geothermal resources, based on a review of government and industry reports. **Table 4-51**, Reasonable Foreseeable Development Scenario for Geothermal Energy on BLM-Administered Lands, below shows the projects identified in the reasonably foreseeable development scenario that are in the study area for this EIS, along with potential electricity generation for 2025.

Construction and operation expenditures associated with geothermal electricity exploration and development include those for drilling wells, constructing power plants, and operating facilities. The geothermal reasonably foreseeable development scenario provides only information on electricity generation capacity; it does not provide additional details that would be necessary to develop a detailed economic impact estimate, such as resource temperature and depth. These data were also not readily available from other sources.

Table 4-51
Reasonable Foreseeable Development Scenario for Geothermal Energy on BLM-Administered Lands

Area	Projected MW at 2025	BLM Field Office
Neal Hot Springs	50	Vale
Lakeview – Hot Lake Area	20	Lakeview
Summer Lake	50	Lakeview
Other Potential Locations	50	Includes Burns and Vale
Total	170	

Source: BLM and Forest Service 2008

Nonetheless, to provide some estimate of economic impact that would be associated with the development of the above projects, the BLM made reasonable assumptions based on available information[2]. Using default parameters from the National Renewable Energy Laboratory's Jobs and Economic Development Impact model (NREL 2012), the BLM estimated that three 50-megawatt plants and one 20-megawatt plant would generate 61 jobs full-time equivalent (FTE) in the operation phase. It would generate 877 temporary construction jobs. These represent direct jobs only, and do not include indirect or induced jobs in the manner of output from the IMPLAN model.

The geothermal reasonably foreseeable development scenario also does not provide detailed location information, and at this time the BLM is uncertain how the potential projects shown would be affected by the management alternatives. In order to provide a quantitative estimate of how economic impacts might differ by alternative, the BLM adjusted the employment estimates above by the proportion of acres open to geothermal leasing under each alternative. However, depending on specific locations and project parameters, the impact of management alternatives may not be proportional to the acres open for geothermal leasing and the estimates below may overestimate or underestimate the impacts.

Alternative A

Under Alternative A, current management, the BLM projects the 170 megawatts of geothermal energy shown in **Table 4-2** to be in place by 2025. This development would be estimated to support 61 full-time operations jobs in study area and 877 temporary jobs during the construction period.

[2] The BLM assumed the capacity estimates from the October 2008 Geothermal PEIS, which are consistent with estimates from the Geothermal Task Force Report of the Western Governors' Association (WGA 2006), represent nameplate capacity (including parasitic losses). The BLM assumed the plants would be developed using conventional hydrothermal, binary cycle technology, with an average resource temperature of 300 degrees at a depth of 3000 feet, which is roughly consistent with the currently operating commercial energy plant at Neal Hot Springs (Clutter 2010; ODEQ 2010b).

Alternatives B and E

Access to geothermal potential could be limited. Acres open to leasing would be reduced by over one-third, compared with Alternative A, which could reduce access to geothermal potential. If these closures were to include the areas identified in the geothermal reasonably foreseeable development scenario, the development of geothermal energy could also be reduced, compared to Alternative A. If the reduction is proportional to the reduction in acres open to leasing, Alternatives B and E would imply a loss of about 21 full-time jobs during operations and about 299 temporary construction jobs, compared to Alternative A.

Alternatives C and F

Acres open to leasing would be reduced by approximately 75 percent. Alternatives C and F would be the most likely to constrain development of geothermal energy resources. If closures were to include the areas identified in the geothermal reasonably foreseeable development scenario, the development of geothermal energy would be reduced, relative to Alternative A. If the reduction were proportional to the reduction in acres open to leasing, Alternatives B and E would imply a loss of about 46 full-time jobs during operations and about 658 temporary construction jobs, compared to Alternative A.

Alternative D

Based on acres open to leasing, projected employment under Alternative D would be the same as under Alternative A with 61 full-time jobs during operations and 877 temporary construction jobs. However, some decrease relative to Alternative A could occur due to NSO stipulations in buffer areas around leks.

Impacts from Management Actions Affecting Wind Energy Development

Overall Employment, Earnings, and Output per Job Impacted by Management Alternatives

The BLM projects that 182 megawatts of wind energy installed capacity expected to occur under Alternatives A, D, and E would no longer occur under Alternatives B, C, and F. This installed capacity corresponds to two existing applications in Harney County that overlap sage-grouse habitat. Additional wind energy development could also be affected by the choice of management alternatives as described further below. **Tables 4-52**, Average Annual Impact on Wind Energy Development on Output, Employment, and Earnings by Alternative, Construction, and **4-53**, Average Annual Impact on Wind Energy Development on Output, Employment, and Earnings by Alternative, Operations, show the estimated impacts of the choice of management alternative on output, employment and earnings generated by these two projects in Harney County.

Table 4-52
Average Annual Impact on Wind Energy Development on Output, Employment, and Earnings by Alternative, Construction[1,3]

	Alternatives B, C and F	Alternatives D and E[2]
Primary Study Area		
Output	-$6.9	See notes
Employment	-43	See notes
Earnings	-$1.9	See notes
Primary and Secondary Study Area		
Output	-$7.1	See notes
Employment	-44	See notes
Earnings	-$2.0	See notes

Source: Calculated using the IMPLAN model as explained in the text and in Appendix K, Economic Impact Analysis Methodology.

1. Average annual impacts of construction calculated distributing impacts over a 10 year period

2. Base on installed megawatts, there would be no change in economic activity from wind energy under Alternatives D and E, relative to Alternative A. However, as described in the text, management actions under Alternatives D and E could increase costs and discourage additional wind energy investments.

3. Output and Earnings are in millions of 2010 dollars

Table 4-53
Average Annual Impact on Wind Energy Development on Output, Employment, and Earnings by Alternative, Operations[1,3]

	Alternatives B, C and F	Alternatives D and E[2]
Primary Study Area		
Output	-$1.4	See notes
Employment	-17	See notes
Earnings	-$0.8	See notes
Primary and Secondary Study Area		
Output	-$1.4	See notes
Employment	-17	See notes
Earnings	-$0.8	See notes

Source: Calculated using the IMPLAN model as explained in the text and in Appendix K, Economic Impact Analysis Methodology.

1. Average annual impacts of operations calculated assuming capacity installed over a 10 year period

2. Based on installed megawatts, there would be no change in economic activity from wind energy under Alternatives D and E, relative to Alternative A. However, as described in the text, management actions under Alternatives D and E could increase costs and discourage additional wind energy investments.

3. Output and earnings are in millions of 2010 dollars

Alternative A

Under Alternative A, the BLM projects the 182 megawatts of installed capacity planned for Harney County would be in place by 2025. In addition, exclusion and avoidance areas would not impede additional wind energy investments in most of the planning area.

Alternative B

Under Alternative B, the BLM projects the 182 megawatts of installed capacity planned for Harney County would no longer occur. This corresponds to an estimated average loss of 60 annual jobs over a 10 year period (between construction and operations). Additional investments in wind energy could also be affected due to PPMA exclusion and PGMA avoidance, with the potential of increased costs in routing of transmission lines and access roads and potential mitigation costs.

Alternative C

Under Alternative C, the BLM projects the 182 megawatts of installed capacity planned for Harney County would no longer occur with the estimated average loss of 60 annual jobs over a 10 year period (between construction and operations). Additional investments in wind energy could also be affected due to the closure of all GRSG to new ROW authorizations.

Alternative D

Under Alternative D, the BLM projects the 182 megawatts of installed capacity planned for Harney County would be in place by 2025. Restrictions to additional wind energy development would be greater than under Alternative A, because wind energy would be avoided in PPMA. Increased costs to investors could occur due to impacts of PPMA avoidance on transmission lines and access roads and due to potential mitigation measures required by BLM.

Alternative E

Under Alternative E, the BLM projects the 182 megawatts of installed capacity planned for Harney County would be in place by 2025. Restrictions to additional wind energy development would be greater than under Alternative A, because wind energy would not be allowed to develop in PPMA where there is evidence of GRSG.

Alternative F

Under Alternative F, the BLM projects the economic impacts from wind energy development to be the same as under Alternative C.

Impacts from Management Actions Affecting Land and Realty and Travel Management

Direct Economic Activity Dependent on BLM-Administered Land and Resource Management

Management actions that affect development of infrastructure could have effects on the growth of economic activity in the area. Limiting 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. It could even make them no longer economically viable.

Alternative A

Alternative A would place the fewest restrictions on ROW development and route construction and would maintain the largest area open to travel, among the alternatives.

Alternative B

Management actions under Alternative B to protect GRSG habitat would impact lands and realty through the closure of PGMA to new ROW authorizations. All cross-country motorized travel would also be prohibited except for designated routes; that is, motorized travel would be limited to existing routes. Alternative B would impose added costs to future economic investments in the study area, when compared to Alternative A.

Alternative C

All GRSG habitat, PGMA, and PGMA would be closed to new ROW authorizations. This alternative would impose the greatest restrictions on new infrastructure development. Restrictions on travel management would be the same as those under Alternative A.

Alternative D

ROW development under Alternative D would also face restrictions, but these would be more limited than under Alternatives B and C. Restrictions to travel would be the same as those under Alternative B. Restriction and costs to infrastructure development under Alternative D would be greater than under Alternative A but less than under Alternatives B or C.

Alternative E

Management under Alternative E would have impacts similar to Alternative A for land use authorizations. Impacts also are similar to Alternative A for travel management, given that only seasonal limits would be imposed near leks. Together with Alternative A, Alternative E would impose the least restrictions on infrastructure development and transport in the study area.

Alternative F

Impacts from Alternative F are the same as or similar to those under Alternative B, except there would be greater restrictions under Alternative F for wind energy, as previously described. New road construction or upgrades would not be allowed in GRSG habitat, resulting in future potential limitations to economic activity in the area.

Impacts from Management Actions Affecting Special Status Species

Other Values Associated with Populations of GRSG

As described in **Section 3.18**, 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. **Section 3.18** documents current methods to estimate these non-use values, including a description of the literature review that the BLM conducted to determine if there were existing non-use value studies for GRSG. There are no studies on valuation specific to the GRSG, but there are several studies published in peer-reviewed scientific journals for bird species with similar characteristics. These studies find average stated willingness-to-pay at between $15 and $58 per household per year in order to restore a self-sustaining population or to prevent regional extinction of the species (see **Section 3.18** for non-market valuation methods details). These values represent a mix of use and non-use values; the non-use components of value are likely to be the majority share since the studies primarily address species that are not hunted.

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 did not quantify the aggregate value because of several factors, including uncertainty over 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 correspond to the degree of habitat protection associated with each alternative. Current management, Alternative A, provides the least protection for GRSG in the planning area, so it could result in the most impacts on GRSG. As a result, to the degree that there are non-use values associated with populations of GRSG, management under Alternative A would have the greatest adverse impacts on those values.

As discussed in **Section 4.2**, Special Status Species – Greater Sage-Grouse, most of the management actions under the alternatives would be beneficial for GRSG. It is therefore estimated that, in comparison to Alternative A, each alternative would have a positive impact on non-use values associated with populations of GRSG. However, so many factors impact the protectiveness of each alternative, such as vegetation and soils management, livestock grazing management, fire and fuels management, and recreation management. Because of this, it is difficult to anticipate the comparative protection and therefore non-use values provided by Alternatives B through F.

Impacts on Tax Revenues and Payments to States and Counties

Reductions in economic activity can reduce tax revenues for local, state, and federal governments. At the state level, these could take the form of reductions in personal and corporate income taxes. At the local level, revenues could be reduced if property taxes decrease. A portion of leases and royalties from activities on BLM lands (e.g. geothermal development) is also shared with counties.

The alternatives are unlikely to have a significant impact on state tax revenues, given the small share of study area on total state fiscal revenues. However, local government tax revenues could be considerably affected in specific areas that would experience reductions in economic activity, particularly under Alternatives C and F. Although specific impacts on local government tax revenues could not be quantified, the anticipated reductions in economic activity suggest that the local communities that may be most affected by reductions in local tax revenues under this alternative would be communities where grazing forms a major basis for the local economy in Malheur, Harney, and Lake Counties.

4.19.4 Social Impacts

Impacts from Management Actions Affecting Migration

Population

The decrease in employment opportunities in the study area under Alternative C from the adverse impacts on farming corresponds to approximately 0.7 percent of the current employment in the study area. Compared to the employment in Harney, Lake, and Malheur Counties, where the impact is more likely to be felt, the adverse impact corresponds to approximately 1.9 percent of the current employment. As shown in **Chapter 3**, of these three counties, Malheur experienced the most population growth from 1990 to 2010 (20 percent) and Harney the least (5 percent). Depending on the distribution of impacts within these counties, this decrease in employment opportunities could impact the capacity of parts of the study area to attract and retain its labor force, with possible consequences for population growth. The impact may be larger in individual communities within those counties. Impacts may also be felt under Alternative F, although to a lesser degree.

Housing and Public Services

Housing demand would not be affected in a substantial way by any of the alternatives. Reductions in employment opportunities could affect population, but under no alternatives would population be increased. This means that the alternatives would not affect housing demand in a way that could be adverse for most populations in the area. Demand for public services also would not increase, for the same reason. Under Alternatives C and F, the abilities of counties to supply public services could be reduced in accordance with potential reductions in local tax revenues.

Impacts from Management Actions Affecting Specific Groups and Communities

Consistency with County Land Use Plans

The decision under consideration may result in amended BLM management and LUPs throughout study area. The BLM management and LUPs must be consistent with state and local LUPs to the extent possible, and any amendments would aim to maintain this consistency. This would be the case under all alternatives.

Interest Groups and Communities of Place

As described in **Chapter 3**, there is a range of interest groups in the study area with overlapping and divergent interests. Groups centered on grazing, land development, infrastructure development, wind and geothermal energy development, conservation of natural resources, and business development generally would be impacted differently by the management alternatives. Within these interest groups, there are more specific ones that could be particularly affected. Among the interest groups most likely to be affected by the choice of alternative are those associated with livestock grazing, wind and geothermal resource exploration and development, infrastructure development, mining, wildlife conservation, recreationists who desire unobstructed cross-country travel in motorized vehicles (not limited to existing routes), and recreationists who could benefit from additional protections to GRSG habitat, such as low-density backcountry camping, or could be harmed by restrictions on GRSG habitat, such as rockhounding groups.

Specific communities will also not be impacted in the same way by the management alternatives. Communities with more diversified economies, particularly those less dependent on livestock grazing, would likely be less impacted than those that depend heavily on grazing. For instance, communities where the economy is based on tourism, agricultural crops (but not livestock), or activities unrelated to natural resources or public lands would be relatively unaffected by any of the management alternatives.

The BLM reviewed the scoping report to identify any comments related to specific communities that may be particularly affected by various management alternatives (BLM and Forest Service 2012). Several comments highlighted concern with impacts on livestock grazing in Harney and Malheur Counties. Some commenters raised the possibility of adverse impacts on wind development. However, the BLM's analysis shows wind energy development would be unaffected by the choice of alternatives.

Among alternatives, Alternative C would generate the greatest impacts. Conservation interests would be expected to benefit most from Alternative C. However, use of BLM-administered lands for income generation and in support of traditional livelihoods would be adversely affected. Grazing interests and communities associated with grazing in Lake, Malheur and Harney Counties, would be expected to be particularly affected. As previously noted, some of these communities could face increased difficulties in attracting and retaining their labor force. As noted in **Section 4.19.5**, Environmental Justice Impacts, these impacts would be expected to disproportionately affect low-income populations. The extent to which these impacts on the livelihoods of low-income populations would have effects on the social fabric of communities in these three counties (e.g., through increased social conflict or decreased social cohesion of individual communities) is not possible to determine based on the information available at this time.

4.19.5 Environmental Justice Impacts

The BLM 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 have 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 considered the information gathered in the Economic Strategies Workshop that was conducted in June 2012. That workshop was convened to identify public concerns related to potential social, economic, and environmental justice impacts that could result from the management alternatives. None of the public comments received during that workshop called out a specific concern related to minority populations.

The BLM also reviewed the scoping report to identify any comments related to environmental justice issues received in the scoping phase. One commenter identified the need to examine exploitation of poor workers, including workers on foreign visas, for work on sheep ranching and other cattle ranching on BLM-administered lands. (This comment was not specific for Oregon but for all sub-regions considering GRSG habitat conservation measures.) No other comments during the scoping period were identified raising concerns regarding potential impacts on minority and low-income populations.

Potential Impacts on Minority Populations

As discussed in **Chapter 3**, CEQ guidance identifies a community or a specific population group as a minority population when either minority populations in the affected area exceed 50 percent of the total population or if 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, the BLM considers Malheur County to have a concentration of a minority population. In Malheur County, Hispanics are represented in almost three times the proportion Oregon as a whole, roughly 20 percentage points more than in the state. Hispanics represent almost a third of the total population of Malheur County. Total minority presence in that county is also over 50 percent higher than in the state. Given its large geographic coverage, the primary study area may contain smaller communities, where minority presence is meaningfully greater than in the state as a whole. This is not identified in **Chapter 3**. In addition, the two tribes present in the Socioeconomic Study Area (Burns Paiute in Harney County and Fort McDemitt Paiute and Shoshone in Malheur County) and the two tribes with traditional interests in the Socioeconomic Study Area (Confederate Tribes of the Warm Spings Reservation and Klamath Tribes) were also considered.

The extent to which existing minority populations are disproportionately impacted by high and adverse human health or environmental effects depends on two factors: 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**.

- Adverse impacts under any of the alternatives would not be restricted to one community or small communities but would be spread out in a broad region.
- No minority group is identified with the specific collection of activities that could be impacted by GRSG management (e.g. grazing).
- No pathways were identified through which minority populations would be particularly vulnerable to the adverse impacts identified in Chapter 4.

The BLM concluded that there would be no disproportionately high and adverse impacts on minority populations under the management alternatives considered.

Potential Impacts on Low-Income Populations

The presence or absence of low-income populations in the primary study area is discussed in **Chapter 3**. Of the seven counties in the socioeconomic study area, all but one have a greater percentage of residents below the poverty level than the state's 14.0 percent. Crook County (14.0 percent) has the same percentage of residents below the poverty level as Oregon as a whole. Grant County has almost the same, at 14.4 percent. Malheur County (22.7 percent) has the highest percentage of residents below the poverty level. The percentage of Baker County (19.9 percent), Harney County (18.5 percent), Lake County (17.5 percent), and Union County (16.1 percent) residents below the poverty level are also higher than Oregon as a whole. For the purposes of this EIS, the BLM considers Malheur, Baker, Harney, Lake, and Union Counties to be low-income communities.

The BLM reviewed the impacts of alternatives described in the respective sections of **Chapter 4**. It identified impacts on grazing in Malheur, Lake, and

Harney Counties under Alternatives C and F to be high and adverse and to disproportionately impact low-income populations. This conclusion was based on the share of farm employment in those counties that could be affected by Alternatives C and F, and the fact that the three counties where impacts would most likely be concentrated were all low-income populations. Adverse impacts from management alternatives through mining, geothermal development, wind energy development, or ROW restrictions could occur but would not be considered to be high and adverse, based on review of the various resource impact sections.

4.20 Unavoidable Adverse Impacts

Section 102(c) of NEPA requires disclosure of any adverse environmental impacts that could not be avoided should the RMPA 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 RMPA. Others are a result of public use of BLM-administered lands within the planning area. This section summarizes major unavoidable impacts discussions of the impacts of each management action (in the discussion of alternatives) and provides greater information on specific unavoidable impacts.

Permanent conversion of areas to other uses, such as transportation and mineral and energy development or OHV use, would be unlikely under all of the action alternatives. These would most likely increase erosion and decrease the relative abundance of species within plant communities, the relative distribution of plant communities, and the relative occurrence of seral stages of those communities. These activities would also intrude on the visual landscape. This type of development is most likely to occur under Alternative A. The other action alternatives place many restrictions on many types of development, which would most likely result in fewer visual intrusions and fewer instances of unavoidable wildlife habitat loss.

Unavoidable damage to cultural resources from permitted activities could occur if resources undetected during surveys were identified during surface-disturbing activities. In these instances, further activity would cease on discovery of a cultural resource, and mitigation measures would be implemented to minimize damage or loss. This scenario is most likely to occur under Alternative A because it would place the fewest restrictions on surface-disturbing activities. Unavoidable loss of cultural resources would also occur, due to nonrecognition, lack of information and documentation, erosion, casual collection, and inadvertent destruction or use. Broad-scale sampling and classification of areas with a high likelihood of containing cultural and resources would be expected to greatly reduce the probability of unavoidable adverse impacts on the resource.

Wildlife, livestock, and wild horses as well as other herbivores consume vegetation and impact soils through hoof action and possible compaction. When these impacts are kept at appropriate levels, natural processes such as plant growth and recovery and microbial activity in the soil surface result in recovery from these impacts and maintain site stability and health. Vegetative treatments promoting recovery of GRSG would result in the destruction of the target species, be it invasive plant species, noxious weeds, encroachment of juniper, or changes in the age classes of a sagebrush stand. Some level of competition for forage between these species, although mitigated to the extent possible, would be unavoidable. Instances of displacement, harassment, and injury could also occur. These types of scenarios are most likely to occur under Alternative A. The action alternatives would place restrictions on many development and surface-disturbing activities, which would make the likelihood that displacement, harassment, and injury would occur to be much lower than Alternative A.

Recreation, development of mineral resources, and general use of the decision area would introduce additional ignition sources into the planning area, which would increase the probability of wildland fire and the need for its suppression. These activities, combined with continued fire suppression, would also affect the overall composition and structure of vegetation communities; this could increase the potential for high-intensity wildland fires. Restrictions on development under all of the action alternatives would be expected to decrease the potential for ignitions in the decision area.

As recreation demand increases, recreation use would disperse, creating unavoidable conflicts between recreation users, such as those seeking more primitive types of recreation, and motorized users sharing recreation areas. In areas where development would be greater, the potential for displaced users would increase. Under all of the action alternatives, restrictions on development would be expected to reduce the potential for displaced recreational users.

Numerous land use restrictions imposed throughout the decision area to protect GRSG habitat and other important values affect the ability of operators, individuals, and groups who use the BLM-administered 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 restrictions to the level of protection necessary to accomplish management objectives and providing alternative use areas for affected activities.

4.21 Irreversible and Irretrievable Commitment of Resources

Section 102(2)(c) of NEPA requires a discussion of any irreversible or irretrievable commitments of resources that would be involved in the RMPA 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 RMPA management actions for all alternatives, except Alternative A, would result in fewer surface-disturbing activities, including mineral, energy, 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 commitment 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 RMPA 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 with the action alternatives.

Laws protecting cultural resources would mitigate irreversible and irretrievable impacts on cultural resources from permitted activity. BLM OHV use areas open to cross-country use could have some resources destroyed. This would be especially true in areas of high cultural sensitivity. Such destruction would be irreversible and irretrievable. Alternative A would have the greatest potential for loss of cultural resource information.

Development of mineral resources (e.g., oil, gas, 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.

4.22 Relationship Between Local Short-term Uses and Long-term Productivity

Section 102(c) of NEPA requires discussion of the relationship between local, short-term uses of the 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 RMPA.

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 primarily under Alternative A, which would allow the most surface-disturbing activities.

Other surface-disturbing activities, including transportation and utility corridor construction and mineral resource development would result in the greatest potential for impacts on long-term productivity. Management prescriptions and reasonably foreseeable development scenarios are intended to minimize the effect of short-term commitments and to reverse changes over the long term. These prescriptions and the associated reduction of impacts would be greatest under Alternative C, with Alternative F close behind for such resources as vegetation and wildlife habitat. However, some impacts on long-term productivity might occur, despite the prescriptions intended to reduce impacts on GRSG habitat.

ROW authorizations and short-term use of an area to foster energy and minerals would result in long-term loss of soil productivity and vegetation diversity. Impacts would persist as long as surface disturbance and vegetation loss continue. In general, the loss of soil productivity would be directly at the point of disturbance; even so, long-term vegetation diversity and habitat value could be reduced due to fragmentation and the increased potential for invasive species to spread from the developments or disturbances. Alternative A would have the greatest potential for short-term loss of productivity and diversity due to the high level of potential development and the lack of stringent mitigation and reclamation standards contained in Alternatives B, C, D, E, and F. Alternative C would provide the greatest long-term productivity by excluding development in many areas through closures or application of severe restrictions on development.

ROWs and the short-term use of GRSG habitat for energy and minerals could impair the long-term productivity of GRSG populations. This would happen by displacing animals from primary habitats and removing components of these habitats that might not be restored for more than 20 years. These short-term uses could also affect the long-term sustainability of some special status species. The potential for these impacts would vary by alternative because long-term deterioration of GRSG habitat as a result of mineral activity would be more evident under Alternative A. The short-term resource uses associated with travel, transportation, and mineral development (e.g., 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.