Nevada and Northeastern California Greater Sage-Grouse

Proposed Land Use Plan Amendment and Final Environmental Impact Statement

Volume II: Chapters 3 and 4

US Department of the Interior
Bureau of Land Management

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BLM
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The Bureau of Land Management's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

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Chapter 3
Affected Environment

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Changes to Chapter 3 between draft and final EIS:

- Additions, corrections, and clarifications.
- Added references, such as the USGS Open File Report 2014-1239 Conservation Buffer Distance; Estimates for Greater Sage Grouse-A Review (Mainer et al. 2014)
- Updated original habitat categories based on USGS-A Spatially Explicit Modeling of Greater Sage-Grouse Habitat in Nevada and Northeastern California: A Decision Support Tool for Management (Coates et al. 2014) and clarified habitat definitions (see Appendix A);
- Updated acreage numbers.

CHAPTER 3
AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter succinctly 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**, Proposed Action and Alternatives. The affected environment provides the context for assessing potential impacts as described in **Chapter 4**, Environmental Consequences.

For this Proposed LUPA/Final EIS, the planning area is the entire Nevada and Northeastern California Sub-region (70,200,500 acres), which contains BLM-administered and National Forest System lands. In the Nevada and Northeastern California Sub-region planning area, there are 45,359,000 acres of BLM-administered land and 9,719,900 acres of National Forest System land.

The planning area is the geographic area in which the BLM and Forest Service will make decisions during this planning effort. The planning area boundary includes all lands regardless of jurisdiction. Lands addressed in the LUP amendments are public (including surface-estate and split-estate lands) managed by the BLM *and* National Forest System land in Greater Sage-Grouse habitats. Any decisions in the LUP amendments will apply only to federal lands administered by the BLM *or* part of the National Forest System.

3.1.1 Organization of Chapter 3

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

- GRSGs and GRSG habitat
- Vegetation (including invasive and exotic species/noxious weeds)
- Riparian areas and wetlands
- Fish and wildlife and special status species

- Wild horses and burros
- Wildfire and fire management
- Livestock Grazing
- Recreation
- Comprehensive travel and transportation management
- Land use and realty
- Renewable energy resources/mineral resources
- Special designations
  - Areas of Critical Environmental Concern
  - Wilderness Areas
  - Wilderness Study Areas
  - National Trails
  - Byways
  - Wild and Scenic Rivers
- Water resources
- Soil resources
- Cultural heritage resources
- Tribal interests (including Native American religious concerns)
- Lands with wilderness characteristics (BLM)
- Visual resources
- Air quality
- Climate change
- Socioeconomics and environmental justice

Each resource section contains a discussion of background information, including guidance and regulations. Each also discusses current conditions, which describe the location, extent, and current conditions of the resource in the planning area on BLM-administered and National Forest System lands. Conditions for a resource can vary, depending on the resource. Vegetation, fire management, livestock grazing, mineral resources, and lands and realty have a greater influence on GRSG populations and their habitat and are more likely to be affected by GRSG management actions. These are discussed in greater detail than those resources that have little to no influence (e.g., water, air quality, and soil resources).

The Nevada and Northeastern California Sub-region planning area is 70,200,500 acres; 45,359,000 acres of BLM-administered lands and 9,179,900 acres of National Forest System lands.

For each resource, a general description of the existing conditions is provided for the Nevada and Northeastern California Sub-region planning area, regardless of land status. This is done to provide a regional context for the resource. Then, a more detailed description of the existing conditions is provided for the BLM-administered and National Forest System lands managed according to the BLM and Forest Service plans being amended by this Proposed LUPA/Final 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 GRSGs and their habitat. Generally, the existing condition acreage was determined using the resource information from the BER report (Manier et al, 2013) overlayed with the updated USGS GRSG habitat map, however in some instances local data was used in lieu of the BER report.

The BLM and Forest Service reviewed the LUPs being amended under this Proposed LUPA/Final EIS and other relevant information sources, such as LUPAs, maps, and state GRSG conservation strategies or plans, for existing conditions and trends for the resources listed above with respect to GRSGs and their habitat. This affected environment information is summarized below and, where appropriate, noted when the information is incorporated by reference.

3.2 GREATER SAGE-GROUSE AND GREATER SAGE-GROUSE HABITAT

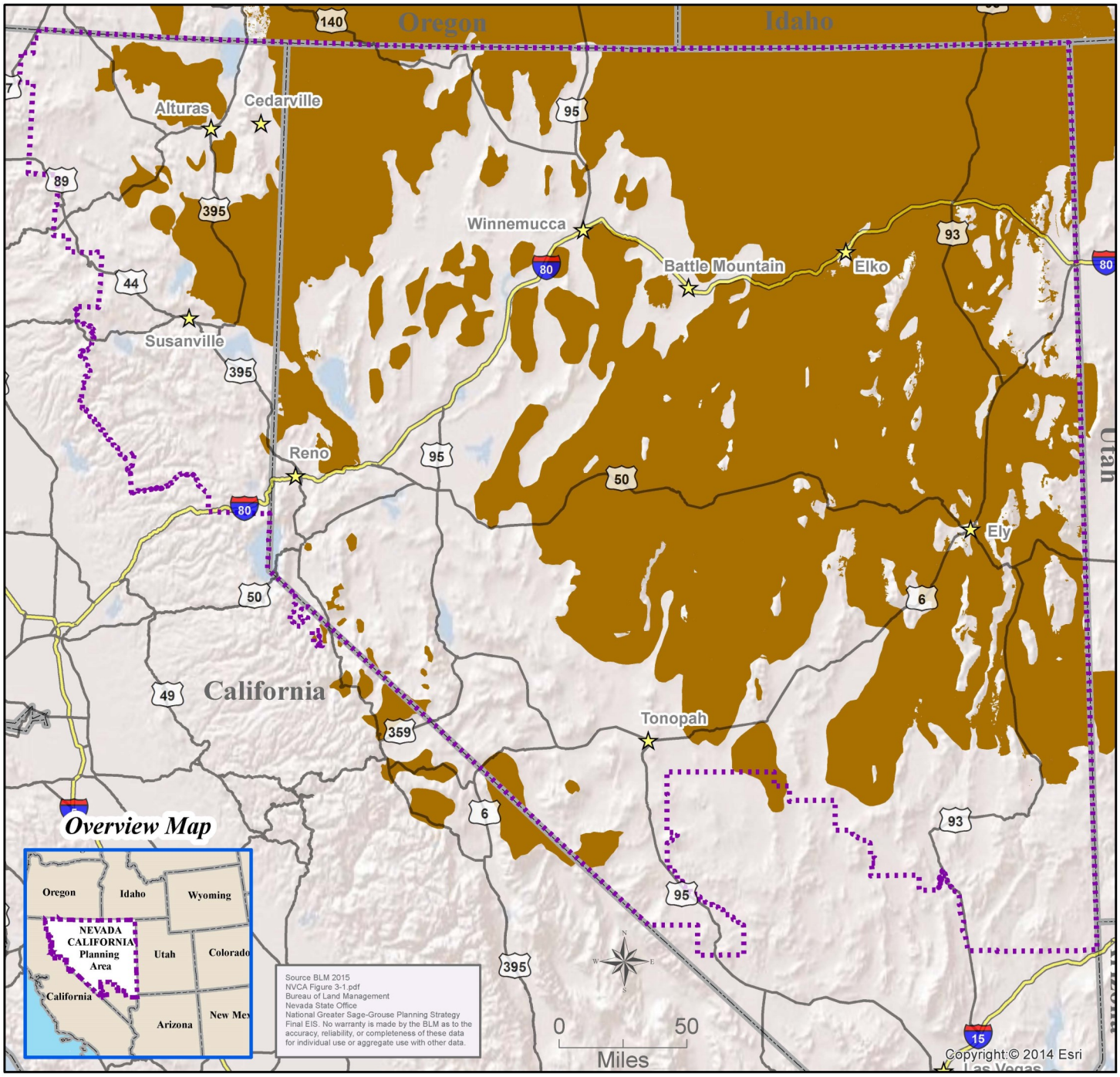
3.2.1 Range and Taxonomy

Greater Sage-Grouse (*Centrocercus* spp.) are the largest grouse found in North America. They are a ground-dwelling, sagebrush-obligate species. Historically, GRSGs were considered to be one species, with a range of fourteen states and three Canadian provinces before Euro-American contact (see **Figure 3-1**; Aldrich 1963; Johnsgard 1983; Connelly et al. 2004; Schroeder et al. 2004).

After considering splitting GRSGs into separate species and subspecies, based on a variety of genetic, morphological, and behavioral evidence, only the Gunnison Sage-Grouse has been determined to be a unique species. The bi-state population in southwestern Nevada and east-central California has been found to be genetically unique. Its status is widely debated, but the species remains taxonomically in GRSGs. The bi-state population, however, is not in the purview of this Northeast California/Nevada Greater Sage-Grouse Proposed LUPA/Final EIS.

The current range of GRSGs is eleven states and two Canadian provinces and is thought to be a reduction of 44 percent from the range prior to Euro-American contact (Connelly and Braun 1997; Schroeder et al. 2004). Regional population

Historic Greater Sage-Grouse Range



Legend

- Historic Greater Sage-Grouse Range
- Planning Area
- City/Town
- Interstate
- US Route
- States

declines have ranged from 17 to 47 percent (Connelly and Braun 1997). Although specific reasons for population decline differ across the range, the underlying cause is the loss, degradation, and fragmentation of suitable sagebrush habitat (Connelly and Braun 1997; Leonard et al. 2000; Aldridge et al. 2008). Sagebrush habitats increasingly overlap with natural resources (e.g., oil, gas, wind, minerals, agriculture, and recreation areas) and face increased landscape-level changes caused by invasive species, fire, and conifer encroachment (Connelly et al. 2004). Because of this, populations have declined substantially, raising conservation concern for the species.

3.2.2 Biology and Life History

GRSGs depend on a variety of shrub-steppe habitats throughout their life cycle and are restricted to several species of sagebrush, including Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), mountain big sagebrush (*A. t.* ssp. *vaseyana*), and basin big sagebrush (*A. t. tridentata*; Patterson 1952; Braun et al. 1976; Connelly et al. 2000a, 2004; Miller et al. 2011). GRSGs also use other sagebrush species such as low sagebrush (*A. arbuscula*), black sagebrush (*A. nova*), fringed sagebrush (*A. frigida*), and silver sagebrush (*A. cana*; Schroeder et al. 1999; Connelly et al. 2004). GRSG distribution is strongly correlated with the distribution of sagebrush habitats (Schroeder et al. 2004).

GRSGs exhibit strong loyalty, also known as site fidelity, to seasonal habitats for breeding, nesting, brood-rearing, and wintering (Connelly et al. 2004), even when areas are of lower value (Welch et al. 1990). Site fidelity in breeding birds could delay population response to habitat changes, and a clear response may require the death of most site-tenacious individuals (Wiens et al. 1986). Adult GRSGs rarely switch between some seasonal habitats once they have been selected, limiting their ability to adapt to changes.

During the spring breeding season, male GRSGs gather to perform courtship displays on areas called leks. Areas of bare soil, short-grass steppe, windswept ridges, exposed knolls, or other relatively open sites typically serve as leks (Patterson 1952; Connelly et al. 2004). Leks are often surrounded by denser shrub-steppe cover, which is used for escape, warmth, and feeding. The proximity, configuration, and abundance of nesting habitat are key factors influencing lek location (Connelly 1982; Connelly et al. 2000b, 2011). Leks can be formed opportunistically at any appropriate site in or next to nesting habitat (Connelly et al. 2000a); therefore, lek habitat availability is not considered to be a limiting factor for GRSGs (Schroeder et al. 1999). Nest sites are selected independent of lek locations, but the reverse is not true (Bradbury et al. 1989; Wakkinen et al. 1992). Thus, leks are indicative of nesting habitat.

Leks range in size from less than 0.1 acre to over 90 acres (Connelly et al. 2004) and can host from several to hundreds of males (Johnsgard 2002). Males defend individual territories in leks and perform elaborate displays with their specialized

plumage and vocalizations to attract females for mating. Males do not participate in egg incubation or chick rearing.

Females have been documented to travel more than 12.5 miles to their nest sites after mating (Connelly et al. 2000a), but distances between a nest site and the lek on which breeding occurs is variable (Connelly et al. 2004). The average distance between a female's nest and the lek on which she was first observed ranged from 2.1 miles to 4.8 miles in five studies examining 301 nest locations (Schroeder et al. 1999). Based on eight studies conducted between 1980 and 2011, over 80 percent of nests were documented within 4 miles of the lek. Hagen (2011) documented greater than 80 percent, Tack (2009) documented greater than 76 percent, Thompson (2006) documented greater than 77 percent, Holloran and Anderson (2005) documented 74 percent, Graham and Jones (2005) documented greater that 96 percent, Giesen (1995) documented greater than 90 percent, Autenrieth (1981) documented 85 percent, and Petersen (1980) documented greater than 85 percent of nests within 4 miles of the lek.

Productive nesting areas are typically characterized by sagebrush with an understory of native grasses and forbs (broad-leaved flowering plants). Horizontal and vertical structural diversity provides an insect prey base, herbaceous forage for pre-laying and nesting hens, and cover for the hen while she is incubating (Gregg 1991; Schroeder et al. 1999; Connelly et al. 2000a, 2004; Connelly et al. 2011).

GRSGs may also use other shrub or bunchgrass species for nest sites (Klebenow 1969; Connelly et al. 2000a, 2004). Studies document that various habitat features are central to GRSG nest survival, such as grass height (Gregg et al. 1994; Aldridge and Brigham 2002; Holloran et al. 2005), grass cover (Holloran et al. 2005; Moynahan et al. 2007), shrub height (Gregg et al. 1994; DeLong et al. 1995; Popham and Gutiérrez 2003), shrub cover (Wallestad and Pyrah 1974; Gregg et al. 1994; Watters et al. 2002), understory cover (Gregg et al. 1994; DeLong et al. 1995), rock cover (Popham and Gutiérrez 2003), and species of nesting shrub (Connelly et al. 1991).

Conversely, other studies have found negative or no relationships between nest survival and grass height (Popham and Gutiérrez 2003), grass cover (Aldridge 2000), shrub height (Autenrieth 1981; Sveum et al. 1998), canopy cover (Popham and Gutiérrez 2003; Aldridge and Boyce 2007), understory cover (Aldridge and Brigham 2002), and species of nesting shrub (Autenrieth 1981; Sveum et al. 1998).

In the sagebrush ecosystem, GRSG nest sites generally have greater cover of shrubs and grasses than the surrounding vegetation, which may include a mosaic of vegetation structure (Connelly et al. 2000). In Oregon, cover of medium-height shrubs (15 to 31 inches) and tall residual grass cover (.07 inch) was found to be greater at nest sites than in the surrounding area (Gregg et al. 1994). In

Washington, nests had greater shrub cover, shrub height, vertical cover height, residual cover, and litter cover than nearby random sites (Sveum et al. 1998). Holloran et al. (2005) found greater total shrub canopy cover and height at GRSG nest sites than at random sites in Wyoming, but no difference between sites in residual grass height or cover. In contrast, no differences in vegetation, except shrub height, were found between nest sites and random sites in northern California (Popham and Gutiérrez 2003; Kolada et al. 2009a). In northwestern Nevada, Lockyer (2012) found that shrub canopy cover was the single most explanatory factor selected by female GRSGs that resulted in increased daily survival rate of hens.

Hens rear their broods in 0.1 to 3.1 miles of the nest site for the first 2 to 3 weeks following hatching, based on two studies in Wyoming (Connelly et al. 2004). Forbs and insects are essential nutritional components for chicks (Klebenow and Gray 1968; Johnson and Boyce 1991; Connelly et al. 2004). Therefore, early brood-rearing habitat must provide adequate cover (sagebrush canopy cover of 10 to 25 percent; Connelly et al. 2000a) next to areas rich in forbs and insects to ensure chick survival during this period (Connelly et al. 2004).

GRSGs gradually move from sagebrush uplands to more mesic areas (moist areas such as streambeds or wet meadows) during the late brood-rearing period (3 weeks post-hatch) in response to summer desiccation of herbaceous vegetation (Connelly et al. 2000a). Summer use areas can include sagebrush habitats as well as riparian areas, wet meadows, and alfalfa fields (Schroeder et al. 1999). These areas provide an abundance of forbs and insects for both hens and chicks (Schroeder et al. 1999; Connelly et al. 2000a). GRSGs will use free water although they do not require it since they obtain their water needs from the food they eat. However, 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).

As vegetation becomes desiccated through the late summer and fall, GRSGs shift their diet entirely to sagebrush (Schroeder et al. 1999). They depend entirely on sagebrush through the winter for both food and cover. Sagebrush stand selection is influenced by snow depth (Patterson 1952; Hupp and Braun 1989; Connelly et al. 2000; USGS in prep.), availability of sagebrush above the snow to provide cover (Connelly et al. 2004) and, in some areas, elevation, slope, and aspect (Beck 1977; Crawford et al. 2004).

Many populations of GRSGs migrate between seasonal ranges in response to habitat distribution (Connelly et al. 2004). Migration can occur between winter, breeding, and summer areas, or not at all. Migration distances of up to 100 miles have been recorded (Patterson 1952); however, distances vary depending on the locations of seasonal habitats (Schroeder et al. 1999). Migration distances for female GRSGs generally are less than for males (Connelly et al. 2004);

however, in one study in Colorado, females traveled farther than males (Beck 1977). Almost no information is available regarding the distribution and characteristics of migration corridors for GRSGs (Connelly et al. 2004). GRSG dispersal (when a population permanently moves to other areas) is poorly understood (Connelly et al. 2004) and appears to be sporadic (Dunn and Braun 1986).

Habitat and Population Trends

Considerable attention has been given to GRSGs since the 1980s, as evidenced by the National Sage-Grouse Habitat Conservation Strategy (DOI 2004). This conservation strategy provides national GRSG habitat conservation guidance. The plan identifies potential conservation actions that might be implemented in order to maintain and enhance GRSG populations and habitat.

Several factors related to GRSG habitat and the way they use it have been considered causes of the decline in GRSG distribution and abundance. These factors include habitat loss, alteration, and degradation (Braun 1995).

Historically, sagebrush-dominated vegetation was one of the most widespread habitats in the country and still covers much of the Great Basin and Wyoming Basin, reaching into the Snake River Plain, Columbia Basin, Colorado Plateau, Montana, southwestern Colorado, northern Arizona, and New Mexico. Across this area, big sagebrush predominates and has five known subspecies (West 1988; Kartesz 1994).

The sagebrush mosaic was historically subject to impacts from natural components of the environment, such as small and patchy fires, and periodic population explosions of jackrabbits, grasshoppers, and crickets. Big sagebrush does not re-sprout after a fire but is replenished by wind-dispersed seed from adjacent unburned stands or seeds in the soil. Depending on the species and the size of a burn, sagebrush can reestablish itself in five years of a burn, but a return to a full pre-burn community (density and cover of sagebrush) cover can take 15 to 30 years (Bunting 1984; Miller and Rose 1999) for species that grow in higher precipitation zones, such as mountain big sagebrush. Species such as Wyoming big sagebrush, which grow exclusively in dry soils, can take 100 to 200 years to recover to pre-burn sagebrush canopy (Cooper et al. 2007; Eichhorn and Watts 1984).

Since Euro-American contact with the West began, the amount, distribution, and quality of sagebrush habitats and populations of GRSGs that depend on them have declined as a result of activities such as large-scale conversions to cultivated croplands or pastures, altered fire frequencies resulting in conifer encroachment at higher elevations and annual grass invasion at lower elevations, livestock grazing, herbicide use, mineral and energy development, and recreation related to urban growth and increased human populations. As a result, the 156 million acres of sagebrush that existed historically were reduced to 119 million acres by 2004 (Connelly et al. 2004). Currently, sagebrush communities and

GRSGs are at risk from multiple sources across multiple scales (BLM 2004d). About 56 percent of the potential distribution of habitat before Euro-American contact is currently occupied by GRSGs (Connelly et al. 2004).

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

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

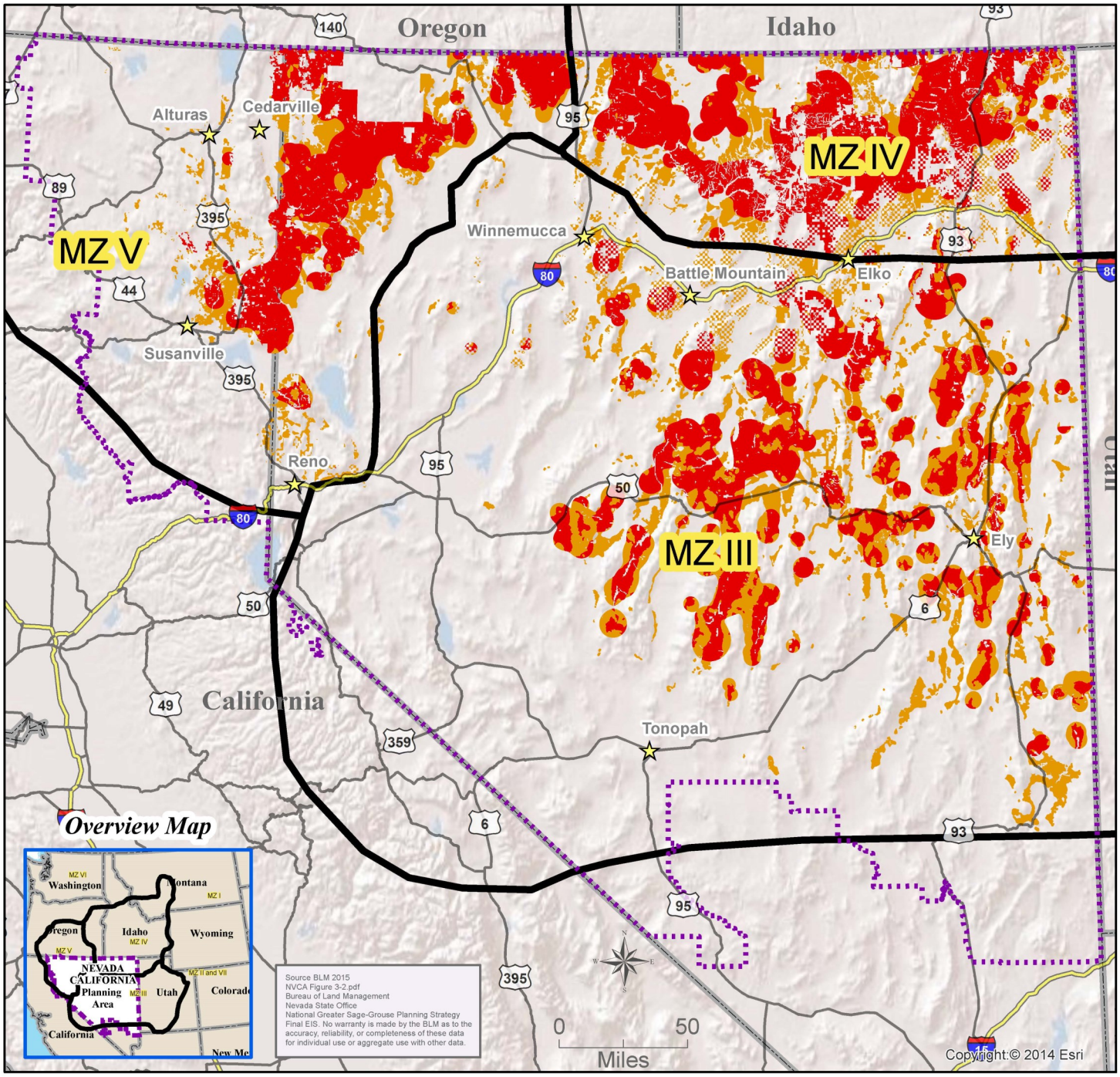
Habitat Selection

GRSGs are currently estimated to occupy 165 million acres across the western United States and Canada (Knick and Connelly 2011). Its range encompasses tremendous variability in habitat conditions, human activities, and GRSG populations.

The development of comprehensive monitoring approaches led to formal recognition that habitat selection assessments need to use approaches that address multiple spatial scales to represent the selection processes of GRSGs (Connelly et al. 2003b, 2011).

First-order selection is the geographic range and defines the GRSG population of interest. In this geographic range, second-order selection hinges on large, relatively intact regions of habitat and is often identified using subpopulation distributions (e.g., geographic proximity and potential connections among leks or regional population connectivity using genetics). Third-order selection represents refinement of habitats used by subpopulations by identifying seasonal habitats (e.g., nesting habitat), patch selection, and migration habitats. The fourth-order of behavioral classification can be assessed by quantifying food and cover attributes and foraging behavior at particular sites (Stiver et al. 2010, see **Figure 3-2**).

Preliminary Priority and General Habitat and WAFWA Management Zones



Legend

- Western Association of Fish and Wildlife Agencies' (WAFWA)
- Preliminary Priority Habitat (PPH)
- Preliminary General Habitat (PGH)
- City / Town
- Interstate
- US Route
- States
- Planning Area

In practice, selection of food items is incorporated in selecting feeding sites because selection of a particular site determines the array of food items available to be selected. Habitat value and use will best be determined using a combination of these characteristics (not one alone). To accurately characterize GRSG habitat selection for a given population at the first and second orders (landscape spatial scale), the migratory nature (e.g., seasonal movements) of the population must be well understood (Connelly et al. 2000a). This may include very large areas annually; it has been suggested that migratory populations may range across a habitat the size of Rhode Island (approximately 1,200 square miles; Connelly et al. 2003).

Habitat

Sagebrush occurs in two natural vegetation types that are delineated by temperature and patterns of precipitation (Miller et al. 2011). Sagebrush steppe ranges across the northern portion of GRSG range, from British Columbia and the Columbia Basin, through the northern Great Basin, Snake River Plain, and Montana, and into the Wyoming Basin and northern Colorado. In this type, sagebrush typically co-dominates with perennial bunchgrasses (Miller et al. 2011).

The second major type, Great Basin sagebrush, occurs south of sagebrush steppe and extends from the Colorado Plateau westward into Nevada, Utah, and California (Miller et al. 2011). The herbaceous component contributes a smaller portion of the total plant cover (Miller and Eddleman 2000) due to hydrologic patterns. In this habitat type, sagebrush is frequently the canopy dominant with little understory (Miller et al. 2011).

Table 3-1 describes GRSG habitat characteristics and provides the standard for seasonal habitat definitions.

Table 3-1
Characteristics of Sagebrush Rangeland Needed for Productive GRSG Habitat

	Breeding		Brood-Rearing		Winter[e]	
	Height (Inches)	Canopy (Percent)	Height (Inches)	Canopy (Percent)	Height (Inches)	Canopy (Percent)
Mesic sites[a]						
Sagebrush	16 to 31	15 to 25	16 to 31	10 to 25	10 to 14	4 to 12
Grass-forb	>7[c]	≥25[d]	Variable	>15	N/A	N/A
Arid sites[a]						
Sagebrush	12 to 16	15 to 25	16 to 31	10 to 25	10 to 14	4 to 12
Grass-forb	7[c]	≥15	Variable	>15	N/A	N/A
Area[b]	>80%		>40%		>80%	

Source: Connelly et al. 2000a; Tisdale and Hironaka 1981; Hironaka et al. 1983; Schroeder 1995
[a]Mesic and arid sites should be defined locally; annual precipitation, herbaceous understory, and soils should be considered.
[b]Percentage of seasonal habitat needed with indicated conditions.
[c]Measured as "droop height"; the highest naturally growing portion of the plant.
[d]Coverage should exceed 15 percent for perennial grasses and 10 percent for forbs; values should be substantially greater if most sagebrush has a growth form that provides little lateral cover.
[e]Values for height and canopy coverage are for shrubs exposed above snow.

Based on current research (see references listed under **Table 3-1** and **Table 3-2**) conducted in the Great Basin sagebrush type (as opposed to the sagebrush steppe), the Nevada and Northeastern California Sub-region has developed GRSG habitat standards to replace the Connelly guidelines in the sub-region or in the floristic provinces represented by WAFWA's MZs III, IV, and V. These guidelines, outlined in **Table 3-2** emphasize the role of sagebrush cover for nesting in the Great Basin sagebrush type, the importance of riparian condition and species diversity in brood-rearing habitat, and the site-specific habitat attributes in broader scales of habitat selection by GRSGs.

Table 3-2
Proposed Habitat Objectives for GRSGs

Attribute	Indicators	Desired Condition (Habitat Objectives)	References
General/Landscape-Level			
All life stages	Rangeland health assessments	Meeting all standards[1]	
Cover (nesting)	Seasonal habitat needed	>65% of the landscape in sagebrush cover	Aldridge and Boyce 2007
	Annual grasses	<%5	Blomberg et al. 2012
Security (nesting)	Conifer encroachment	<3% phase I (>0 to <25% cover) No phase II (25 to 50% cover) No phase III (>50% cover)	Casazza et al. 2011 USGS (in prep. A)
Cover and food (winter)	Conifer encroachment	<5% phase I (>0 to <25% cover) No phase II (25 to 50% cover) No phase III (>50%)	USGS (in prep. A) USGS (in prep. B)
	Sagebrush extent	>85% sagebrush land cover	USGS (in prep. A) Doherty et al. 2008
Lek (Seasonal Use Period March 1 to May 15)			
Cover	Availability of sagebrush cover	Has adjacent sagebrush cover	Blomberg et al. 2012 Connelly et al. 2000 Stiver et al. (in press) HAF
Security[2]	Pinyon /juniper cover	<3% landscape cover in .6 mile of leks	Connelly et al. 2000 (modified) Stiver et al. (in press) HAF Baruch-Mordo et al. 2013
	Proximity of tall structures[3]	Use Mainer et al. 2014 Conservation Buffer Distance Estimates for GRSG-A Review; preference is 3 miles	Coates et al. 2013 Manier et al. 2014
Nesting (Seasonal Use Period April 1 to June 30)			
Cover	Sagebrush cover	≥20%	Kolada et al. 2009a, 2009b
	Residual and live perennial grass cover	≥10% if shrub cover is <25%[4]	Coates et al. 2013 Coates and Delehanty 2010 Kolada et al. 2009a, 2009b
	Annual grass cover	<5%	Lockyer et al. (in press)
	Total shrub cover	≥30%	Coates and Delehanty 2010 Kolada et al. 2009a Lockyer et al. (in press)

Table 3-2
Proposed Habitat Objectives for GRSGs

Attribute	Indicators	Desired Condition (Habitat Objectives)	References
	Perennial grass height	Provide overhead and lateral concealment from predators	Connelly et al. 2000, 2003 Hagen et al. 2007 Stiver et al. (in press) HAF
Security[2]	Proximity of tall structures[3] (3 feet above shrub)	Use Mainer et al. 2014 Conservation Buffer Distance Estimates for GRSG-A Review; preference is 3 miles	Coates et al. 2013 Gibson et al. 2013 Manier et al. 2014
Brood-Rearing/Summer (Seasonal use period: May 15 to September 15; Early: May 15 to June 15; Late: June 15 to September 15)			
Upland Habitats			
Cover	Sagebrush cover	10 to 25%	Connelly et al. 2000
	Perennial grass cover and forbs	>15% combined perennial grass and forb cover	Connelly et al. 2000 Hagen et al. 2007
	Deep rooted perennial bunchgrass	7[5, 6] inches	Hagen et al. 2007
Cover and Food	Perennial forb cover	≥5% arid ≥15% mesic	Casazza et al. 2011 Lockyer et al. (in press)
Riparian/Meadow Habitats			
Cover and food	Riparian areas/meadows	PFC	Dickard et al. 2015 Prichard et al. 1998, 1999 Stiver et al. (in press) HAF
Security	Upland and riparian perennial forb availability and understory species richness	• Preferred forbs are common, with several species present.[5] • High species richness (all plants)	Stiver et al. (in press) HAF
	Riparian area/meadow interspersion with adjacent sagebrush	Has adjacent sagebrush cover	Casazza et al. 2011 Stiver et al. (in press) HAF
Winter (Seasonal Use Period: November 1 to February 28)			
Cover and Food	Sagebrush cover	≥10% above snow depth	Connelly et al. 2000 USGS (in prep C)
	Sagebrush height	>9.8 inches above snow depth	Connelly et al. 2000 USGS (in prep C)

[1]Upland standards are based on indicators including litter, live vegetation, and rock, appropriate to the ecological potential of the site.
[2] Applicable to phase I and phase II pinyon and/or juniper.
[3] Does not include fences.
[4]In addition, if upland rangeland health standards are being met.
[5]Relative to ecological site potential.
[6]In drought years, 4-inch perennial bunchgrass height with greater than 20 percent measurements exceeding 5 inches in dry years.

GRSG Habitat Mapping

A quantitative approach was used to develop a spatially explicit support tool for conservation planning, consisting of multiple steps. The overall modeling framework was made up of input data sets that were subjected to a series of processing steps to produce interim and final spatially explicit maps.

GRSG telemetry location data was compiled from multiple areas across Nevada and northeastern California. It was divided into three independent sets for model training (80 percent of locations), mapping classification (10 percent), and map validation (10 percent; see Habitat Suitability Model Development in Coates et al. 2014).

The training data set was linked spatially with corresponding environmental covariates (such as, data on land- cover types representing the dominant vegetation) to enable calculation of population-level resource selection functions (RSFs; Coates et al. 2014; Manly et al. 2002) in 12 sub-regions with adequate data. The relevant spatial scale and linear relationships of environmental characteristics were identified. Next, model-averaged parameter estimates for influential covariates among all candidate models were calculated to account for model selection uncertainty (Burnham and Anderson, 2002; see RSF Analyses). Then the estimates to develop spatially explicit models reflecting the relative probability of selection at each sub-region was used.

The following was completed for each of the 12 sub-regional RSF models:

- Transformed the model into habitat suitability index (HSI)
- Extrapolated the HSI across the extent of the region
- Averaged the HSI predictions generated from each sub-region to provide an unbiased region-wide HSI map

The independent classification telemetry data set was then used to extract the region-wide HSI predictions and categorize the continuous HSI value. This was based on the mean and variance of the extracted data that resulted in a region-wide categorical habitat map, grouped into four hierarchical classes of descending probability of selection.

The third independent data set was used to validate the region-wide map by calculating the proportion of locations in each category. The proportions for telemetry data in each of the training subregions and telemetry data from multiple independent sub-regions (that is, non-RSF sub-regions) was then calculated. Data from independent sub-regions were used to assess the map in interpolated areas. Locations of active leks were used as an additional dataset for map validation (see Region-Wide Habitat Suitability Index and implementation for Conservation Planning).

From the RSFs, information of the probability of selection was produced solely on predicted associations of GRSGs with environmental covariates. However, the model did not incorporate knowledge of GRSG abundance and density that represents space currently occupied by GRSGs. Therefore, a space use index (SUI) was created, based on lek count data and existing information regarding how GRSGs use space in relation to leks. Specifically, the SUI integrated information on lek density, size (average number of males attending leks), and

the nonlinear relation between probability of space use and distance to the lek; this was then used to create categories of high use or low-to-no use across the sub-region.

To provide a modeling tool that can aid conservation planning, the region-wide HSI (categorized into high, moderate, low, and nonhabitat, based on the variance distribution of HSI values) and high and low-to-no use SUI categories were combined into a single sub-regional map.

The map simultaneously reflects both the presence of GRSGs and the presence of habitat features associated with GRSG occupancy and can then be used to prioritize areas for different management scenarios. The strength of the map is to account for characteristics that describe the quality of the environment for GRSGs, as well as an index of population abundance (Coates et al. 2014).

The three management categories derived from this mapping process for the Nevada and Northeastern California Sub-region are priority, general and other habitat management areas. However, the State of Nevada's alternative refers to these management categories as core, priority, and general habitat.

Surface and Habitat Acres

Population/subpopulation surface acreage in the sub-region is dominated by BLM-administered lands at 72 percent. National Forest System lands comprise 11 percent, and all other ownerships comprise the remaining 17 percent (**Table 3-3**).

Table 3-3
Surface Ownership in WAFWA Management Zones by Population/Subpopulation

Population/Subpopulation	BLM	Forest Service	Other	Total
Management Zone III				
Central Nevada	9,549,100	2,459,100	1,786,200	13,794,400
Northwestern Interior	990,900	-	293,100	1,284,000
Quinn Range	1,712,300	222,900	50,500	1,985,700
Southeast Nevada	7,524,400	787,800	705,200	9,017,400
Management Zone IV				
North-central Nevada	1,333,000	316,200	403,400	2,052,600
Northeastern Nevada	3,401,300	678,000	1,897,000	5,976,300
Management Zone V				
Klamath (California)	-	-	69,700	69,700
Lake Area: northeastern California/northwestern Nevada	3,123,800	-	1,128,900	4,252,700
South-central Oregon/north-central Nevada	455,500	-	23,900	479,400
Warm Springs Valley	231,700	-	124,500	356,200
Grand Total	**28,322,000**	**4,464,000**	**6,482,400**	**39,268,400**

Source: BLM and Forest Service GIS 2015

Population/subpopulations in PPH and PGH in the Nevada and Northeastern California Sub-region are skewed toward BLM-administered lands comprising 71 percent and National Forest System lands comprising 9 percent (**Table 3-4**).

3.2.3 Management Zones

Due to the differences in the ecology of sagebrush across the range of the GRSGs, WAFWA further parcels sagebrush habitats into MZs I through VII, based primarily on floristic provinces. The boundaries of these MZs were delineated based on their ecological and biological attributes rather than on arbitrary political boundaries (Stiver et al. 2006). Vegetation found in each management zone is similar, and GRSG and its habitat in these areas are likely to respond similarly to environmental factors and management actions.

The Nevada and Northeastern California Sub-regional planning area includes GRSG habitat and populations in three management zones as delineated by WAFWA. To facilitate local planning and foster stakeholder involvement in state-led planning initiated by Nevada's governor in 2004, the Nevada and Northeastern California Sub-region was divided into 66 PMUs that remain a primary reference tool for describing the sub-regional populations (Nevada Governor's Sage-Grouse Conservation Team 2004). MZs in the Nevada and Northeastern California Sub-region are the following:

- Management Zone III—Southern Great Basin (includes Utah, Nevada, and California)
- Management Zone IV—Snake River Plain (includes Idaho, Utah, Nevada, and Oregon)
- Management Zone V—Northern Great Basin (includes Oregon, California, and Nevada)

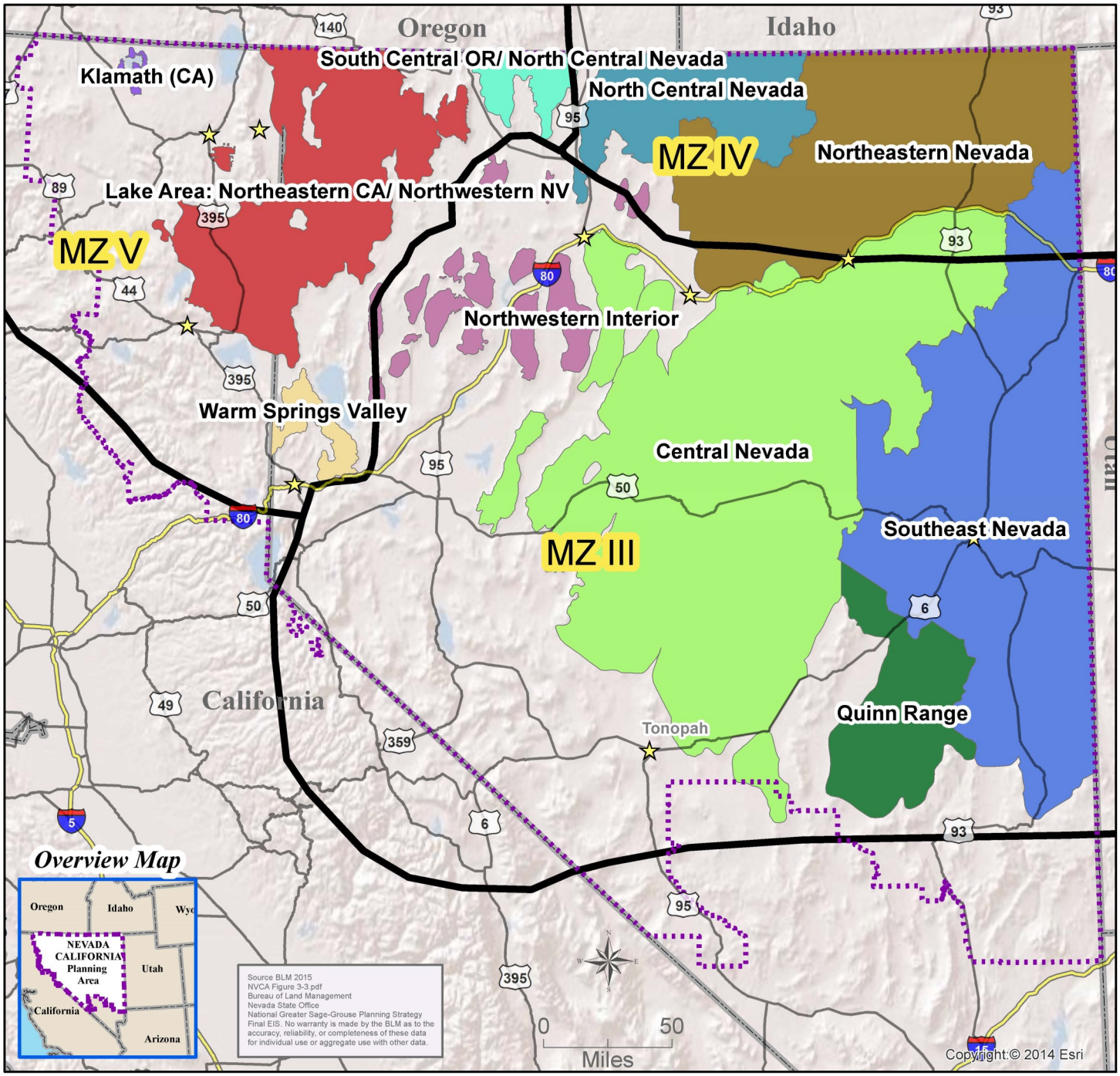
These MZs, their aggregate populations and subpopulations, and the PMUs in the sub-region are described in **Table 3-5** and **Figure 3-2**. They may cross population/subpopulation boundaries (Connelly et al. 2004). For planning purposes, MZ boundaries are adapted to the PMU boundaries described for the sub-region. Connelly et al. (2004) defined populations of GRSGs on the basis of isolation-by-distance or isolation-by-topography rather than political or jurisdictional boundaries. Some of these populations were further divided into subpopulations based on their large size, expansive distribution, differences in region, and a relatively small degree of separation. GRSG populations and subpopulations do not encompass the entire GRSG mapped habitat in the Nevada and Northeastern California Sub-region (**Table 3-5, Figure 3-3** and **Figure 3-4**).

Table 3-4
Acres of GRSG Habitat in Population/Subpopulations

Population/ Subpopulation	BLM		FOREST SERVICE		OTHER LANDS		TOTAL	
	PPH	PGH	PPH	PGH	PPH	PGH	PPH	PGH
Management Zone III								
Central Nevada	2,352,800	1,711,100	265,100	528,100	510,200	548,600	3,128,100	2,787,800
Northwestern Interior Nevada	12,000	84,600	-	-	3,900	23,100	15,900	107,700
Quinn Canyon Range Nevada		187,900	-	6,400	-	5,000	-	199,300
Southeastern Nevada	1,190,900	1,620,300	36,300	149,100	87,500	147,400	1,314,700	1,916,800
Management Zone IV								
North-central Nevada	701,300	318,400	189,000	50,500	124,800	208,900	1,015,100	577,800
Northeastern Nevada	2,140,100	714,500	323,500	152,100	979,300	482,900	3,442,900	1,349,500
Management Zone V								
Klamath, Oregon/California	-	0	0	0	18,700	44300	18,700	44,300
Lake Area Oregon, Northeastern California/northwestern Nevada	1,900,500	659,000	0	0	680,400	247800	2,580,900	906,800
South-central Oregon/north-central Nevada	306,700	86,400	0	0	14,200	4900	320,900	91,300
Warm Springs Valley Nevada	35,900	71,600	0	0	11,600	34,200	47,500	105,800
Grand Total	**8,640,200**	**5,453,800**	**813,900**	**886,200**	**2,430,600**	**1,747,100**	**11,884,700**	**8,087,100**

Source: BLM and Forest Service GIS 2015

Populations/Subpopulation, Population Management Units and WAFWA Management Zones



Legend

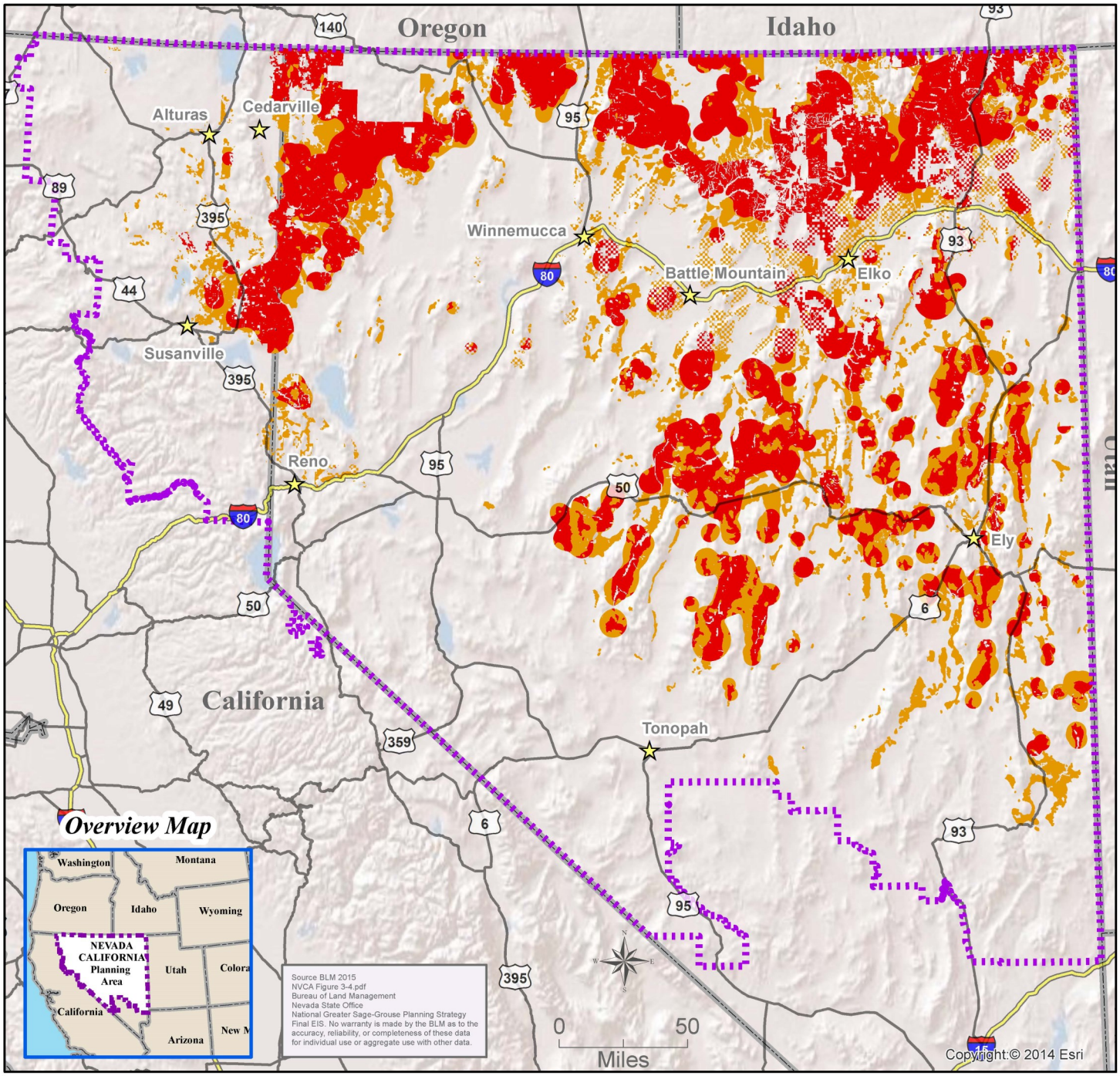
- Western Association of Fish and Wildlife Agencies' (WAFWA)

Population / SubPopulation

- Central Nevada
- Klamath (CA)
- Lake Area: Northeastern CA/ Northwestern NV
- North Central Nevada
- Northeastern Nevada
- Northwestern Interior
- Quinn Range
- South Central OR/ North Central Nevada
- Southeast Nevada
- Warm Springs Valley

- City / Town
- Interstate
- US Routes
- States
- Planning Area

Greater Sage-Grouse Habitat in the Nevada and Northeastern California Sub-region



Legend

- Preliminary Priority Habitat (PPH)
- Preliminary General Habitat (PGH)
- City / Town
- Interstate
- US Routes
- States
- Planning Area

Figure 3-4

Table 3-5
WAFWA MZs, Populations/Subpopulations, and PMUs in the Planning Area

WAFWA MZ	Populations/ Subpopulations	PMUs
III	Central Nevada	Cortez, South Fork,* Shoshone, Three Bar, Monitor, Reese River, Toiyabe, Kawich, Clan Alpine, Desatoya, Stillwater, Fish Creek, Sonoma, Ruby Valley,* Battle Mountain, Diamond
	Southeast Nevada	East Valley,* Butte/Buck/White Pine, Schell/Antelope, Spring/Snake Valley, Steptoe/Cave, Lincoln
	Northwestern Interior	Jackson, Slumbering Hills, Eugene, East Range, Humboldt, Trinity, Limbo,* Majuba 1,2,3,4, Sahwave 1,2, Nightingale,* Eden Valley*
	Quinn Range	Quinn
IV	North-central Nevada	Santa Rosa,* Desert
	Northeastern Nevada	Tuscarora, North Fork, Islands, O'Neil Basin, Snake, Gollaher
V	South-central Oregon/north-central Nevada	Lone Willow*
	Northeastern California/northwestern Nevada	Massacre, Vya, Sheldon, Buffalo-Skedaddle, Likely Tablelands, Devils Garden/Clear Lake, Black Rock, Pine Forest
	Klamath (California)	Devil's Garden
	Warm Springs Valley	Virginia/Pah Rah

Source: Stiver et al. 2006
*PMUs fall in other population/subpopulation

Greater Sage-Grouse Populations

The NDOW and CDFW lek database classifies leks into five categories defined as follows:

- Active—two or more males observed at least twice in the last 5 years
- Pending Active—Two or more males observed only once in the last 5 years, with no other visits conducted
- Inactive—Zero or one male observed during every visit (minimum two visits) in the last 5 years
- Historic—Zero or one male observed during every visit (minimum 5 visits) in the last 30 years
- Unknown—No other conditions met

Currently, there are 635 leks classified as active and 324 classified as inactive. Active leks are distributed among the population/subpopulations, as shown in **Table 3-6**.

Table 3-6
Leks in Population/Subpopulations

Population/Subpopulation	Active	Inactive	Total
Management Zone III			
Central Nevada	158	68	226
Northwestern Interior Nevada	0	0	0
Quinn Canyon Range Nevada	N/A	N/A	N/A
Southeastern Nevada	112	41	153
Management Zone IV			
North-central Nevada	47	30	77
Northeastern Nevada	180	118	298
Management Zone V			
Klamath, Oregon/California	N/A	N/A	N/A
Lake Area Oregon, northeastern California/northwestern Nevada	99	31	130
South-central Oregon/north-central Nevada	36	18	54
Warm Springs Valley Nevada	3	0	3

Source: NDOW and CDFW 2013

Lek data demonstrate where GRSGs in the sub-region are persistent in populations/subpopulations. (See management zone discussions below for summaries of population trends and habitat factors.)

Numbers of males per active lek in each population/subpopulation are characterized in **Table 3-7**.

Table 3-7
Percentage Distribution of Active Leks by Size Category in Population/Subpopulation

Population/Subpopulation	0 to 10 Males	11 to 21 Males	22 to 30 Males	31 to 40 Males	41 to 50 Males	51+ Males
Central Nevada	23	23	17	15	10	11
Northwestern Interior Nevada	0	0	0	0	0	0
Quinn Canyon Range Nevada	0	0	0	0	0	0
Southeastern Nevada	33	29	12	13	4	10
North-central Nevada	21	25	27	9	10	9
Northeastern Nevada	26	29	16	10	8	9
Klamath, Oregon/California	37	13	0	0	49	0
South-central Oregon/north-central Nevada	21	22	24	7	9	16
Lake Area Oregon, northeastern California/northwestern Nevada	18	19	15	17	10	21
Warm Springs Valley, Nevada	27	0	29	44	0	0

Source: NDOW and CDFW 2013

The distribution of lek categories among the population/subpopulations depicts their relative strength. Of note is the Lake Area Oregon, northeastern California/northwestern Nevada subpopulation, with a relatively flat distribution across lek categories indicating a disproportionate number of larger leks. Central Nevada exhibits a similar distribution. Northeastern Nevada and southeastern Nevada have a high number of small leks and a linear decrease in number of leks by size across the categories. The smaller but viable populations in south-central Oregon/north-central Nevada have fewer leks overall, but lek size distributions are similar to those of the most robust Lake Area Oregon, northeastern California/northwestern Nevada and central Nevada populations. These distributions generally correlate to wildland fires, annual grass invasion, and conifer encroachment influences among subpopulations.

Fire Occurrence

Fire has played a major role in the decline of GRSG habitat in the sub-region. Fire starts and total burned acres by both year and decade have increased substantially since 1980. Causes are attributable initially to the influence of invasive grasses on fire return intervals. The fine fuel bed created annually has the ability to ignite more frequently and to burn in larger, more continuous patches.

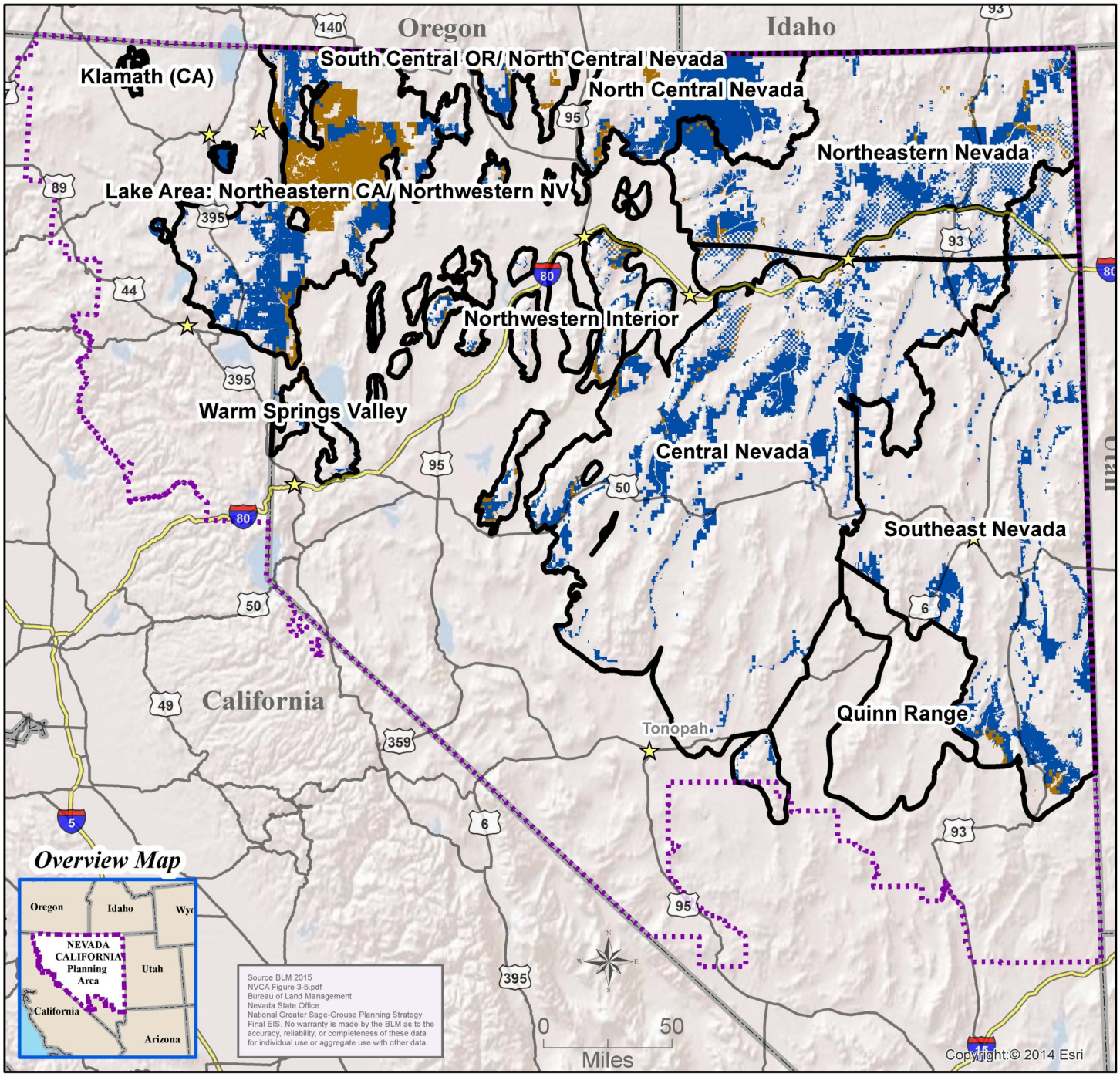
Of increasing importance is the role of climate change. Live fuel moistures are reaching lower values earlier than in recorded history, thus greatly increasing the flammability of larger fuels, such as sagebrush. This increases fire size and also intensifies fire behavior.

Figure 3-5 shows the areas of the sub-region with a high probability for cheatgrass to occur. The loss of GRSG habitat in the northwestern Interior population of the sub-region bears a direct relationship to the high risk of cheatgrass replacement following wildland fire (Connelly et al. 2004). Of note is the low risk for the Nevada portion of the Lake Area Oregon, northeastern California/northwestern Nevada, north-central, and northeastern Nevada subpopulations and the low to moderate risk in the central and southeastern Nevada subpopulations. This demonstrates some level of resilience to the effects of wildland fire and ultimately loss of habitat in these areas.

More recent fire history in the sub-region is shown on **Figure 3-6**, while the trends in fire starts and burned acres are depicted in **Table 3-8**.

Chart 3-1 displays fire data by decade and demonstrates the increase in fire size. Trends in fire starts reflect a general increase across the chart, while acres burned more than doubled from the 1980s to the 1990s and nearly quadrupled between 2000 and 2009.

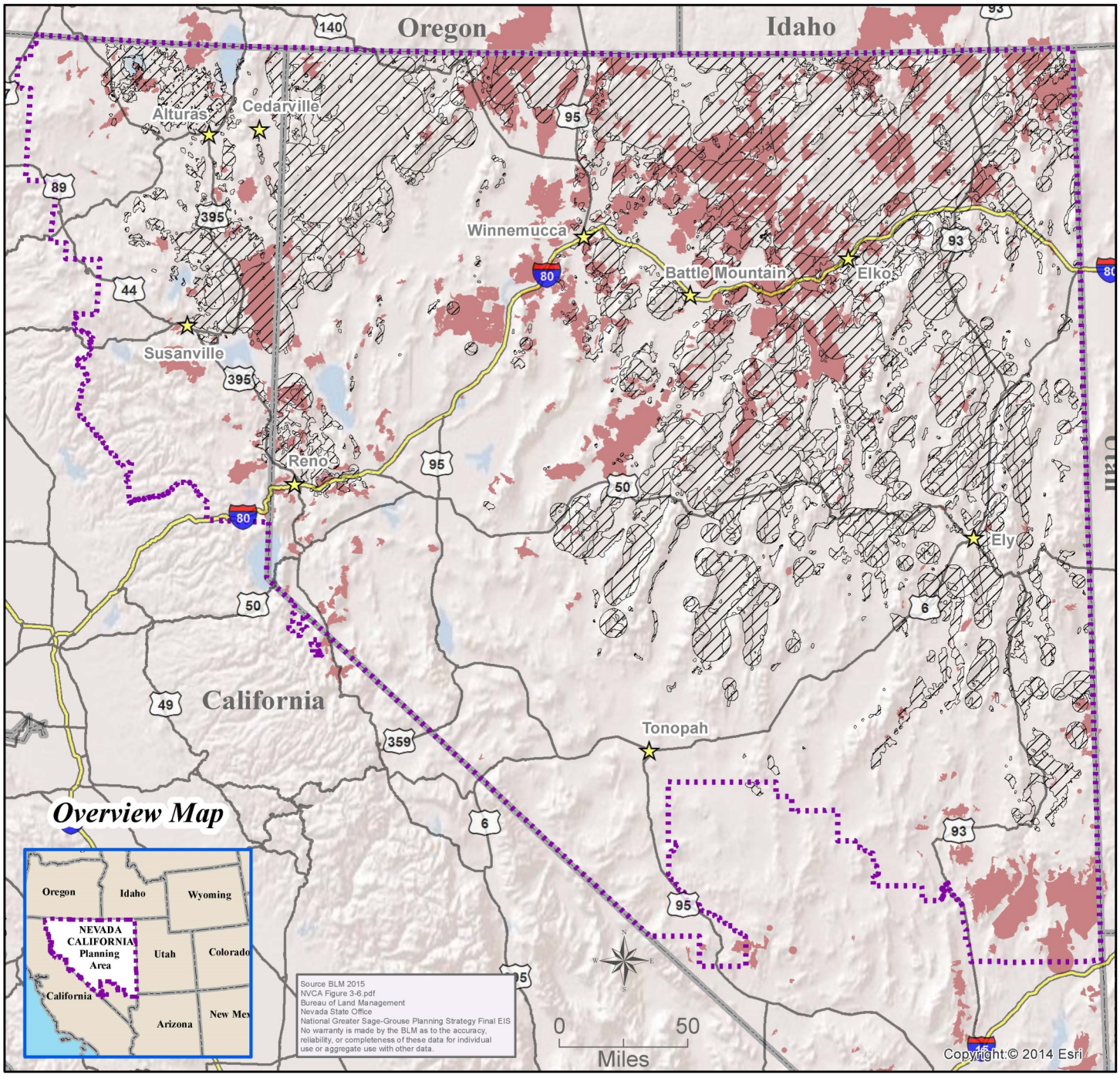
Areas with High Probability of Cheatgrass Occurrence



Legend

- Population Management Units
- **Cheatgrass within Habitat**
  - Low - Moderate Risk
  - High Risk
- City / Town
- Interstate
- US Routes
- States
- Planning Area

Large Fire History 1992-2014



Legend

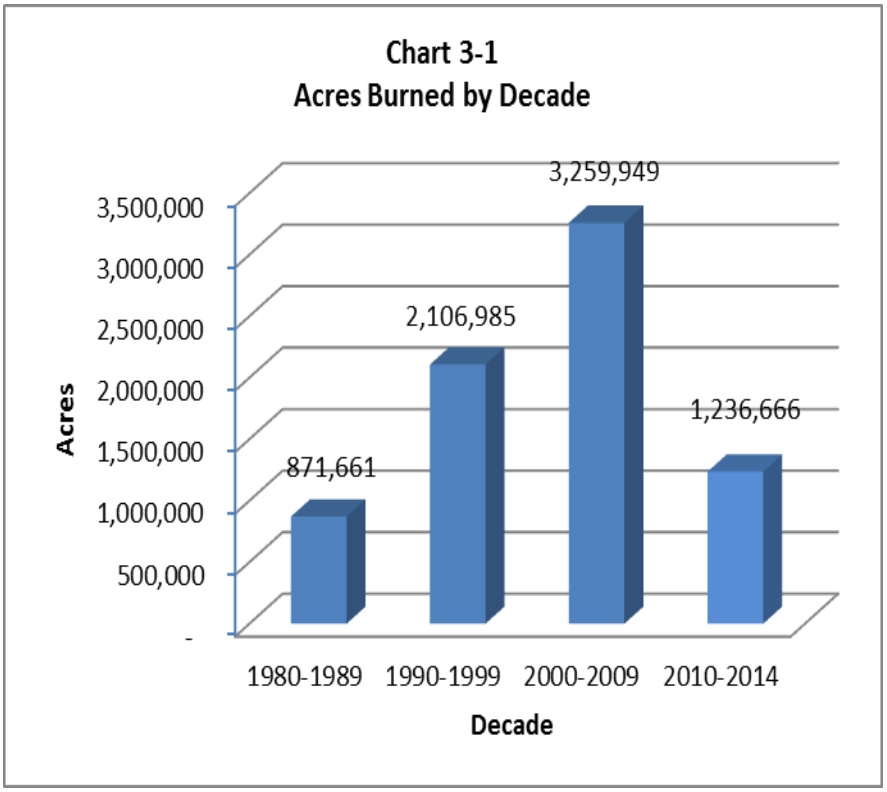
- City/Town
- Interstate
- US Route
- States
- Planning Area
- Preliminary Priority and General Habitat
- Fires >= 1,000 Acres '92-'14

Table 3-8
Fire Starts and Acres Burned by Decade[1] by Population/Subpopulation Area

Population/Subpopulation	1992-2001		2002-2012		Total Acres
	Starts	Acres	Starts	Acres	
Central Nevada	1,165	1,214,385	1,237	430,331	1,644,716
Klamath Oregon/California	645	63,562	482	28,691	92,253
Lake Area Oregon, northeastern California/northwestern Nevada	727	235,277	640	469,638	704,915
North-central Nevada	177	243,505	187	270,243	513,748
Northeastern Nevada	534	813,221	493	1,750,369	2,563,590
Northwestern Interior Nevada	116	536,357	82	73,818	610,175
Quinn Canyon Range Nevada	58	14,292	60	16,762	31,054
South-central Oregon/north-central Nevada	35	88,018	16	503,981	591,999
Southeastern Nevada	1,529	123,651	1,503	91,613	215,264
Warm Springs Valley Nevada	169	68,768	156	5,255	74,023
Grand Total	**5,155**	**3,401,036**	**4,856**	**3,640,701**	**7,041,737**

Source: Short 2013, BLM GIS WFMI 2015.

Chart 3-1
Acres Burned by Decade



Source: BLM/NDOW data not published

Chart 3-1 and **Table 3-8** reflect a relatively lower frequency and fire size in the 1980s. Burned acreage increased dramatically in central Nevada from 1993 to 2002 and remained high into 2012. Fires are concentrated in the northern third of this subpopulation next to the northeastern Nevada subpopulation, where fire activity more than doubled per decade, burning nearly 1.8 million acres between 2002 and 2012.

This general area of fire activity is in an apparent storm track that bisects the state from west to east and runs generally from the Warm Springs Valley Nevada population on the west, through the northwestern Interior Nevada population, and into the northeastern Nevada population. While certain spikes of fire activity are obvious, of note are the general increases in recent fire activity in those previously relatively unburned populations. These trends are noticeable in the Lake Area Oregon, northeastern California/northwestern Nevada, northeastern Nevada and south-central Oregon/north-central Nevada population/subpopulations, where the 2002 to 2012 decade demonstrates decadal highs. Populations of comparatively low fire activity are southeastern Nevada and the southern two-thirds of central Nevada. Higher terrain, varied fuel types, and monsoonal late-summer weather patterns may contribute to this effect.

Fire Effects on GRSGs

To depict the direct effects of fires and fire history on GRSG populations, **Table 3-9** uses the composite footprint of all wildland fires in the sub-region and overlays active and inactive leks (NDOW and CDFW 2012) and any leks that had wildland fire occurrence in a four-mile buffer to reflect impacted nesting habitat. An unknown number of "pending active" leks may be either active or inactive and are omitted from this analysis.

Table 3-9
Active and Inactive Lek Sites Burned Since 1984

Population/Subpopulation	Total Leks		Burned Leks	
			Lek Site Burned	
	Active	Inactive	Active	Inactive
Central Nevada	158	68	11	8
Northwestern Interior Nevada	0	18	0	5
Quinn Canyon Range Nevada	0	0	0	0
Southeastern Nevada	112	41	5	0
North-central Nevada	47	30	8	6
Northeastern Nevada	180	118	52	89
Lake Area Oregon, northeastern California/northwestern Nevada	99	31	8	2
South-central Oregon/north-central Nevada	36	18	11	9
Warm Springs Valley Nevada	3	0	1	0

Source: BLM and Forest Service GIS 2015

In areas of high wildland fire frequency and extent, an extremely high percentage of active and inactive lek sites have been impacted. Many of these leks are assumed to have become inactive in the years following wildland fires. The northeastern Nevada subpopulation shows the highest percentage of impact on active and inactive leks burned. Approximately 29 percent of active leks and 75 percent of inactive leks have been burned. Virtually all leks have had varying amounts of associated nesting habitat burned. The effects of the 2012 wildland fires are shown in the south-central Oregon/north-central Nevada subpopulation, where 37 percent of active and inactive leks were burned and virtually all nesting habitat associated with active and inactive leks was impacted. In the Lake Area Oregon, northeastern California/northwestern Nevada subpopulations, nesting habitat associated with virtually all leks has been impacted, while fewer than 10 percent of active leks were burned.

Connectivity

A key feature relating to connectivity on the statewide scale in Nevada is the presence of the Interstate 80 corridor following the general centerline of the checkerboard landownership that bisects the state. The checkerboard ownership is a product of the Pacific Railroad Act of 1862, which conveyed to the railroads ten sections of land in alternating sections on either side of each completed mile of railroad in support of the construction and operation of the trans-continental railroad system. The act facilitated a 40-mile wide corridor (20 miles on either side of the railroad) of checkerboard ownership.

The railroad and the subsequent interstate highway provide a transportation network around which much of the infrastructure development in northern Nevada has occurred. While this infrastructure is not expected to expand drastically into GRSG habitats, development will continue to intensify in this zone (Comer et al. 2012a). The corridor contains the largest urban areas in northern Nevada, extensive mining and transportation infrastructure, and agricultural development. The combined effects of the corridor on GRSG and its habitats are well demonstrated, with consensus among the land and wildlife management agencies that very little seasonal range connectivity exists across this corridor. It is unknown whether enough episodic crossing occurs to facilitate genetic exchange.

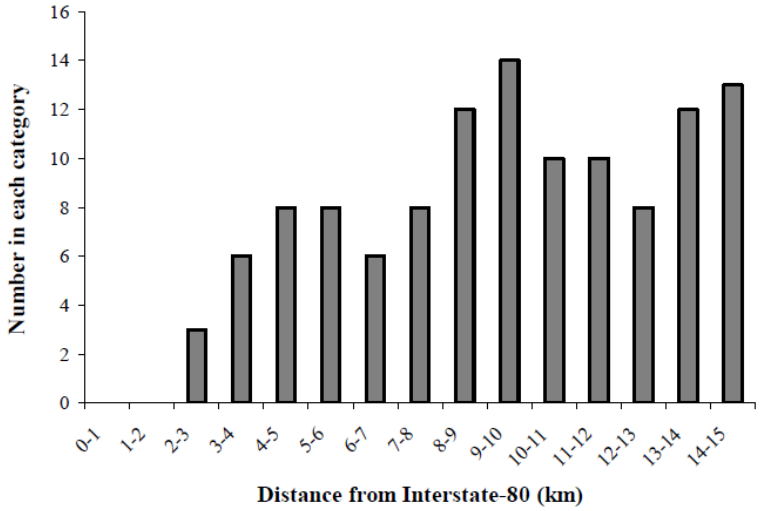
The detrimental effects of interstate highways on GRSG nesting has been documented in Wyoming and northeastern Utah (Connelly et al. 2004; Chart 2-5). This was determined by an analysis of active leks in distance buffers from the interstate and exhibiting similar landownership and concentration of infrastructure as in Nevada. The analysis found no leks within a mile of the interstate (a 2.5-mile-wide band) and only 9 leks between 1.2 and 2.5 miles of the interstate.

Only one equivalent-sized band 38.5 to 40 miles from the interstate had eight leks, with all other intervals having more. A similar analysis for Interstate 80 in Nevada shows similar results. In the Nevada analysis, active leks were counted

in 3.1-mile bands out to 37.3 miles on either side of the interstate, from Winnemucca to the Utah border. No leks occur in the 3.1-mile band (6.2 miles wide), nine occur in the 6.2-mile band (12.4 miles wide), and 10 occur in the 9.3-mile band (18.6 miles wide). An equivalent band, 13 to 15.5 miles away, contains nine leks. Of the highest five band counts, four occur beyond 24.8 miles, indicating that the corridor may be affecting GRSGs to that distance.

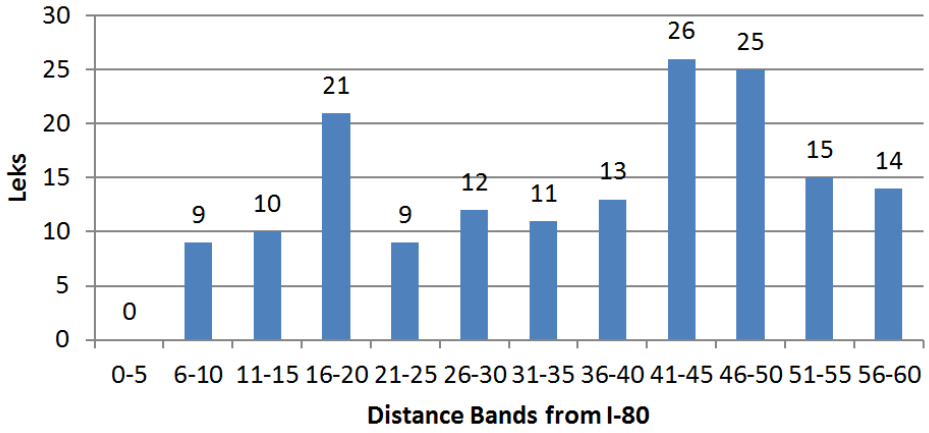
The distance and distribution of GRSG leks in relation to Interstate 80 are displayed in **Charts 3-2** and **3-3**, below.

Chart 3-2
Leks by Distance from Interstate 80



Source: Connelly et al. 2004

Chart 3-3
Nevada Lek Distribution—Interstate 80



Source: NDOW and CDFW 2012

Management Zone Conditions

Management Zone III

MZ III is the most arid and includes the southern extent of GRSG populations across all of central and south-central Nevada and five of seven subpopulations across Utah. The zone consists of four populations/subpopulations (Connelly et al. 2004) and all or portions of 39 PMUs in central and southeastern Nevada. Of the four populations/subpopulations, two are considered large but fragmented (central Nevada and southeast Nevada) and two are considered small and isolated (northwestern Interior and Quinn Range).

The central Nevada subpopulation includes portions of western Nye, eastern Churchill, Eureka, southern Elko, Lander, and western White Pine Counties, including 13.8 million surface acres and 4.9 million acres of PPH and PGH combined. Surface ownership includes a higher percentage of higher elevation lands managed by the Humboldt-Toiyabe National Forest. The BLM administers 9.6 million surface acres (69 percent) and Forest Service administers 2.5 million surface acres (18 percent).

The subpopulation contains 16 PMUs and is considered one of the four strongholds in Nevada. Vegetation modeling across GRSG populations was completed in 2013. It was updated in 2015 by the Forest Service, using the Vegetation Dynamics Development Tool (VDDT). This tool incorporated the Landscape Fire and Resource Management Planning Tools Project (LANDFIRE; USGS 2006a), available GRSG habitat information, expert opinion, and other related information.

VDDT modeling indicates that 44 percent of sagebrush habitats support 10 to 30 percent sagebrush cover, which is considered suitable habitat. Habitat condition trends, which include continued implementation of habitat treatments under current management, are projected to bring sagebrush habitats supporting 10 to 30 percent cover up to 68 percent in 50 years.

Current vegetation treatments are resulting in an improving trend. However, the central Nevada subpopulation is considered in long-range population decline (Connelly et al. 2004; Garton et al. 2011). The subpopulation area supports 158 active and 68 inactive leks. Seventeen percent of active leks have greater than 21 males in attendance, and 11 percent of active leks have greater than 50 males (NDOW 2013).

The Conservation Objectives Team (COT) report (USFWS 2013a) characterizes the population status as being "potentially at risk" because of limited or declining numbers, range, or habitat, even though GRSGs may be locally abundant in some portions of the subpopulation. The report highlights as threats conifers, weeds and annual grasses, fire, infrastructure, grazing, free-roaming horses and burros, and recreation.

Wildland fire activity has been concentrated in the northern end of the subpopulation next to the northeastern Nevada subpopulation where wildland fire has exerted the highest impacts in the state. The southern two-thirds of the central Nevada subpopulation remains relatively insulated from the occurrence and effects of wildland fire.

Generally, wildland fire has had less overall impact on habitats than in other populations/subpopulations in central Nevada, while conifer encroachment plays a larger role. Annual grasses model at or below 45 percent probability of occurrence throughout the entire subpopulation, giving it a lower but still moderate ranking of fire regime departure (projected to increase in frequency and extent) but reflective of the current level of annual grass invasion that has already occurred. Overall, compared to the habitats of other Nevada subpopulations, these habitats maintain the highest integrity in the state, with respect to potential abundance of annual grasses.

Change in extent of pinyon /juniper woodlands is moderate, indicating a significant level of continuing expansion into sagebrush habitats. Summarizing the effects of climate change on GRSG habitats indicates a strong predicted influence. Increased temperature regimes are shifting lower elevation sagebrush habitats into mixed salt desert scrub on a significant scale. Sagebrush habitat is expanding at higher elevations, retaining significant habitat as potential projected climate change focal areas for GRSGs and other species (Comer et al. 2012).

The southeastern Nevada subpopulation includes portions of far southeast Elko, the eastern portion of White Pine, and the northern portion of Lincoln Counties, including 9 million surface acres and approximately 3 million acres of PPH and PGH combined. It contains all or portions of six PMUs. GRSG habitats here are considered important as a stronghold in the state, but they are recognized as having generally smaller population size (lek size) on average, compared to other stronghold areas.

The southeastern Nevada subpopulation supports 112 active and 41 inactive leks. Only 12 percent of leks have greater than 21 males in attendance, and 10 percent have greater than 50 males (NDOW 2014). VDDT modeling indicates that 36 percent of sagebrush habitats support 10 to 30 percent sagebrush cover, which is considered suitable habitat.

Habitat condition trends, which include continued implementation of habitat treatments under current management, are projected to bring sagebrush habitats supporting 10 to 30 percent cover up to 54 percent in 50 years. Current vegetation treatments are resulting in an improving trend.

Topography in this subpopulation is a north-south basin and range configuration, with invasive conifer occupying an elevation zone between breeding and summer brood-rearing habitats. GRSGs complete one- and two-stage migrations in this subpopulation between these seasonal ranges. The COT

Report (USFWS 2013a) characterizes the seasonal ranges as "disjunct, but connected."

As with populations throughout Nevada, the population is considered to be in long-term decline (Connelly et al. 2004; Garton et al. 2011). The COT report (USFWS 2013a) does not differentiate between the central and southeastern Nevada subpopulations. The report characterizes the population status as being "potentially at risk" because of limited or declining numbers, range, and habitat, even though GRSGs may be locally abundant in some portions of the area.

The report highlights as threats conifers, weeds and annual grasses, fire, infrastructure, grazing, free-roaming horses and burros, and recreation. Annual grasses have potential abundance at or above 45 percent throughout the basins, with low to no risk on mountain topography.

Climate change projections indicate a substantial decline of sagebrush habitats from the southern end of the subpopulation. This is due to an increase in salt desert scrub and northerly encroachment of Mojave Desert species with only minor expansion of pinyon /juniper woodlands. Intact habitats will persist at higher elevations (Comer et al. 2012).

The northwest Interior Nevada population consists of Pershing and portions of southern Humboldt Counties and is relatively small (1.9 million acres). The population contains all or portions of 16 small and isolated PMUs. The population is dominated by lower elevation Wyoming sagebrush habitats that have burned extensively and repeatedly for the last two decades due to the domination of invasive grasses and altered fire return intervals. Approximately 560,000 acres have burned since 1984.

Sagebrush canopy is absent over vast areas, marginalizing habitat value to GRSGs. NDOW mapped habitat on only small portions of seven of the PMUs in the northwest Interior population. This is due to the lack of active leks and the suspected inability of these areas to recover from wildland fire. The total of PPH and PGH combined is 96,600 acres.

VDDT modeling was not completed on this population. The COT report (USFWS 2013a) characterizes the population status as "high risk" because of extremely limited or rapidly declining numbers, range, or habitat. This makes GRSGs in this area highly vulnerable to extirpation. The NDOW lek database indicates no active leks and 18 inactive leks. The report highlights as threats the area's isolation and small size, fire, weeds, annual grasses, mining, infrastructure, grazing, free-roaming horses and burros, and recreation. The invasive grass potential is above 45 percent, with fire regime departures the highest in Nevada (Comer et al. 2012).

The Quinn Canyon Range Nevada population contains one PMU and is the southernmost extent of GRSG range in Nevada, located in east Nye and

northwest Lincoln Counties. The Quinn PMU encompasses 2 million surface acres (1.7 million BLM; 223,000 Forest Service).

VDDT modeling was not completed on this population. The COT report (USFWS 2013a) characterizes the population status as "high risk" because of extremely limited or rapidly declining numbers, range, or habitat, making GRSGs in this area highly vulnerable to extirpation. The report states the population as containing fewer than 200 birds and that Garton et al. (2011) does not model the population due to lack of data. The NDOW lek database indicates no active or currently inactive leks.

Moderate and imminent threats to the population are weeds and invasive grasses, conifers, infrastructure, livestock, and wild horses. Climate change modeling indicates the near elimination of sagebrush habitat for this population by 2060 (Comer et al. 2012).

Management Zone IV

This MZ is extensive, including subpopulations in Nevada, southern Idaho, northwestern Utah, and southeastern Oregon. MZ IV consists of the subpopulations in northeastern and north-central Nevada and all or portions of nine PMUs in north-central and northeastern Nevada, in the northern half of Elko and eastern Humboldt Counties.

Surface acreage and GRSG habitat in the northeastern subpopulation is 6 million acres and 3 million acres (PPH/PGH), respectively. Surface acreage and habitat for the north-central Nevada subpopulation includes 1.6 million acres and 1.3 million acres (PPH/PGH) acres, respectively. Of seven management zones, MZ IV is characterized as one of those supporting the highest densities of GRSGs but also is considered in long-range population decline (Connelly et al. 2004; Garton et al. 2011). The northeastern Nevada population supports 180 active leks and 118 inactive leks. Active lek size distribution is skewed toward those with fewer than 21 males (55 percent); 9 percent of leks have more than 50 males. The north-central Nevada population supports 47 active leks and 30 inactive leks. Forty-six percent of leks have more than 21 males and nine percent have over 50 males.

The critical factor affecting GRSGs and their habitats in Management Zone IV is wildland fires. Combined, these subpopulations have had approximately 1,400 fire starts burning over 3 million acres since 1992. Sixty (26 percent) of 227 active leks and 95 (64 percent) of 148 inactive leks have burned. Wildland fires have increased dramatically in both frequency and extent, leaving large areas devoid of sagebrush canopy and dominated by grasses in general but particularly invasive species.

Restoration has been moderately successful in some areas. VDDT modeling in the northeastern Nevada subpopulation indicates that 55 percent of sagebrush habitats support 10 to 30 percent sagebrush cover, which is considered suitable

habitat. Habitat condition trends, which include continued implementation of habitat treatments under current management, are projected to bring sagebrush habitats supporting 10 to 30 percent cover up to 62 percent in 50 years.

Current vegetation treatments are resulting in a stable to improving trend. VDDT modeling in the north-central Nevada subpopulation indicates that 56 percent of sagebrush habitats support 10 to 30 percent sagebrush cover, which is considered suitable habitat. Habitat condition trends, which include continued implementation of habitat treatments under current management, are projected to bring sagebrush habitats supporting 10 to 30 percent cover up to 70 percent in 50 years. Current vegetation treatments are resulting in an improving trend.

The COT report (USFWS 2013a) highlights fire and invasive plant species, conifer encroachment, and infrastructure development as threats. The potential abundance of invasive annual grasses is consistently above 45 percent over most of MZ IV, with the remainder in the 25 to 45 percent range, second only to the northwest Interior subpopulation area in invasive grass abundance. However, climate change modeling shows the expanding habitat types to be supportive of GRSGs through time, with an accompanying increase in juniper or pinyon encroachment. Considering the intermediate scores for landscape condition and invasive annual grasses, low likelihood of future development, and low climate change stress, habitat restoration opportunities are very high in MZ IV. This supports the potential for management as a stronghold in this MZ (Comer et al. 2012).

Management Zone V

This MZ consists of five populations/subpopulations in three states (Connelly et al. 2004) and all or portions of ten PMUs in northwestern Nevada and northeastern California. It represents the westernmost extent of the GRSG range in California and contains a mix of habitat issues that have had long-term effects on GRSG populations. The range of GRSG in this region has continued to shrink over the last three decades, while some populations in the MZ are relatively stable. When considered in its entirety, including south-central Oregon, population changes from 1965 to 2004 are statistically undetectable (Connelly et al. 2004). Of the seven MZs, MZ V is characterized as one of those supporting the highest densities of GRSGs.

The Klamath Oregon/California population in northern Modoc County, California, is shared with Oregon and contains the Devil's Garden PMU. It was once connected to PMUs in northeastern California and northwestern Nevada, but it is now virtually extirpated. Of 46 active leks known to have been extant in the PMU as late as the 1970s, only one active lek remains. It is on USFWS lands at Clear Lake and has been supported since 2005 through population augmentation, consisting of annual translocation of various numbers of GRSG males and females from other lek sites, mostly from the Sheldon National Antelope Refuge and other well-attended lek locations in Nevada. Habitat in this

area has been severely compromised by conifer encroachment and to a lesser extent by invasive grasses. The persistence of the Clear Lake population depends on the large-scale juniper removal by the Modoc National Forest. Planning for this PMU/population is not considered further in this Proposed LUPA/Final EIS.

The Lake Area Oregon, northeastern California/northwestern Nevada subpopulation includes portions of west Humboldt and north Washoe Counties in Nevada and east Lassen and southeast Modoc Counties in California. Total surface acreage is 4.3 million, with 2.6 million acres of PPH and PGH combined. The subpopulation includes a mix of extirpated, highly threatened, and relatively stable PMUs. In the COT report (USFWS 2013a), the USFWS generalizes threats to this subpopulation as isolation, small population size, conifers, fire, invasive plant species, livestock, and wild horses.

The California portion includes the Likely Tablelands PMU in eastern Modoc County, which is likely to become extirpated in the next decade. The population consists of only one lek that contained three strutting males in 2012 and no birds in 2013 or 2014. Up to eight leks were present on the Likely Tablelands in the 1980s. They were connected to other populations on the Devil's Garden and farther west onto Rocky Prairie and into Round Valley to the west and Big Valley in far northwestern Lassen County, all of which are extirpated.

The Likely Tablelands PMU is the site of an extensive invasion of nonnative grasses, including cheatgrass, but specifically medusahead. Repeated fires and the resulting continuous mat of medusahead have precluded all but a few localized areas of sagebrush from this landscape. The PMU is disconnected from the Buffalo-Skedaddle PMU to the south by a 20-mile-wide band of invasive conifer.

The Buffalo-Skedaddle PMU is one of mixed habitat quality and is discussed as a stronghold in many references. Of its 1.4 million acres, restoration mapping indicates 46 percent of potential habitat (mature sagebrush) understory is dominated by annual grass, annual forbs, bare ground, or 0 to 9 percent juniper cover (phase 1). An additional 19 percent of potential sagebrush habitat has crossed the threshold from sagebrush-dominated to juniper or annual grass-dominated communities (Armentrout and Hall 2005).

The PMU has been subject to a highly altered fire regime that has systematically reduced sagebrush cover. In 2012, the Rush fire burned 315,000 acres, or 23 percent of the PMU. The Rush fire burned nearly the entire length of the PMU and severed its remnant western half from the stronghold populations to the east, creating another isolated GRSG population along the western edge of the range.

Restoration of previous burns in the PMU has not proven successful due to the presence of invasive grasses, low-elevation Wyoming sagebrush sites, and low precipitation. Similar results are expected from the Rush fire.

Long-term population declines leading to extirpation of GRSGs in this PMU are likely over the next several decades due to isolation and habitat loss. This will greatly shrink GRSG range on the western edge and potentially eliminating them from northeastern California. No modeling has been completed to support this hypothesis.

As of 2012, 21 leks were active in Buffalo-Skedaddle PMU; 11 were burned in the Rush fire of 2012. Livestock grazing, both historic and present, and wild horse overpopulation are additional threats affecting this PMU, including both nesting cover and availability of late-summer brood-rearing habitats.

The remaining PMUs in the northeastern California/northwestern Nevada subpopulations are stronghold populations in northwestern Nevada and the far northeastern corner of California. The Massacre PMU has experienced much less wildland fire than the surrounding PMUs. Invasive grasses, though present, have not manifested extensively in the Massacre PMU.

GRSG populations remain high and stable and are connected with stronghold PMUs at the Sheldon National Antelope Refuge and into Oregon. As of 2012, 28 leks were active in the PMU, including two leks with over 100 males. Though the high level of fire activity since the 1980s characterizing much of northern Nevada has spared this PMU, recent wildland fire activity has affected up to 100,000 acres, including 60,000 acres lost in 2012. This potentially reflects a further heightening of wildland fire activity overall, due to the effects of climate change and resultant lowering of fuel moisture levels in larger fuel types such as sagebrush. Habitat quality is further threatened by both livestock grazing and wild horse and burro overpopulation, affecting both nesting cover and availability of late-summer brood-rearing habitats.

Next to the Massacre PMU, the Vya PMU is the northwestern-most Nevada PMU and includes a sliver of northeastern California. Similar to the Massacre PMU, wildland fire and invasive grasses are less manifested than in north-central and northeastern Nevada, with overall habitat quality relatively high; however, GRSG habitat is affected by conifer encroachment.

The agencies continue to conduct large-scale conifer control in this PMU. Livestock grazing and wild horse and burro overpopulation are additional threats. This PMU supports 16 active leks, with population declines apparent as the juniper encroachment increases fragmentation.

Overall, VDDT modeling for the northeastern California/northwestern Nevada subpopulations indicates that 56 percent of sagebrush habitats supports 10 to 30 percent sagebrush cover, which is considered suitable habitat. Habitat condition trends, which include implementing habitat treatments under current management, are projected to bring sagebrush habitats supporting 10 to 30 percent cover down to 45 percent in 50 years. The trend is down due to increasing annual grasses and conifer encroachment.

The south-central Oregon/north-central Nevada subpopulation contains 455,500 surface acres and 393,000 acres of PPH and PGH in Humboldt County, north of Highway 140 and west of Highway 95. It is denoted as the Lone Willow PMU and includes the Bilk Creek and Montana Mountains. The subpopulation is continuous into Oregon and also includes the Trout Creek Mountains and the Hart Mountain National Antelope Refuge.

Though relatively small, the subpopulation includes 36 active leks. Twenty-one percent of active leks have greater than 21 males and 16 percent have greater than 50 males, similar to other larger subpopulations considered as strongholds in the sub-region. It contains one of the most densely populated winter ranges identified in Nevada.

Fire activity is high, with nearly 25 percent of the area burning every decade. In 2012, the Holloway fire burned approximately 214,000 acres in the Nevada portion and another 245,000 acres in Oregon. VDDT modeling indicates that 30 percent of sagebrush habitats support 10 to 30 percent sagebrush cover, which is considered suitable habitat. Habitat condition trends, which include continued implementation of habitat treatments under current management, are projected to bring sagebrush habitats supporting 10 to 30 percent cover up to 35 percent in 50 years. Current vegetation treatments are an improving trend, though they are greatly impacted by recent fires. The COT report (USFWS 2013a) characterizes fire and annual grasses as substantial and imminent threats in this portion of the subpopulation, along with mining and infrastructure as substantial and not imminent.

The Warm Springs Valley population (Pah Rah and Virginia PMUs) encompass 231,000 surface acres of BLM lands and 107,500 acres of PPH and PGH in southern Washoe County. This area is bounded on the west by Highway 395, on the south by Long Valley, Interstate Highway 80, and the cities of Reno and Sparks, Nevada, and on the east and north by State Highway 446.

Wildland fires have burned approximately 35 percent of this PMU, converting sagebrush-dominated shrublands to annual grasses and invasive species. Wildland fires that occurred from 1999 through 2001 were particularly devastating, burning some of the last strongholds of GRSG habitat left in both the Pah Rah and Virginia Mountain Ranges. GRSGs in these two mountain ranges occur in small isolated pockets of suitable habitat in the northern Virginia Mountains.

GRSGs use approximately 54,000 acres (15 percent) of the 356,034 acres in this PMU. Only 65 percent is under BLM administration, while 24 percent is under private ownership, and 9 percent belongs to the Pyramid Lake Indian Tribe. Urbanization, particularly in the Pah Rah Range, threatens existing GRSG habitat. Of the estimated 53,760 acres of habitat used by GRSGs in the Pah Rah and Virginia Mountain Ranges, 27,520 acres, or 51 percent, are under private

ownership. In the Pah Rah Range, an estimated 69 percent of existing GRSG habitat is under private ownership.

VDDT modeling indicates that 60 percent of the remaining sagebrush habitats support 10 to 30 percent sagebrush cover, which is considered suitable habitat. Habitat condition trends, which include continued implementation of habitat treatments under current management, are projected to bring sagebrush habitats supporting 10 to 30 percent cover to 56 percent in 50 years.

Downward trends are slight and due to treatment rates not keeping pace with annual grass expansion. A qualitative population viability analysis was completed using parameters outlined in Appendix I of the Nevada Governor's GRSG Conservation Plan (State of Nevada 2004). NDOW analysis of factors in these mountain ranges indicates a high probability of extirpation in the next 20 years.

Only three active leks are known. Current population estimates based on these leks indicate declining numbers, with a spring breeding population of 150 to 200 GRSGs (NDOW 2004b). The COT report (USFWS 2013a) notes only two leks and characterizes the population at less than 200 males. It does not provide estimates for persistence. The report highlights such threats fire, infrastructure, annual grasses and invasive species, conifer encroachment, energy development, wild horses and burros, recreation, and urbanization. The report identifies the population as "at risk" overall.

3.2.4 Regional Context

Clear patterns in the distribution and current ecological condition of conservation elements are a direct response to change agents of invasive plant species, alterations to wildland fire regimes, and development.

Roads, other linear infrastructure, urban areas, mining, and other industries have a relatively small overall footprint in this ecoregion. Approximately 7 percent of the land surface is occupied by these uses. Development tends to occur in areas of productive soils, surface and groundwater availability, and areas topographically suitable for roads, transmission, and pipelines. These also tend to be favored for wildlife movement and may impact some of the most productive and sensitive resources (Comer et al. 2013).

Much more pervasive are the effects of expanding invasive species and their effects on wildland fire. Nearly every fifth field watershed is vulnerable to, if not already seriously infested with, invasive annual grasses, substantially altering effects on the behavior of natural wildland fires. Effects include wildland fires of increased size and severity, conversion from perennial bunchgrasses, forbs, and shrubs to annual grasses, and related fragmentation of habitat for species such as GRSGs. The relative size and frequency of wildland fires will in all likelihood continue to increase across the region.

Infrastructure

All development types occupy approximately 7 percent of the ecoregion and are expected to increase another 0.5 percent by 2025. The proportion of the ecoregion that would be developed by 2025 will increase from less than 7.1 percent currently to 7.6 percent by 2025. While this increase is proportionately small, it represents nearly 500,000 acres of additional development. Renewable energy development remains a key concern for managers. While the current and expected 2025 renewables footprint amounts to only 0.2 percent of the ecoregion, the potential (as mapped by the National Renewable Energy Laboratory) covers most of the area (Comer et al. 2013).

All of the indicators consistently show impacts for the heavily developed urban and agricultural use areas in the northwestern quadrant of the ecoregion, along the Wasatch Front, in the Owen's Valley, along the Interstate 80 corridor, and in certain interior watersheds where large mines and other impacts occur.

Consistent with forecasts of the development change agents, the summary map of landscape for current and projected 2025 conditions does not indicate a large degree of change. For the most part, increased urbanization is forecasted to occur in and around current locations. **Figure 3-7** shows the current landscape condition indicator in the Central Basin and Range (CBR), based on development change agents.

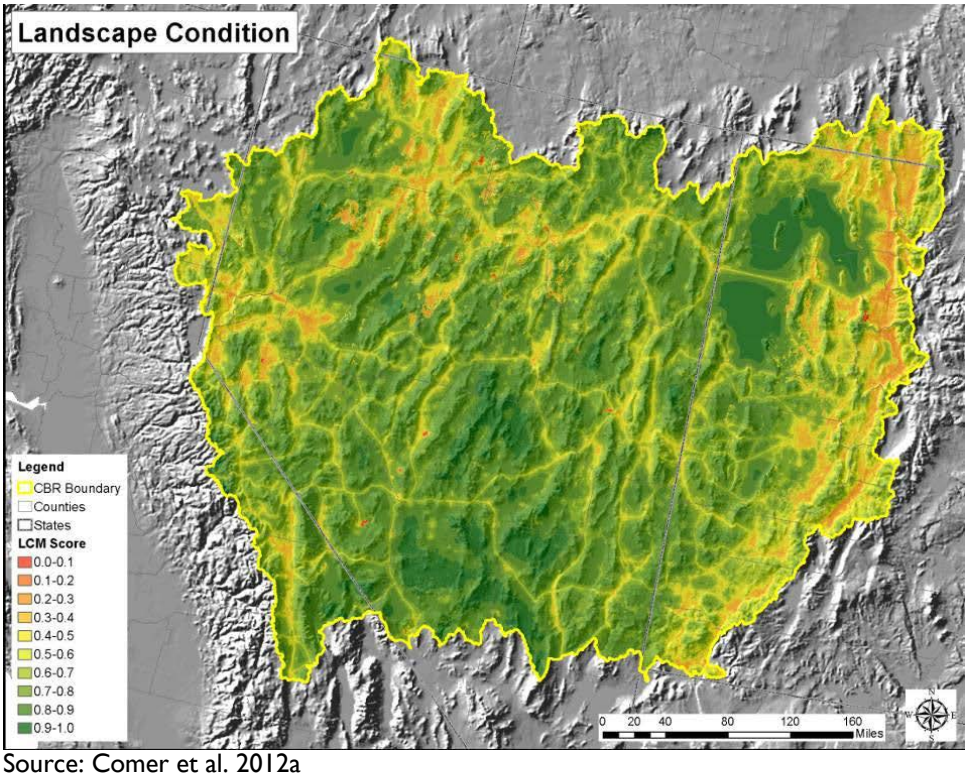
Invasive Species/Fire

Currently and by 2025, wildland fire and invasive annual grasses are by far the greatest management concerns.

An overwhelming proportion of the CBR is predicted by a landscape condition model to support annual grasses at 45 percent cover (Comer et al. 2013). Although disturbance is a driver of the competitive success of these invasive annual grasses, one can assume that future disturbances will continue in the present patterns. This is undoubtedly the most severe circumstance on an ecoregion scale in the western United States. Indicators suggest overall that substantial fire regime departure has occurred throughout the Montane Uplands (montane forest and shrub land vegetation) of the CBR.

Change from historic reference conditions (known as fire regime departure in fire analysis discussions) for upland ecosystems in the intermountain basins (such as salt desert scrub and big sagebrush shrub land) is overall more severe. It reflects a spatial pattern similar to that provided by the invasive annual grass indicator. While annual grasses and fire regime departure are linked processes operating on the landscape, the current mapping of invasive species is not yet fully coupled with fire regime departure. For example, fire frequency remains very low in some desert scrub types, while they appear to be accumulating invasive plant abundances.

Figure 3-7
Landscape Condition



Source: Comer et al. 2012a

Fire regime departure models from 2025 to 2060 indicate relative minor differences. Thus, management priorities guided primarily by the analysis of current conditions should hold for the upcoming decades. Where current conditions suggest needs for habitat restoration and management focus, forecasts for upcoming decades for landscape condition and fire regime departure suggest those same management directions.

Climate Change

Over the next 20 to 50 years, forecasts indicate the potential for truly profound transformation in many ecosystems across the CBR. Climate space trends indicate the potential for extreme growing season temperatures throughout most of the ecoregion. These forecasts appear most intense along the southern CBR, and throughout the other largest basins.

For November through June for the 2020s, less than 5 percent of the CBR area is projected to experience statistically significant increases in monthly maximum temperature of one standard deviation beyond the values of the twentieth century baseline. In contrast, for this same period, July, August, and September may see similarly significant maximum temperature increases over 50, 65, and 70 percent of the CBR ecoregion, respectively. The spatial distribution of these projected changes by the 2020s is concentrated toward the southern half of the ecoregion.

By 2060, the six global climate models forecast substantial increases in maximum temperatures for all months, with the greatest increases concentrated during the summer. For July and August, by 2060, 90 percent and 85 percent of the CBR, respectively, is forecast to experience monthly maximum temperatures 2 standard deviations beyond the values of the twentieth century baseline.

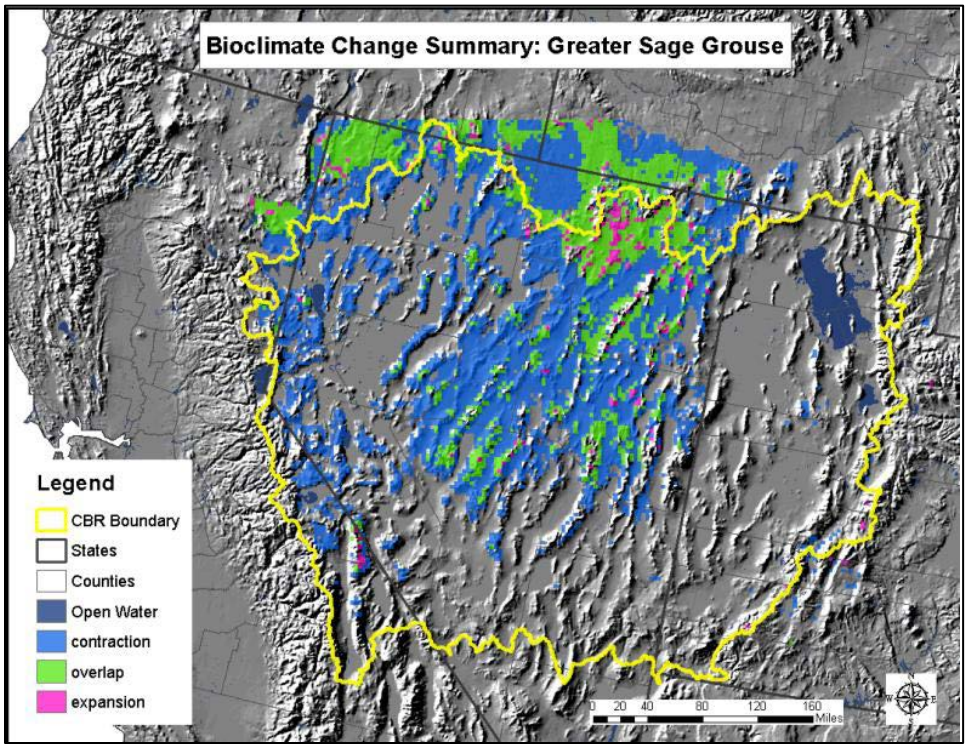
As early as the 2020s, July, August, and September minimum temperatures (i.e., night-time temperatures) are predicted to exceed one standard deviation beyond the twentieth century baseline for 90 percent of the CBR. By the 2050s, the increases in monthly minimum temperature become even more pervasive and severe. For every month during the 2050s, nearly all of the CBR is projected to exceed one standard deviation beyond the twentieth century baseline, and for July through September, the models predict that 90 percent of the region will experience monthly minimum temperatures two standard deviations beyond baseline values; 61 percent of the region will experience this in October. In some cases, substantially more than 50 percent of the area of the current climate distribution will be lost over the next 50 years.

Regarding landscape pattern effects, in most cases, a clear shift to higher elevation, and to the north, can be observed in each model. Differences among types tend to be in the forecasted magnitude of change (i.e., the relative proportion of current distribution where the climate envelope is forecasted to move elsewhere).

There is a tendency for mixed salt desert scrub to expand into adjacent lands currently occupied by big sagebrush shrub land. In the southern portion of the region mixed salt desert scrub is displaced with expansion by desert scrub species characteristic of the Mojave Desert. Farther upslope, the climate envelope for Great Basin pinyon /juniper woodland is forecast to retreat northward to some degree, but overall there appears to be considerable overlap throughout this region.

Dramatic climate envelope shifts are forecasted for GRSGs, with only a relatively small proportion of the current distribution forecasted to retain the climate regime close to that currently supporting this species (see **Figure 3-8**). Green areas indicate where current climate envelope distributions overlap with the forecast. Blue areas indicate potential contraction, where current climate characteristics supportive of GRSG habitat will be replaced by significantly different climate regime. Pink areas indicate where current climate regime for GRSG habitat is forecasted to occur outside of the current distribution by 2060. In more general terms, species that rely on sagebrush habitat have higher loss in climate envelope compared to other species. In particular pygmy rabbit, sage sparrow, and Columbian sharp-tailed grouse are projected to experience severe climate-related loss by 2060.

Figure 3-8
Bioclimate Change Summary: Greater Sage-Grouse



Source: Comer et al. 2012a

Lowest elevation basins throughout the ecoregion could transition from cool semidesert into very warm and sparsely vegetated desert landscapes more typical of the Mojave Basin and Range.

When the overlap areas of major vegetation type climate envelopes are combined, one can identify areas ranging in importance for retaining these vegetation types (i.e., focal areas). In some areas of the CBR, as many as seven major vegetation types show an overlap between current and forecasted climate envelopes. These areas are good indicators of potential climate change focal areas. Areas forecasted to experience the least amount of change are concentrated in north-central and south-central Nevada. These areas may be further evaluated in this light for their potential to provide some degree of climate change focal areas.

Restoration priorities and restoration focal areas can be identified in areas showing intermediate status scores for landscape condition and invasive annual grasses, low likelihood of future development, and low climate change stress by mid-century.

3.3 VEGETATION (INCLUDING INVASIVE AND EXOTIC SPECIES AND NOXIOUS WEEDS)

Vegetation serves multiple purposes on the landscape and provides many ecosystem services. It stabilizes soils, prevents erosion, uses carbon dioxide,

releases oxygen, increases species diversity, and provides habitat and food for animals and products for humans. Many of the BLM's and the Forest Service's land management policies are directed toward maintaining 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.

The planning area falls in the Northern Basin and Range, CBR, Sierra Nevada, and Eastern Cascades Slopes and Foothills ecoregions (EPA 2010). These ecoregions are subdivided based on physical characteristics of the landscapes; they are further divided into vegetation communities, which are named according to the types of plant species that comprise them. Plant communities with the same name can occur in more than one ecoregion or subdivision; however, these communities often have subtle differences in their makeup. A description of each of the major vegetation communities in the planning area is provided below.

Acres of each vegetation community in PPH and PGH on BLM-administered and National Forest System lands in the planning area are shown in **Table 3-10**.

Table 3-10
Acres of Vegetation Communities in PPH and PGH

Vegetation Community	Bureau of Land Management		Forest Service		Other Landownership	
	PPH	PGH	PPH	PGH	PPH	PGH
Northern Basin and Range	4,138,200	1,462,200	491,500	199,600	1,280,800	672,100
Central Basin and Range	4,610,500	4,484,300	322,400	686,600	1,160,400	1,358,500
Sierra Nevada	-	12,100	-	-	-	15,300
Eastern Cascades Slopes and Foothills	10,700	108,500	-	-	37,100	583,800
Mojave Basin and Range	-	-	-	-	-	-
Cascades	-	-	-	-	-	-

Source: BLM and Forest Service GIS 2015

3.3.1 Weed Control Guidance and Programs

Integrated weed management is a systems approach for managing noxious weeds and invasive species. Walker and Buchanan defined integrated weed management as "the application of many kinds of technologies in a mutually supportive manner. Integrated Weed Management involves the deliberate selection, integration, and implementation of effective weed control measures with due consideration of economic, ecological, and sociological consequences" (Walker and Buchanan 1982).

Noxious weeds and invasive annual grass species out-compete native vegetation for resources through advantageous physiological characteristics. Weeds

threaten to degrade public lands in Nevada and California by spreading into and infesting sensitive riparian ecosystems, important rangelands, wildland fire scars, and developed lands maintained as ROWs or recreation areas. These threats can come in the form of unbalanced biodiversity, a weakened ecosystem, a higher propensity for soil erosion, increased frequency of wildland fires, and limited food resources for both terrestrial and aquatic wildlife. Weeds on private agricultural lands have the potential to spread onto federal lands and vice versa.

3.3.2 Current Condition

Noxious Weeds on BLM-Administered Lands

There are about 8.5 million acres of noxious weeds on BLM-administered land in the planning area. Most species are expanding at about 14 percent annually (BLM 1985c). Noxious weeds are regularly managed by federal, state, and county agencies, conservation groups, and private landowners.

Repeated wildland fires and other disturbance regimes tend to increase noxious and invasive weed presence and likelihood. Infestation rates have reached the point in many areas where complete eradication is no longer possible (BLM 1986c).

Noxious Weeds on National Forest System Lands

On the Humboldt-Toiyabe National Forest, invasive species account for less than 0.5 percent of the land base in Nevada. Approximately 29,000 acres of invasive species have been identified, approximately 16,000 acres of which is classified as noxious weeds. Of the 16,000 acres, 40 percent of the infestation is less than one tenth of an acre, and 30 percent of the infestations is half an acre or less.

The Forest Service has comparative data showing what vegetative community types are currently infested with noxious weeds. These data show that while mountain big sagebrush accounts for 18 percent of the vegetative types, it contains 27 percent of the weed occurrences. Comparatively, pinyon and juniper account for 37 percent of the vegetative types but contains 17 percent of the noxious weed occurrence.

When all riparian vegetative types are combined, they account for one percent of the vegetative types found on the forest but contain 24 percent of the noxious weed occurrence. The fact that riparian-related vegetation types support such a disproportionate amount of noxious weeds species makes managing riparian areas even more important. This is especially true in arid Nevada, where preserving the integrity of riparian areas is critical for wildlife, recreation, water quality, and grazing management.

Ecoregion Types

Northern Basin and Range

The Northern Basin and Range ecoregion contains arid intermontane basins, dissected lava planes, and scattered mountains. Shrub communities and aridisols are common, and non-mountain areas have sagebrush steppe vegetation. Mountain ranges are generally covered in sagebrush at higher elevations and other mountain browse species, with an understory of bunchgrasses and forbs. These areas are largely treeless and include a mosaic of native bunchgrasses and shrubs. In this type, sagebrush typically co-dominates with perennial bunchgrasses (Miller et al. 2011).

Common species include Wyoming, basin, and mountain big sagebrush as shrub components, with inclusion areas that contain low sagebrush, early sagebrush, and black sagebrush in shallower soils. Other mountain browse species can be found at higher elevations, which typically include antelope bitterbrush, serviceberry, and snowberry. Bunchgrasses are typically cool season grasses, such as Sandberg bluegrass, bottlebrush squirreltail, bluebunch wheatgrass, Great Basin wildrye, Indian ricegrass, needle and thread, and Idaho fescue. However the range of understory and diversity is based on successional stages that vary from early to mid to late.

Central Basin and Range

The CBR ecoregion is internally drained (Great Basin) and is characterized by a mosaic of xeric[1] basins, scattered low and high mountains, salt flats, and dry lake beds. It has a hotter and drier climate, more shrubland, and more mountain ranges than the Northern Basin and Range ecoregions to the north. Basins in this ecoregion are primarily covered by Wyoming and basin big sagebrush, with a limited understory of bunchgrasses and forbs, as well as salt desert and greasewood vegetation in the low valleys. The herbaceous component contributes a smaller portion of the total plant cover (Miller and Eddleman 2000), due to hydrologic patterns. In this habitat type, sagebrush is frequently the canopy dominant, with little understory (Miller et al. 2011).

Sierra Nevada

The Sierra Nevada is a deeply dissected block fault that rises sharply from the arid basin and range ecoregions on the east; it slopes gently toward California's Central Valley to the west. The eastern portion has been strongly glaciated, and much of the central and southern parts are underlain by granite. The vegetation is mixed conifer and in Nevada is predominately white fir and lodgepole pine on the west side and Jeffery pine and lodgepole pine on the east side. Higher elevations include red fir, mountain hemlock, and western white pine. There are many high mountain lakes, streams, and meadow/riparian areas. Alpine conditions exist at the highest elevations (EPA 2010).

[1]Very dry

Eastern Cascades Slopes and Foothills

The Eastern Cascade Slopes and Foothills ecoregion is in the rain shadow of the Cascade Mountains. Its climate exhibits greater temperature extremes and less precipitation than ecoregions to the west. Open forests of ponderosa pine and some lodgepole pine distinguish this region from the higher ecoregions to the west where fir and hemlock forests are common, and the lower drier ecoregions to the east, where shrubs and grasslands are predominant. The vegetation is adapted to the prevailing dry continental climate and is highly susceptible to wildland fire. Volcanic cones and buttes are common in much of the region (EPA 2007).

Vegetation Types

Vegetation Alliances

Vegetation Alliances are the largest division of plant formations. "An alliance is a vegetation classification unit containing one or more associations, and defined by a characteristic range of species composition, habitat conditions, physiognomy, and diagnostic species, typically at least one of which is found in the uppermost or dominant stratum of the vegetation" (Jennings et al. 2004).

There are four alliances in the management area: forest/woodland, shrubland, herbaceous, and wetland/riparian. Plant associations are used to describe a characteristic collection of diagnostic species according to local habitat conditions and physiognomy (Jennings et al. 2004), for example Great Basin mixed shrub or basin big sagebrush. Plant communities are used to describe a collection of plants living in close association that are linked by effects on one another and by their response to a shared environment (Jennings et al. 2004). The following is a list of the most common plant alliances, associations, and communities that provide habitat for GRSGs in the Nevada and northeastern California planning area.

Shrub Alliances

Shrubs are woody, relatively short plants that have multiple stems. Seven shrub associations have been identified in the planning area; a description of each follows. Because many disturbance factors affect these associations similarly, they are addressed in a general manner here. Disturbance means a significant, and relatively sudden, modification of the resource (i.e., an alteration of the plant community away from a stable state, accompanied by changes in species composition, growth patterns, and reproduction).

The key functional elements of any disturbance are its timing (seasonality), intensity (degree of resource modification/loss), frequency (recovery interval between disturbances), availability of abiotic (water and nutrients), biotic resources (plant species and effects of wildlife and domestic stock), and regime (connection with similar disturbances in time and space; Sousa 1984).

In the following discussion, variations in response to disturbance are noted for each plant community.

Past and current human influences on sagebrush-steppe ecosystems (particularly livestock grazing, fire, and recreation) are not perpetuating the original plant communities. West (1999) estimates that less than 1 percent of the sagebrush-steppe remains in unaltered condition. Furthermore, systematic disturbance has caused significant, and sometimes radical, changes in species composition in many areas. This has occurred in one of three ways:

1. Disturbances may enhance the competitive ability of a dominant species (e.g., sagebrush) and force formerly dominant species into a subservient role (e.g., perennial grasses)
2. Disturbances may enhance the competitive ability of a dominant species (e.g., a perennial grass) and eliminate the other formerly dominant species (e.g., sagebrush)
3. Disturbance may result in loss of the original dominants. In order to preserve the integrity of the original plant community

In all three scenarios, one or all of the originally dominant species must exhibit sufficient dynamism and adaptability to compete with various disturbance-adapted species (e.g., cheatgrass and medusahead). The natural dominants, having evolved under indigenous disturbance conditions, are not well adapted to this role.

Fire management, livestock, and wild horse and burro grazing in particular are difficult issues that involve much ecological uncertainty. The question is whether human activities will be sufficiently altered to rehabilitate and stabilize natural ecosystems, or whether compromised but fairly functional desired plant communities will be perpetuated. The present state of sagebrush-steppe ecosystems requires difficult decisions about fire, livestock, and wild horse and burro management to be made in order to salvage sagebrush steppe communities.

The effects of overgrazing, high-frequency fires, and other factors (particularly off-road driving) on sagebrush-steppe communities and soils are obvious (Blaisdell et al. 1982; Bunting et al. 1987; Vavra et al. 1994). Less obvious are the effects on other biota and more subtle changes. For instance, judicious grazing and prescribed fire are still associated with varying degrees of uncertainty regarding short-term and long-term outcomes in these plant communities. A degree of uncertainty can be expected because the manner in which these key disturbance activities are conducted varies with time and location. Furthermore, with a highly variable climate, they function more as a disturbance regime than as independent events (Eddleman and Doescher 1999).

Great Basin Mixed Shrub Association

This association includes several plant communities, a few of which have substantial variation in canopy cover or understory vegetation. Human and natural phenomena can have adverse effects on these communities. These include heavy, late-summer livestock browsing on snowberry, antelope bitterbrush, and other palatable shrubs, pinyon /juniper invasion, decreasing precipitation associated with long-term climate change, and short-term climate extremes, especially drought.

The risk of dominance and type-conversion to exotic annual grasses is high below 5,500 feet because of lower precipitation and a drier environment that supports hotter fires. Above this elevation, native plants normally receive more precipitation and respond better to disturbance; therefore, they compete successfully with invasive annuals such as cheatgrass.

A typical plant community is the mixed mountain shrub 25 to 39 percent perennial grass community. This is a moderate-to-dense, primarily broad-leaf community of 3-to 6-foot evergreen shrubs. Canopy cover is 25 percent to 39 percent.

The dominant shrubs are mountain big sagebrush and snowberry. Grasses are California brome, western needlegrass, Idaho fescue, bluebunch wheatgrass, and squirreltail. Understory forbs are mule's ears, old man's whiskers, and silvery lupine. This plant community grows between 6,600 and 7,600 feet and is frequently found on north-facing slopes throughout the region.

Another typical plant community is the Great Basin mixed shrub 10 to 24 percent perennial grass community. This is an open to moderately dense, broad-leaf evergreen and deciduous community dominated by 3- to 6-foot tall sagebrush. Canopy cover is 10 percent to 24 percent. Grasses are Sandberg bluegrass, squirreltail, bluebunch wheatgrass, basin wildrye, Thurber's needlegrass, and cheatgrass. Understory forbs are tapertip hawksbeard, silvery lupine, uncommon annual buckwheat, mule's ears, arrowleaf and Hooker's balsamroot, sulfur buckwheat, and rock eriogonum. This plant community occupies flats and moderate slopes at elevations of 4,500 to 5,800 feet.

Mountain Big Sagebrush Association

Most researchers believe that genus *Artemisia* (sagebrush) originated in Eurasia. Mountain big sagebrush, the most genetically primitive form, evolved during the middle Pliocene (5 million years ago) or earlier. During times of increased rainfall, mountain big sagebrush had a nearly continuous distribution. However, under tepid climatic conditions (and into recent times), mountain big sagebrush retreated into foothills and mountains, where deep, well-drained but summer-moist soils are prevalent (Trimble 1989).

Mountain big sagebrush is normally found at elevations above 5,000 feet (in locations where soils are deep, well-drained, and moist). This species is not a

fire responder, and recovery after fire may take 20 years (Bunting et al. 1987). Where undisturbed, canopy cover varies from 15 percent to 40 percent, though it may be 50 percent in wetter areas with deep, loamy soils and northerly exposures. Bitterbrush and snowberry are commonly associated shrubs (Tisdale 1994). Forbs are usually abundant, with 12 genera and many species. Idaho fescue, bluebunch wheatgrass, and Thurber's needlegrass are the principal grasses on drier sites. On deeper loamier sites, onion grass, western needlegrass, and subalpine needlegrass are more common.

A typical plant community is the big sagebrush, 10 to 24 percent perennial grass community. This is an open to moderately dense, broad-leaf evergreen shrub community dominated by 3- to 6-foot mountain big sagebrush. Canopy cover is 10 percent to 24 percent. The understory is primarily bluebunch wheatgrass; however, plateau gooseberry, antelope bitterbrush, snowberry, basin wildrye, Idaho fescue, arrowleaf balsamroot, mule's ears, and prickly gilia are also present. This community grows on flats or gentle-to-steep slopes, primarily at elevations of 5,500 to 7,800 feet.

Basin Big Sagebrush Association

Basin big sagebrush has trunk-like stems and is heavily branched, with uneven tops. Shrub heights normally range from 3 to 6 feet, though plants in heavily incised drainages may reach 15 feet. This plant grows in various soils, but prefers the dry, deep, well-drained soils of the plains, and valleys and foothills below 7,000 feet (Blaisdell et al. 1982). The presence of this subspecies often indicates productive rangeland because it frequently grows in deep, fertile soil (Blaisdell et al. 1982; Collins 1984).

Basin big sagebrush was once the most abundant shrub in North America. However, its lowland range has been largely converted to agricultural uses. This subspecies was thought to be intolerant of alkali; however, there are distinct species that grow in relatively alkaline areas in association with alkali-tolerant plants, such as black greasewood, shadscale, saltbush, and saltgrass (Blaisdell et al. 1982). Basin big sagebrush is killed by fire, and recovery may take as long as 50 years (Bunting 1990). Overgrazing can eliminate the understory of native perennial grasses. Communities in this association may then be easily dominated by exotic annual grasses (weeds) where this is allowed to happen.

A typical plant community is the big sagebrush 10 to 24 percent perennial grass community. This is an open to moderately dense, broad-leaf evergreen shrub community dominated by 3- to 6-foot basin big sagebrush. Canopy cover is 10 percent to 24 percent. It is associated with forbs and perennial grasses, especially bluebunch wheatgrass, which dominates the understory. Other common grasses are basin wildrye, Sandberg bluegrass, and Thurber's needlegrass. This community grows on flats at elevations of 4,700 to 7,800 feet.

Wyoming Big Sagebrush Association

The Wyoming big sagebrush association appears to have originated as a cross between basin big sagebrush, mountain big sagebrush, and black sagebrush (Trimble 1989). Although Wyoming big sagebrush grows in combination with the other two big sagebrush subspecies, it occupies the drier, shallower, and poorer soils. It is the shortest subspecies, reaching only 3 to 4 feet under normal conditions (Blaisdell et al. 1982).

Natural fire intervals in Wyoming big sagebrush communities appear to range from 10 to 110 years or more. Post-burn recovery to 20 percent canopy cover may take more than 40 years after a stand-replacing fire (Young and Evans 1989; Winward 1991). Grasses usually dominate the site before Wyoming big sagebrush reestablishes. Sites are reestablished from soil seedbanks and seeds from remnant and adjacent plants. Because Wyoming big sagebrush occupies drier soils and poorer sites, these communities are especially vulnerable to grazing impacts. Many have lost a substantial portion of the native perennial grass understory. This has opened these communities to invasion by exotic annual grasses such as cheatgrass, which has now replaced the native perennial grasses in most areas. A cheatgrass understory is highly susceptible to fire and greatly shortens the fire interval. As a result, these communities are dominated by exotic annual grasses and are severely degraded (Young and Evans 1989).

A typical plant community is the big sagebrush 10 to 24 percent perennial grass community. This is an open to moderately dense, broad-leaf, evergreen shrub community, dominated by Wyoming big sagebrush about 3 feet in height. Canopy cover is 10 to 24 percent. Low-growing sagebrush is associated with perennial grasses and forbs. Other co-dominants in Wyoming big sagebrush steppe are western wheatgrass, Sandberg bluegrass, bottlebrush squirreltail, Idaho fescue, Thurber needlegrass, and needle-and-thread grass. Although not often used in vegetation classifications, cheatgrass is also a dominant species in some Wyoming big sagebrush steppe communities. This community occurs on flats at elevations of 4,700 to 5,500 feet.

Low Sagebrush Association

Low sagebrush grows on very poor shallow soils that are dry, rocky, and frequently alkaline. In the warmer drier parts of its range, particularly in Nevada, it may grow at elevations above 9,800 feet. In some areas, low sagebrush grows in discontinuous, low- or high-elevation bands. Soils that support this species generally are rockier and contain more clay than those that support big sagebrush; they are also wetter in spring and drier in fall (Blaisdell et al. 1982). Low sagebrush stands generally escape fire when mixed with big sagebrush. However, under extreme conditions, low sagebrush will burn and recovery time is longer than for big sagebrush. If overgrazed, low sagebrush communities are susceptible to cheatgrass invasion. Where clay content is high, the invasive grass is usually medusahead (Blaisdell et al. 1982).

A typical plant community is the low sagebrush scrub 10 to 14 percent perennial grass community. This is an open, broad-leaf evergreen shrub community dominated by low sagebrush, usually less than 1 foot in height. Canopy cover is 10 to 24 percent. Associated plants are primarily perennial grasses and forbs, sometimes with scattered western juniper. Sandberg bluegrass dominates the understory; other associated species are antelope bitterbrush, plateau gooseberry, gray horsebrush, squirreltail, bluebunch wheatgrass, Idaho fescue, ballhead sandwort, desert yellow daisy, low pussy-toes, rock eriogonum, Bolander's yampah, Hooker's balsamroot, and cushion eriogonum. Tufts of perennial grasses are often elevated, indicating soil loss. This community occurs on rocky flats or gentle slopes at elevations of 4,200 to 6,800 feet throughout the region.

Black Sagebrush Association

Black sagebrush is generally 12 inches tall or shorter, with leaves less than half an inch long. This species flowers in the fall. Flower stalks often cast a slight orange appearance and often persist from year to year. The canopy is often loosely branched, with a short trunk, it but may have a compact rounded appearance if heavily grazed by wildlife or livestock. The stems are usually dark, and the leaves have tiny black dots, hence the name black sagebrush. Black sagebrush is found on sites from about 4,500 feet to 8,500 feet, where the annual precipitation ranges from less than 8 inches to over 16 inches.

Black sagebrush is often found on gentle slopes above the nearly level valley bottoms, the adjacent foothills, and on steep mountainside slopes. The primary factors that control its distribution are a soil with a low water holding capacity and usually a high level of calcium carbonates. Black sagebrush typically inhabits soils that have either bedrock or a caliche[2] layer at about 18 inches or less. Black sagebrush tolerates large amounts of soil carbonates better than the other sagebrush species. It is common on shallow soils derived from limestone. Soil profiles often have substantial amounts of gravel or rock that further limit the soil's water holding capacity.

Black sagebrush does not tolerate prolonged flooding, preferring to inhabit drier sites. It provides important forage for pronghorn, mule deer, GRSGs, and domestic sheep, particularly in the late summer, fall, and winter, when succulent forbs and grasses decline. Cattle may increase consumption of the plant in the fall and winter (Shultz and McAdoo 2002).

The perennial grasses associated with these communities are Idaho fescue, Webber ricegrass, bottlebrush squirreltail, Cusick bluegrass, Sandberg bluegrass, and pine bluegrass. Potential vegetative composition is about 50 percent grasses, 15 percent forbs, and 35 percent shrubs. Typically, the sparse vegetation of most black sagebrush communities normally precludes the occurrence of fire,

[2]Thick calcium carbonate that restricts rooting depth

except in exceptional years. Black sagebrush stands, where they form a major part of the community, are a valuable wildlife winter forage species and should not be burned on a large-scale basis.

Herbaceous and Grassland Alliance

By definition, herbaceous plants have succulent (not woody) stems; they include forbs and aquatic plants and may have annual or perennial life-cycles (Sawyer and Keeler-Wolf 1995). Herbaceous plants are usually a major part of the understory vegetation in tree- or shrub-dominated communities. However, in this alliance, forbs and grasses are the dominant plants. The herbaceous and grassland alliance is primarily seasonal or permanent meadow and seep communities (the latter are described under Wetland and Riparian Associations). Although herbaceous and grassland habitats are characterized by low species diversity, when compared with habitats with more complex structural diversity, they are very important in terms of regional biodiversity. There are three main plant associations.

Nonnative Perennial Grass Association

During the late 1950s and early 1960s, various forms of crested wheatgrass were used to control the invasive weed halogeton (*Halogeton glomeratus)* and to provide spring grazing deference on native ranges to improve rangeland conditions. These seedings were conducted primarily on gentle terrain at lower elevations (Wyoming big sagebrush sites). BLM records indicate that the cumulative acreage of rangeland seedings on BLM-administered lands in Nevada increased from approximately 30,000 acres in 1962 to 160,000 acres by 1965, 400,000 acres by 1969, and 500,000 acres by 1975. This acreage does not include private land seedings. The practice of range seeding to improve spring ranges peaked in Nevada as early as 1965, then underwent a slow, steady decline through the next decade until no acres were treated from 1978 through 1981. By 1999, the cumulative total of seeded acres had grown to 590,000 (State of Nevada 2001).

Native Perennial Grass Association

These areas also include areas of dominant native grasses and forbs that can occur following a wildland fire. Fire occurrences in the last 20 years have resulted in many acres of shrub-grasslands being converted to a vegetative community currently dominated by perennial grasses and forbs. Over time, shrubs will naturally reestablish and begin to dominate the vegetative composition of these areas. These areas are historic GRSG habitat that still have potential in the future to develop a shrub component capable of providing cover and forage for GRSGs. Some of these areas in higher elevations have had successful fire rehabilitation treatments and already have established sagebrush seedlings but currently do not have the height or structure to provide adequate habitat.

Annual Grassland Association

Annual grassland habitats composed of invasive weeds (primarily cheatgrass and medusahead) are highly undesirable and considered biological deserts. Exotic annual grasses (particularly medusahead and cheatgrass) are likely to persist, whether or not livestock grazing continues on BLM-administered lands. These plants persist because of abundant annual seed production and long-term viability of seed stored in surface litter and soil, plus earlier germination than native perennials.

Damage and loss of native perennial shrubland/bunchgrass communities because of persistent grazing and frequent wildland fires has greatly accelerated introductions and domination by exotic annual weeds. However, it is possible to reduce infestation, or at least slow its progress, through proper grazing management on lands surrounding the affected area. Improving health in adjacent areas creates a natural barrier to the spread of weeds. Properly designed grazing strategies have also noticeably improved areas presently dominated by exotic annuals. Areas where annual grasses are still a minor problem have also benefited from improved grazing management. Improvement is evidenced by increased vigor and seed production in native vegetation, and such efforts are now being prioritized (Reisner et al. 2013).

Wetland and Riparian Alliance

Nationwide, riparian-wetland areas comprise less than nine percent of the land base (Prichard et al. 1993, 1994, 1998, 2003). However, these areas are the most productive and prized resource on BLM-administered lands. Riparian-wetland areas are essential to restoring and maintaining natural hydrologic function (particularly groundwater recharge and flood control) and the physical, chemical, and biological health of the nation's water supply.

There is disproportionately heavy use of riparian-wetland areas by numerous wildlife species, more so than any other habitat types. Riparian-wetland areas are also highly prized for their recreational value (e.g., hunting, fishing, photo taking, hiking, and wildlife viewing), economic value (e.g., livestock grazing), and for nature education. These habitats are highly valued by Native Americans for food gathering and other traditional economic activities.

When viewed from high elevations, riparian zones usually appear as thin green ribbons in canyon bottoms. Green strips in many mountain drainages are less than 15 feet wide (including stream width); even the largest streams in the management area are only 10 to 40 feet wide. However, portions of some rivers exceed 100 feet in width. The riparian vegetation zone varies tremendously in width, according to water depth, volume, and flow rate and local topography, soils, and streambank (or nearby) modifications.

Riparian and wetland communities in this planning area are primarily found in or next to seeps and springs, seasonal or permanent meadows, creeks and rivers, natural lakes or playas, and human-made irrigation canals and reservoirs.

Because of the proximity and abundance of water, riparian plants are usually quite different from those found in adjacent upland areas; they also thrive in or tolerate wet or saturated soil conditions that upland plants cannot.

The BLM's Riparian-Wetland Initiative for the 1990s (BLM 1991c) establishes national goals and objectives for protecting riparian-wetland resources on public lands. The initiative's chief goals were to restore and maintain riparian-wetland areas so that at least 75 percent were in PFC by 1997 and to achieve an advanced condition of ecological stability (except where resource management objectives, such as PFC, required an earlier stage of succession to provide greater habitat diversity for wildlife, fish, and watershed protection). The strategy of this initiative requires holistic watershed-based management. The condition of the entire watershed is an essential component for determining whether a riparian-wetland area is functioning properly.

Riparian Scrub/Herbaceous Association

Riparian zones and riparian plant communities in this association occupy areas next to streams, lakes, and other natural sources of open water, as well as reservoirs; this water exerts a predominant influence on the native vegetation and the associated biotic community (USDA NRCS 1997). The riparian association, riparian communities, and ecological sites all describe plants that grow in the riparian zone. Certain species require the environmental conditions that prevail in this zone, whereas other species tolerate these conditions but are frequently found outside the riparian zone.

Riparian ecosystems are distinctly different from surrounding lands and vegetation because of the strong influence exerted by free water in the soil (USDA NRCS 1997). Riparian and all plant communities are classified according to recognizable, repeatable, and clearly defined assemblages of riparian plant species. The following plant communities are commonly found in California and Nevada.

Willow Scrub Community

This is an open to moderately dense deciduous community of tall shrubs (less than 8 feet) or trees (less than 30 feet). The dominant genus is willow, mixed with wet meadow plants and scattered low shrubs (3 feet or less). Associated species may include narrow-leaf willow, arroyo willow, red willow, Scouler's willow, Lemmon's willow, shining willow, interior rose, sedges, rushes, columbine, mountain alder, American dogwood, quaking aspen, and black cottonwood. This community occupies flats or gentle slopes in springs, meadows, and wet drainages throughout the region. Willows grow in riparian and wetland associations on periodically saturated soils. Healthy willow communities sprout vigorously following fire. Willows also sprout well from cuttings, and are used extensively for revegetation. However, close association with open water and palatability make willows especially vulnerable to overgrazing by livestock, wild horses, and burros. Repeated streambank

trampling by livestock causes soil erosion and gullying, which lowers the water table and converts riparian habitats to upland shrub communities. Similar effects can result from improper road placement (through or alongside riparian habitats) and excessive motor vehicle traffic.

Seasonally Dry Meadow Community

This community occupies areas with remnant meadow soils that are wet in spring but usually dry by early summer. It is primarily composed of perennial, grass-like plants, but also may contain scattered 3- to 6-foot shrubs. When in poor condition, it may contain numerous annual weeds or bare ground. The dominant plants are usually Baltic rush and various sedges. Associated species are silver sagebrush, rubber rabbitbrush, squirreltail, annual beardgrass, clustered field sedge, mat muhly, beardless wildrye, inland saltgrass, meadow barley, fine-branched popcornflower, and tanseyleaf evening primrose. This community occupies flats or gentle slopes at elevations of 4,000 to 6,000 feet.

Wet Meadow or Seep Community

This community occupies seeps, springs, or meadows that are wet most of the year. It supports a dense community of primarily riparian grass-like plants and sometimes a few scattered 3- to 6-foot shrubs. Rushes and sedges are the dominant plants. Associated species include willow, golden currant, interior rose, Nebraska sedge, Baltic rush, common spikerush, short-awn foxtail, meadow barley, spike redtop, thingrass, western blue flag, small-flowered camas, hoary nettle, and common monkeyflower. This community grows on flats or gentle slopes at elevations of 4,000 to 8,000 feet.

Noxious Weeds and Invasive Plants

Noxious weeds and invasive plants are recognized as a very serious threat to the biodiversity of native rangelands, second only to habitat loss and fragmentation (Pimm and Gilpin 1989; Scott and Wilcove 1998). These plants alter basic ecosystem functions, such as nutrient cycling, hydrology, and wildland fire frequency; they overwhelm native plants and animals and sometimes hybridize with native species. All natural plant communities are susceptible to noxious weed invasion. The presence, abundance, and influence of noxious weed infestations in a particular ecosystem is highly dynamic, responding to changes in local environmental conditions from a range of human and natural causes. Introduction, proliferation, and spread of noxious weeds and invasive plants—and priorities for their control—can change in as little as two years, as new infestations are located, known infestations are successfully treated (or increase in size and severity), and management priorities change.

Trends in noxious weed infestation are assessed according to the number and severity of infestations, and their net or gross size in acres. A sustained reduction in any of these factors is considered a positive trend. The ultimate goal of the noxious weed program is elimination (or effective control) of noxious weeds on BLM-administered and National Forest System lands. Effects

of change on the noxious weed problem are difficult to predict because of the complexity of ecosystem processes and the diversity of management activities. However, there is an undisputed consensus that, in the absence of continued inventory, a coordinated weed-treatment program, and yearly treatment evaluation, the problem would rapidly worsen. Certain weeds have already become so widespread that infestations are now considered too difficult, time-consuming, and costly to treat.

Aggressive fire suppression and overgrazing have led to encroachment and degradation of sagebrush communities by certain native shrubs, particularly western juniper. Fire can be used to control invasive species or to approximate historic fire regimes. Nonetheless, land managers must be cautious when using fire for these purposes; if not used correctly, fire may favor proliferation of other fire-tolerant invasive species or exotic weeds, resulting in further degradation of already compromised ecosystems. Natural fire conditions in sagebrush ecosystems did not occur in the presence of numerous exotic plants, and its use may not be feasible if fire-tolerant exotics are present (Brooks and Pyke 2001).

Exotic annual grasses especially benefit from fire, and the proliferation of these grasses results in a frequent reoccurrence of fire (i.e., an unnaturally shortened fire-return interval), to the point where native species cannot persist and sagebrush communities are converted to exotic annual grasslands. Type-conversion of this kind severely reduces biodiversity and is devastating for wildlife, including carnivores. Therefore, effective wildlife management depends on the control of invasive and exotic plants and use of appropriate, site-specific fire regimes (Brooks and Pyke 2001).

Cheatgrass, especially, is widespread in low-elevation juniper woodlands. However, cooler, mesic woodlands appear less susceptible to invasion and dominance by this and other exotic annuals. A better understanding of factors that influence woodland susceptibility to invasive and exotic species is required. Whisenant (1990) reviewed the effects of cheatgrass infestation on fire frequency in shrub-steppe communities and found that it tends to exert dominance on disturbed soils. Because it forms a continuous fuel load, its presence leads to more frequent fires. Frequent fire shrinks native plant cover, encourages proliferation of cheatgrass, and reduces biodiversity, making establishment easier on relatively undisturbed soils.

The BLM and Forest Service use an integrated pest management approach to prevent the introduction and establishment of noxious weeds and to control existing infestations. This includes education and preventive measures, as well as physical, biological, chemical, and cultural treatments. In 2007, the BLM released the Vegetation Treatments Using Herbicides on Bureau of Land Management Land in 17 Western States Programmatic Environmental Impact Statement and Record of Decision (BLM 2007a). The ROD identified prevention measures and

standard operating procedures for the BLM to follow to protect and enhance natural resources that could be affected by future vegetation treatments. Prevention measures are designed to minimize invasive weed establishment as part of activity planning.

In **Table 3-11** the known acreage values of cheatgrass, by jurisdictional boundaries, are presented.

Table 3-11
Acres of Cheatgrass Potential in Greater Sage-Grouse Habitat

Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
BLM	III	1,149,800	1,574,600	2,724,400
	IV	1,175,000	681,200	1,856,200
	V	1,557,400	515,800	2,073,200
Forest Service	III	16,900	30,100	47,000
	IV	23,500	20,000	43,500
	V	0	0	0
Other	III	336,600	563,600	900,200
	IV	489,900	470,600	960,500
	V	594,200	146,800	741,000

Sources: Manier 2013; USGS 2014

Conifer Encroachment

Pinyon /juniper woodlands are complex, not only in terms of species composition and appearance, but also because the management area contains woodlands that vary greatly in successional stage (from early to aged). The developmental stage greatly affects fuel loads, wildlife habitats, and management activities involving other natural resources. Treatment of invasive pinyon /juniper, including methods, cost, and response to treatment, also largely depends on developmental stage.

Studies show that the expansion of pinyon/juniper has more than tripled in the areas dominated by pinyon /juniper woodlands in the last 150 years. Although pinyon/juniper woodlands have increased dramatically in the last 150 years, they currently occupy far less than they are capable of under current climatic conditions (Miller and Tausch 2001). These changes have generally coincided with the introduction of heavy livestock grazing, tree use by the mining industry, and fire suppression that followed settlement of the region.

Unfortunately, pinyon/juniper has the potential to replace existing shrubland and grassland communities. An increase in tree dominance results in a loss of understory. This further reduces the fuel and further decreases the fire frequency. Altered disturbance regimes and climate change have resulted in major changes in plant community compositions. Since the 1860s, many bunchgrass and sagebrush-bunchgrass communities, which dominated the

Intermountain West, have shifted to pinyon/juniper woodland or introduced annual-dominated communities (West 1984; Miller et al. 1994).

Studies conclude that, barring some major environmental change or management action, continued forage reduction and decreased fire frequency will continue until trees dominate most of the sites favorable to their survival. This continued tree dominance then jeopardizes the historic woodland sites because under the right conditions, a crown fire could result in a stand replacement wildland fire, with catastrophic consequences because of continuous tree canopy. Studies further show that in pinyon/juniper communities that are overstocked, the ability of the understory to respond after a fire is dramatically reduced and potentially opens the site to invasion by exotics. Once these communities become mature tree-dominated woodlands, treatment becomes difficult and expensive (Miller and Tausch 2001).

Biological Crusts

Biological 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 establish vascular[3] plants, and promote the health of plant communities. Intense disturbance results in bare soil. Severely, newly, or frequently disturbed soils are generally dominated by large filamentous cyanobacteria. When disturbance is less severe or less frequent or some time has elapsed since the disturbance, crusts are generally in some mid-successional state, with some lichens and mosses present. If disturbance continues, crusts will stay in early successional stages (i.e. cyanobacteria only; USDI 2001).

Biological soil crusts are found throughout the planning area but are not uniformly distributed. Some of the same characteristics that influence sagebrush species distribution also influence biological crust development. Crusts tend to be lacking in sagebrush types that occur on seasonally flooded soils as they create oxygen-free conditions that are not well tolerated by lichens. Heavily saline soils also lack lichen cover, although moss is sometimes present if the salt concentration is not too great. Mountain, subalpine, and xeric big sagebrush types support higher biological crust cover unless soil surfaces are greatly disturbed or the current vegetation is in an early successional stage (USDI 2001). Northern Great Basin recovery rates based on USDI (2001), for elevations of near 3,280 feet and average precipitation amount of 14 inches range from 20 years for the gelatinous lichens, 25 years for early colonizers, 60 years for mid-successional, and 125 years for late successional crusts.

[3]Flowering plants

3.4 RIPARIAN AREAS AND WETLANDS

Riparian areas and wetlands are critical to the long-term viability of GRSG populations. Riparian habitats provide important sources of food and cover for GRSGs, particularly during the late summer brood-rearing period (see **Section 3.2**, Greater Sage-Grouse and Greater Sage-Grouse Habitat). This function is especially important in the more arid portions of the GRSG range, including much of the planning area.

Riparian areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Typical riparian areas are lands along perennially and intermittently flowing rivers, streams, and shores of lakes and reservoirs with stable water levels. Excluded are 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 some riparian areas. For a description of riparian and wetland vegetation community types characteristic of the planning area, refer to **Section 3.3**, Vegetation.

Riparian and wetland areas next to surface waters are the most productive and important ecosystems in the planning area. These areas represent an estimated 1,817,800 acres (3 percent) of the planning area, according to information derived from the National Wetlands Inventory (USFWS 2013b). Although they are limited in extent, riparian habitats play an integral role in restoring and maintaining the chemical, physical, and biological integrity of water resources (Fitch and Ambrose 2003).

Healthy riparian and wetland areas have the potential for multi-canopy vegetation layers with trees, shrubs, grasses, forbs, sedges, and rushes. They are valuable habitat for a wide variety of wildlife species. Healthy systems also filter and purify water, reduce sediment loads, enhance soil stability, provide micro-climatic moderation, and contribute to groundwater recharge and base flow (Prichard et al. 1998).

Generally, riparian areas and wetlands are stratified into lotic (flowing water or riverine) systems and lentic (standing water) systems, which may include a variety of wetland types. In the planning area, lentic riparian habitats typically include seeps, springs, aspen stands, and both wet and dry meadows.

Current Conditions

Although detailed information on the condition and trend of riparian and wetland areas is not available for the planning area as a whole, some data are available for portions of the Battle Mountain, Elko, and Winnemucca BLM Districts in Nevada, the Alturas, Eagle Lake, and Surprise BLM Field Offices in

California, and the Humboldt-Toiyabe National Forest (**Table 3-12**). Collectively, these seven management areas encompass approximately 17,721,700acres of PPH and PGH, which represents approximately 82 percent of the total PPH and PGH in the planning area).

Table 3-12
Lotic and Lentic Riparian Areas Meeting Riparian Goals

Management Unit	Percent Meeting Goals[1]	Data Set	Assessment Method[2]
Lotic Riparian Areas			
Elko District	60	558 miles (2000 to 2012)	1
Winnemucca District	55	891 miles (1993 to 2012)	2, 3
Battle Mountain	47	752 miles (1994 to 2012)	2, 3
Alturas Field Office	81	51.5 miles (1995 to 2012)	2, 3
Eagle Lake Field Office	90	109 miles (1995 to 2012)	2, 3
Lentic Riparian Areas			
Elko District	30	2,237 assessments (1996 to 2012)	4, 5
Winnemucca District	38	2,103 acres (1993 to 2012)	4, 5
Battle Mountain	27	2,213 assessments (1994 to 2012)	4, 5
Alturas Field Office	95	737 acres (1995 to 2012)	4, 5
Eagle Lake Field Office	71	146 acres (1995 to 2012)	4, 5
Surprise Field Office	14	398 assessments (1993 to 2012)	4, 5
Lotic and Lentic Riparian Areas Combined			
Humboldt-Toiyabe National Forest	21	553 assessments (1990 to 2012)	6

[1]Goals are defined here as PFC or functional-at-risk with an upward trend (most BLM district data); good to excellent riparian habitat condition (Elko District data); or high ecological condition (Forest Service data).
[2]1=Stream Survey (Elko District, BLM 2002d); 2=Lotic Functioning Condition Assessment (Prichard et al. 1993); 3=Lotic Functioning Condition Assessment (Prichard et al. 1998); 4=Lentic Functioning Condition Assessment (Prichard et al. 1994); 5=Lentic Functioning Condition Assessment (Prichard et al. 1999, Revised 2003); 6=Forest Service Ecological Scorecard System.

Much of the information presented in **Table 3-12** is based on PFC assessments, as the BLM uses this technique to determine whether riparian areas are meeting rangeland health standards. Riparian areas are considered to be in PFC when adequate vegetation, landform, or debris is present to dissipate energy, improve water quality and reduce erosion, filter sediment and aid floodplain development, capture and store water, and provide for greater biodiversity (Prichard et al. 1998, 1999 [revised 2003]). Riparian areas that are functioning at risk lack one or more soil, water, or vegetation attributes, making them susceptible to degradation. Nonfunctional riparian areas are clearly not providing adequate vegetation, landform, or debris to dissipate energy, filter sediment, capture and store water, and provide for greater biodiversity.

Some of the data in **Table 3-12** are from stream surveys (Elko District, BLM 2002d) or from a scorecard system used by the Forest Service to determine

ecological condition based on riparian community types and attributes, such as frequency, cover, root depths, and soil characteristics. High ecological condition indicates that the site is functioning in physical and biological capability of the ecosystem. Moderate ecological condition indicates the site has one or more disturbances to the biological and physical features that limit the capability of the site. Low ecological condition indicates that the site has crossed a biological or physical threshold where site disturbance has resulted in the loss of the ability to sustain the ecosystem.

Condition of riparian habitats varies throughout the planning area. In many portions of California, a high percentage of both lotic and lentic riparian habitats are functioning properly or functioning-at-risk with an upward trend. For some portions of California and most of Nevada, riparian management goals have not been met for a most assessed lentic riparian habitats (or for both lentic and lotic areas for National Forest System lands).

On BLM-administered lands in Nevada, results are more positive for lotic riparian habitats in comparison to lentic riparian habitats. This is likely the result of management strategies that have been focused on priority stream habitats in the last 15 to 20 years. In addition, lentic areas are characteristically small, widely scattered, and typically less resilient to grazing impacts than stream systems. Consequently, these areas tend to be disproportionally impacted by grazing animals, including livestock and wild horses.

For remaining management units in the planning area, including the BLM Ely and Carson City Districts, information on condition and trend of riparian areas has not been summarized. However, available information generally indicates many of these areas are not functioning properly.

Where riparian habitats in the planning area are not meeting goals, grazing by livestock and wild horse and burros is often identified as the primary cause. Overgrazing riparian vegetation makes streambanks more vulnerable to destabilizing effects of livestock trampling and the erosive force of water, exposes soils to drying out by wind and sunlight, reduces water storage capacity of the riparian area, reduces shade and thereby increases stream water temperature, encourages invasion of undesirable plants, speeds up runoff, and reduces filtration of sediment necessary for building streambanks, wet meadows, and floodplains (Chaney et al. 1993).

Where riparian habitats are meeting goals, this is often the result of protective fencing or implementation of prescriptive livestock grazing practices to reduce frequency and duration of hot season use on riparian areas. Many of these efforts have been undertaken in cooperation with the livestock industry as well as other agencies and entities and have included both public and private lands.

Besides grazing impacts from livestock and wild horses and burros, riparian areas and wetlands in the planning area are impacted by a range of land uses that

have occurred and continue to occur throughout the western United States. These can include recreation, water diversions, mining, roads, agricultural encroachment, channelization, flood control, urbanization, and railroads (Meehan 1991; Williams et al. 1997; Sada et al. 2001; Prichard et al. 1998). Impacts include accelerated erosion, concentration of stream energy, loss of floodplain access, reduced water supplies, sediment loading, and degradation of water quality. These all affect functionality and condition of riparian ecosystems.

Although identified as the number one threat to the GRSGs by the USFWS, impacts on riparian areas from wildland fire are highly variable, depending on a host of factors, including elevation, precipitation, time frames, habitat conditions, grazing impacts, and fuel moisture levels. Especially during periods of drought or in areas of low average annual precipitation, wildland fires can completely destroy riparian communities, resulting in loss of hydrologic function or in plant community shifts from mesic species to invasive weed species. Riparian areas in the planning area, in general, are inherently resilient to the impacts of fire due to the persistence of soil moisture.

However, habitat conditions (often tied to livestock grazing practices) can also determine riparian response to fire. In an analysis of 81 streams on BLM-administered and National Forest System lands in northern Nevada, Dalldorf et al. (2013) found that the occurrence of wildland fires between 1999 and 2001 did not play an influential role in the response of selected stream survey attributes when coupled with livestock grazing attributes.

Climate change also has the potential to negatively impact lotic and lentic riparian habitats in the planning area. Increases in water and air temperatures and decreases in precipitation rates predicted as a result of climate change can fuel expansions of invasive species, lead to increased stream temperatures, and create higher potential for floods and erosion (Karl et al. 2009).

3.5 FISH AND WILDLIFE AND SPECIAL STATUS SPECIES

This section describes the existing conditions of special status and non-special status fish and wildlife resources, including aquatic and terrestrial animal species and their habitats, in the planning area. Fish and wildlife resources include big game, upland game, waterfowl, raptors, migratory birds, small mammals, reptiles, amphibians, and fish. NDOW, CDFW, and USFWS have primary responsibilities for managing fish and wildlife species in the planning area. The BLM and Forest Service are responsible for land management. Therefore, on BLM-administered and National Forest System lands in the decision area, the agencies are directly responsible for managing habitat for fish and wildlife species and indirectly responsible for the health of fish and wildlife populations that are supported by these habitats.

The ESA mandates the protection of species listed as threatened or endangered of extinction and the habitats on which they depend. Section 7 of the ESA clarifies the responsibility of federal agencies to use their authority to carry out

programs for the conservation of listed species. In addition, federal agencies must consult with USFWS to insure that any action authorized, funded, or carried out by the agency is "…not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species."

3.5.1 Conditions on BLM-Administered Lands

In the planning area, the major ecoregions are the Great Basin and Modoc Plateau and the westernmost edge of the Sierra Nevada. Sagebrush generally occurs throughout the Great Basin and Modoc Plateau and is most common in valleys and mountain ranges north of the Mojave Desert. Sagebrush does occur in the ecotone between the Mojave Desert and the Great Basin ecoregions, mostly in mid-elevation drainages and old burn scars of blackbrush shrublands and higher on mountain ranges.

Because sagebrush is a dominant vegetation type in the planning area, a high number of species have evolved specifically to thrive in sagebrush habitat. Sagebrush types are generally found in a mosaic with other habitat types but can occur as large monotypic expanses.

Sagebrush habitats generally occur between 4,500 and 10,000 feet and are widespread throughout valley, foothill, and mountain environments (NDOW 2012b). Annual precipitation ranges from 8 to 30 inches, mostly in the form of snow. Temperatures range from minus 30 degrees to 110 degrees Fahrenheit (NDOW 2012b). Sagebrush overstory structure can range from less than 6 inches on exposed rocky slopes up to 9 feet in drainages where basin big sagebrush has extended its roots into the water table. Sagebrush canopy, however, is generally between 2 and 3 feet high. Crown cover varies from 1 to 70 percent but commonly is between 20 and 40 percent (NDOW 2012b).

There are 27 recognized species and distinct subspecies of sagebrush in the planning area. Dominant species are basin big sagebrush, mountain big sagebrush, Wyoming big sagebrush, low sagebrush, and black sagebrush (Cronquist et al. 1994). Co-dominant plant species are bitterbrush, snowberry, rabbitbrush, snakeweed, white sage, spiny hopsage, bluebunch wheatgrass, bluegrass, needle and thread, Idaho fescue, Indian ricegrass, Great Basin wildrye, Indian paintbrush, lupine, buckwheat, globemallow, and penstemon.

The altitudinal distribution of sagebrush generally follows a pattern of basin big sagebrush in the valley floors or lower alluvial fans, Wyoming big sagebrush at mid-elevations, and mountain big sagebrush above 6,500 feet.

Low and black sagebrush are both low-growing shrubs that rarely exceed heights of 15 inches, primarily on shallow or poorly drained soils with a root-restricting layer, interspersed throughout the greater sagebrush expanse in many elevation bands.

Commonly occurring trees in the planning area are Utah juniper, western juniper, mountain mahogany, and pinyon pine. Aspen communities are dispersed throughout the planning area. Conifer forests dominate the higher elevations.

The planning area has a diverse aquatic environment of wetland, spring, meadow, seep, vernal pool, stream/river, and riparian communities, all providing invaluable water sources across the arid cool desert landscape.

The planning area is an outstanding region for wildlife, providing habitat for characteristic megafauna such as mountain lion, mule deer, elk, black bear, and pronghorn antelope, as well as an abundance of birds, such as hawks, peregrines, golden eagles, pinyon jay, burrowing and other owls, and various shorebirds and waterfowl. The area boasts at least eight sagebrush-dependent species: pygmy rabbit, Great Basin pocket mouse, sagebrush vole, sagebrush lizard, sage thrasher, Brewer's sparrow, sage sparrow, and GRSGs. The varied aquatic habitats and natural barriers have resulted in the evolution of several unique communities of endemic fish and invertebrates.[4]

Sagebrush range in good condition supports an abundant understory of protein rich bunchgrasses and forbs. The presence of this understory is critical to the needs of other wildlife species, including the sagebrush vole. The various shrew species that live in sagebrush are invertivores,[5] but they depend on the productivity of the herbaceous component for the abundant production of their prey items, as well as for cover.

Much of the planning area has been substantially altered or degraded since the nineteenth century by a combination of change agents. Despite being in one of the least-developed regions of the country, the Great Basin and Modoc Plateau are one the most threatened ecosystems in the country (TNC 2001). Major change agents that negatively affect terrestrial wildlife in the planning area, including GRSGs, are increases in both the frequency and intensity of wildland fire, invasive annual grasses, the expansion of native pinyon and juniper, development, and livestock and wild ungulate grazing that exceeds land health standards. The aggregate effects of these change agents have altered the planning area's sagebrush, riparian, and forest habitats (Miller et al. 1994; Schaeffer et al. 2003).

For example, much of the basin big sagebrush and Wyoming big sagebrush range in Nevada lacks understory of native bunchgrasses and forbs that were historically present. Shrub cover has increased from what are generally regarded as the conditions before Euro-American contact. Nonnative annual grasses, most notably cheatgrass, have invaded big sagebrush range, bringing with them an accelerated fire interval for which sagebrush regeneration cannot

[4]Animals without backbones, for example, snails
[5]Feeding on invertebrates

compensate. Low and black sagebrush are being similarly invaded by cheatgrass throughout the state and by medusahead in northern Nevada; the latter is an aggressive exotic grass that can tolerate the shallow clay soils of these ecological sites and can cause a similar negative impact through altered fire regime. It is threatening the low sagebrush landscape. Overall, shrubland with high species diversity is being converted over time to annual grassland with drastically reduced wildlife value is occurring (NDOW 2012b).

Pinyon/juniper expansion into shrubland has thrived due to range overgrazing in the nineteenth century and continuing in the first half of the twentieth century (Young and Sparks 2002) and fire suppression after the 1920s (Blackburn and Tueller 1970; Pyne 2004). Many true woodlands within a few miles of mines were harvested or thinned during the historic mining era of the late nineteenth century; however, many woodlands have repopulated the soils that supported them and continue to aggressively contribute to the expansion of trees into sagebrush range.

Pinyon/juniper expansion into sagebrush range drastically alters range structure and creates conditions difficult to restore to pre-encroachment conditions. Pinyon/juniper expansion is also generally facilitated by regional warming (Grayson 1993; Tausch and Nowak 1999). Currently, there is considerable discussion in Nevada concerning the need to manipulate the balance between woodland expansion and healthy sagebrush communities in light of the recent efforts to conserve GRSGs and the habitat needs of pinyon/juniper-dependent species, such as pinyon jay, which are currently experiencing a 4 to 6 percent decline in population per year (GBBO 2010).

New road development, existing road improvement, and urban, suburban, and industrial development are also contributing to depletion and fragmentation. Increased human population in several areas of the sub-region has exerted increased pressure on the landscape, and thus sagebrush community integrity will continue to be challenged over time.

Loss of habitat reduces living space for wildlife. Where sagebrush habitat has been depleted of its understory, it lacks the ability to provide nesting and escape cover and sources of food to plant- and seed-eating animals. Lack of nesting and escape cover, coupled with increasing human infrastructure (e.g., roads and utility ROWs), creates travel lanes for mammalian predators and perch sites for avian predators (Knight et al. 1995) and serves to fragment the landscape into smaller and smaller patches. This interaction may increase the success of predators at the expense of species such as ground-nesting birds. Predation pressure may be reaching effect levels on a suite of sagebrush residents, including GRSGs. Increased human activity on the land can leave in its path a footprint of habitat degradation in the form of a broken-down shrub layer, loss of species diversity, and increased soil erosion that reduces site restoration capability.

The US Breeding Bird Survey documented a population decline of 50 percent or greater for Brewer's sparrow between 1966 and 1999. The Partners in Flight North American Landbird Conservation Plan has identified Brewer's sparrow as a Watch List Species in need of management action in the Intermountain Bird Conservation Region due to the significant population decline (Rich et al. 2004). Loggerhead shrike continues to decline significantly across its range in North America, and the sage thrasher continues to exhibit significant declines in neighboring states, although it is showing signs of stabilizing in Nevada and throughout the Great Basin.

Declining populations for most fish and wildlife species are attributable to habitat loss and fragmentation as the primary cause. **Table 3-13** and **Table 3-14**, under Current Condition, below, list species federally recognized as threatened or endangered and those recognized by the Forest Service and BLM as sensitive.

The BLM designates as sensitive all federally designated candidate species, proposed species, and delisted species in the first five years following their delisting. Additional species may be designated as sensitive if they are native species found on BLM-administered land for which the BLM has the capability to significantly affect the conservation status of the species through management and one of the following:

- There is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend, such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range
- The species depends on ecological refugia[6] or specialized or unique habitat on BLM-administered lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk.

The BLM coordinates the potential listing of species as sensitive in consultation with their respective state wildlife agencies and the Nevada Natural Heritage Program.

The following species accounts are a selection of Forest Service indicator species or are considered strongly dependent on a sagebrush-dominated ecosystem for their persistence. Alternatives for various land management scenarios affecting the sagebrush ecosystem are likely to positively or negatively impact these species.

[6]Areas where species can survive unfavorable conditions

3.5.2 Conditions on National Forest System Lands

The National Forest System lands in the Humboldt-Toiyabe National Forest and in the project area provide a diversity of terrestrial and aquatic habitats, similar to what is described above for BLM-administered lands. For management purposes, the Forest Service categorizes species into four main group: Federally listed threatened and endangered species, designated by the USFWS under the ESA; sensitive species, designated by the Regional Forester with each Forest Service region; management indicator species, designated for each forest unit in the individual LUPs during the planning process; and other wildlife species, which are those that are not included in the special status species categories (federally listed threatened or endangered or sensitive). They include mammals (e.g., deer and elk), birds (e.g., raptors and migratory birds), fish, amphibians, insects, and other species.

3.5.3 Species Accounts

Mule Deer

Mule deer occur in a diversity of habitat types throughout the sub-region but occur in highest densities in montane shrub-dominated communities. They are often associated with successional vegetation. They are often found on open or "bared off" south-facing slopes in winter. Mule deer browse on a wide variety of woody plants and graze on grasses and forbs. Throughout the year, most activity occurs at dawn and dusk, though nocturnal and daytime activity is common.

Mule deer are a secondary successional species (taking advantage of plant species that are often the result of some type of disturbance). They have a high degree of selectivity, not only for the plant species they choose to eat, but also for the specific parts of the plant and the time of year that a particular plant may be eaten. Browse species include sagebrush, bitterbrush, serviceberry, snowbrush, and snowberry. When deer are feeding on browse, they prefer the most tender parts, the new shoots and tips or leaders (the most nutritious, most easily bitten off, most flavorful, and most easily digested part of the browse).

Seasonally, home range size is extremely variable and may be 74 to 593 acres or more and is directly correlated with the availability of food, water, and cover. In mountainous regions, mule deer tend to migrate up to 120 miles, from high summer range to lower winter range. In the intermountain west, deer often migrate in response to snowfall patterns. They exhibit high fidelity to individual seasonal ranges (Kucera 1992).

Mule deer populations were estimated at all-time highs in the late 1980s. Habitat loss and degradation are the primary concerns for this species. Invasive weeds, increase in number and frequency of large-scale fires, pinyon/juniper encroachment, shrubland decadence, urban development and expansion, and

drought all contribute to habitat degradation and loss. Decreases in quality of summer range and loss of critical wintering habitat in particular have been the biggest challenges to the species.

Pygmy Rabbit

This species is found primarily on big sagebrush-dominated plains and alluvial fans where plants occur in tall dense clumps (Green and Flinders 1980). Deep, crumbly, loamy-type soils are required for burrow excavation. They may occasionally use burrows excavated by other species (e.g., yellow-bellied marmot) and, therefore, may occur in areas that support shallower, more compact soils as long as sufficient shrub cover is available (USFWS 2010b).

Dense stands of sagebrush growing next to permanent and intermittent streams, along fence rows, and in ditches may be avenues of dispersal (Green and Flinders 1980). Cover and height of woody vegetation appear to be critical habitat features (Green and Flinders 1980); however, Larrucea and Brussard (2008) found that pygmy rabbits occupied clusters of sagebrush that were taller than the sagebrush shrubs in the surrounding area (i.e., sagebrush islands that range from 4.7 to 46 inches in height).

Big sagebrush is the primary food and may comprise up to 99 percent of food taken in winter and 51 percent in summer. Wheatgrass and bluegrass were highly preferred foods in the summer, while forbs were eaten only occasionally (Green and Flinders 1980). This is the only native rabbit species in the sub-region to excavate its own burrows (Weiss and Verts 1984; Janson 1946).

Dispersal abilities are limited; this species is reluctant to cross open areas, such as roads or areas cleared of sagebrush (Weiss and Verts 1984). The size of pygmy rabbit home ranges fluctuates with the seasons; they tend to have smaller home ranges during winter and larger home ranges during spring and summer. Individuals generally remain near their burrows during the winter. Annual home ranges in southeastern Oregon and northwestern Nevada differed between the sexes and ranged from 1.2 to 25.8 acres for males and 0.27 to 18.7 acres for females. Male home ranges tend to be larger than females during the spring and summer, as males travel farther between a number of females. In the southeastern Oregon and northwestern Nevada study, home ranges for males ranged from 0.27 to 18.5 acres and from 0.15 to 17.5 acres for females during the breeding season. Juvenile dispersal in Nevada and Oregon was reported greater than 0.3 mile, with a maximum long-distance movement of 5.3 miles recorded for a juvenile female (Weiss and Verts 1984).

Livestock grazing at inappropriate levels can be detrimental to sagebrush habitat. Recent studies show that grazing is compatible with pygmy rabbits if grazing occurs at levels that leave sagebrush plants intact and soils not overly compacted. Fire was found to be the strongest predictor of loss of pygmy rabbits in Nevada and California. Cheatgrass invasion is detrimental to pygmy rabbits. Shrub cover is necessary for protection during dispersal, and cheatgrass

monocultures may provide a barrier to dispersal. Pinyon/juniper encroachment decreases understory species and, in turn, decreases suitable pygmy rabbit habitat. Climate change has been attributed to forcing pygmy rabbits to higher elevations; extant historical pygmy rabbit sites averaged 515 feet higher than extirpated sites. With local downward shift effect accounted for, overall upward elevation shift of extant sites was 722 feet; the researchers attributed this to climate (USFWS 2010b).

Sage Thrasher

In the northern Great Basin, the sage thrasher breeds and forages in tall sagebrush/bunchgrass, juniper/sagebrush/bunchgrass, mountain mahogany/shrub, and aspen/sagebrush/bunchgrass communities (Maser et al. 1984). The species is positively correlated with shrub cover, shrub height, bare ground, and horizontal patchiness and negatively correlated with spiny hopsage, budsage, and grass cover (Rotenberry and Wiens 1980; Wiens and Rotenberry 1981). The species usually nests within 3 feet of the ground in the forks of shrubs (almost always sagebrush) and sometimes nests on the ground (Harrison 1978; Reynolds 1981; Rich 1980).

In winter, the sage thrasher uses arid and semiarid scrub, brush, and thickets. The species feeds on a wide variety of insects, including grasshoppers, beetles, weevils, ants, and bees, as well as fruits and berries. The Great Basin Bird Observatory (GBBO 2012) analysis of bird population responses to projected effects of climate change indicates sage thrasher is expected to be most affected by projected losses in mountain sagebrush/mid-closed, big sagebrush/mid-open, and salt desert shrub/late covers, and is expected to gain some birds in salt desert shrub/annual, Wyoming big sagebrush/late, and greasewood/shrub/annual covers, for a total projected statewide population loss of 21 percent.

Loss, degradation, or fragmentation of high-quality sagebrush shrubland suitable for sage thrasher is attributed to fire, invasive plants, expansion of pinyon/juniper woodland into sagebrush, heavy livestock grazing, and heavy OHV use (GBBO 2010).

Sage Sparrow

Strongly associated with sagebrush for breeding, sage sparrows are also found in saltbush brushland, shadscale, antelope brush, rabbitbrush, mesquite, and chaparral (AOU 1998; Green and Smith 1981; Martin and Carlson 1998; Paige and Ritter 1998; Reynolds 1981). The species prefers semi-open habitats with shrubs 3 to 7 feet tall (Martin and Carlson 1998).

Sage sparrows nest on the ground or in shrubs, up to about 3 feet above the ground (Terres 1980). In the Great Basin, the species usually nests in living sagebrush, where cover is sparse but shrubs are clumped, and avoids the southwestern side of the plant (Petersen and Best 1985). Placement may be related to density of vegetative cover over the nest, as sage sparrows will nest higher in a taller shrub (Rich 1980).

The species migrates to and winters in arid plains with sparse bushes, grasslands, and open situations with scattered brush, mesquite, and riparian scrub, preferring to feed near woody cover (Martin and Carlson 1998; Meents et al. 1982; Repasky and Schluter 1994).

The GBBO analysis of bird population responses to projected effects of climate change indicates sage sparrow populations are projected to be most affected by reductions in mountain sagebrush/mid-closed and salt desert/mid-late covers; however, their population is expected to increase in salt desert/shrub/annual covers, for a projected statewide population reduction of 20 percent (GBBO 2012).

Sage sparrow is negatively affected by many factors that fragment its habitat or alter its basic structure, including fire, cheatgrass invasion, heavy livestock use, nest predation, expansion of pinyon/juniper woodland into shrubland, heavy OHV use (GBBO 2010), urban and suburban development, and road and power line ROWs.

Pinyon Jay

The pinyon jay is found in pinyon/juniper woodland and less frequently in pine; in nonbreeding season, it also inhabits scrub oak and sagebrush (AOU 1983). The species nests in shrubs or trees (e.g., pine, oak, juniper) about 5 to 30 feet above the ground, when and where adequate numbers of pine seeds are available. The species eats pinyon and other pine seeds, berries, small seeds, and grain, as well as beetles, grasshoppers, caterpillars, and ants. Pinyon jay may also eat bird eggs and hatchlings.

The species lives in loose flocks of multiple breeding pairs and their offspring from previous nesting seasons and communally stores large numbers of seeds. The flock has an established home range but may wander to other areas in search of food. During nesting season, flocks of yearlings may form. A GBBO radio-telemetry study found that foraging pinyon jays appeared to favor transitional areas where pinyon/juniper woodland is interspersed with sagebrush (GBBO 2012).

During the daytime, jays were usually found in 2,600 feet of woodland edge and always within 1.2 miles of the edge. Roosting and nesting jays went deeper, but usually no more than 1.8 miles into the woodland interior to denser tree stands. Jays were nearly always found in areas with diverse woodland canopy closure and age structure; they were not observed in large contiguous areas of mature, dense woodland. Although very large flocks have been reported elsewhere, telemetry studies most often observed smaller sub-flocks (fewer than 30 birds) that periodically joined other sub-flocks to form flocks of 50 to 100 birds. Sub-flock home ranges were less than 5,000 acres in all cases.

The GBBO analysis of bird population responses to projected effects of climate change indicates pinyon jay populations are projected to experience losses from

habitat change in mountain sagebrush/mid-closed, big sagebrush/shrub/annual, and pinyon/juniper, and they are expected to gain in Wyoming big sagebrush/late, pinyon/juniper/late, and mountain sagebrush/late-open, for an overall projected population decline of 19 percent (GBBO 2012).

Preliminary data suggest that pinyon jay declines may be at least partly related to substantial increases in the acreage of closed-canopy mature (or aged) woodland with a poor shrub understory, coupled with a corresponding loss of mixed-age woodland mosaics with openings and a complex shrubland edge. These landscape-scale changes are largely the result of altered fire conditions, although grazing pressure and invasive plants may be contributing factors.

3.5.4 Federal Endangered, Threatened, Proposed, and Candidate Species

Current Conditions

Table 3-13 shows federally listed, proposed, and candidate species in the planning area. There are also several species of BLM and Forest Service sensitive species in the planning area. **Table 3-14** lists BLM and Forest Service sensitive species in the planning area.

Table 3-13
Federal Endangered, Threatened, Proposed, and Candidate Species

Species	Federal Status	Designated Critical Habitat	Designated Critical Habitat in Planning Area
Amphibians			
Columbia spotted frog (*Rana luteiventris*)	Candidate	No	N/A
Oregon spotted frog (*R. pretiosa)*	Proposed threatened	Yes	No
Birds			
Greater Sage-Grouse *(Centrocercus urophasianus)*	Candidate	No	N/A
Yellow-billed cuckoo *(Coccyzus americanus)*	Threatened	Yes	No
Mammals			
Gray wolf (*Canis Lupus*)	Endangered	No	N/A
Fishes			
Cui-ui *(Chasmistes cujus)*	Endangered	No	N/A
Lahontan cutthroat trout *(Oncorhynchus clarkii henshawi)*	Threatened	No	N/A
Lost River sucker (*Deltistes luxatus*)	Endangered	Yes	No
Modoc sucker (*Catostomus microps*)	Endangered	Yes	No

Table 3-13
Federal Endangered, Threatened, Proposed, and Candidate Species

Species	Federal Status	Designated Critical Habitat	Designated Critical Habitat in Planning Area
Shortnose sucker (*Chasmistes brevirostris*)	Endangered	Yes	No
Warner sucker *(Catostomus warnerensis)*	Threatened	No	N/A
Bull trout (*Salvelinus confluentus*)	Threatened	Yes	Yes
Clover Valley speckled dace *(Rhinichthys osculus oligoporus)*	Endangered	No	N/A
Desert dace *(Eremichthys acros)*	Threatened	Yes	Yes
Hiko White River springfish (*Crenichthys baileyi grandis*)	Endangered	Yes	No
Independence Valley speckled dace (*Rhinichthys osculus lethoporus*)	Endangered	No	N/A
Pahrump poolfish *(Empetrichthys latos)*	Endangered	No	N/A
Railroad Valley springfish *(Crenichythys nevadae)*	Threatened	Yes	No
Warm Spring pupfish *(Cyprinodon nevadensis pectoralis)*	Endangered	No	N/A
White River spinedace *(Lepidomeda albivallis)*	Endangered	Yes	Yes
White River springfish *(Crenichythys baileyi baileyi)*	Endangered	Yes	No
Big Spring spinedace *(Lepidomeda millispinis pratensis)*	Threatened	Yes	Yes
Plants			
Geene's tuctoria *(Tuctoria greenei)*	Endangered	Yes	No
Slender Orcutt grass *(Orcuttia tenuis)*	Threatened	Yes	Yes
Webber ivesia *(Ivesia webberi)*	Threatened	Yes	No
Churchill Narrows buckwheat *(Eriogonum diatomsaceum)*	Candidate	No	N/A
Goose Creek milkvetch *(Astragalus anserinus)*	Endangered	No	N/A
Gentner's fritillary *(Fritillaria gentneri)*	Endangered	No	N/A
Insects			
Carson wandering skipper *(Pseudocopaeodes eunus obscurus)*	Endangered	No	N/A

Table 3-13
Federal Endangered, Threatened, Proposed, and Candidate Species

Species	Federal Status	Designated Critical Habitat	Designated Critical Habitat in Planning Area
Crustaceans			
Vernal pool fairy shrimp *(Branchinecta lynchi)*	Threatened	Yes	No

Sources: USFWS December 18, 2013; BLM June 2014; Forest Service June 2014

Table 3-14
BLM and Forest Service Sensitive Species

Common Name	Scientific Name	BLM	Forest Service
Mammals			
Silver-haired bat	*Lasionycteris noctivagans*	✓	
Western red bat	*Lasiurus blossevillii*	✓	
Hoary bat	*L. cinereus*	✓	
Dark kangaroo mouse	*Microdipodops megacephalus*	✓	
Pale kangaroo mouse	*M. pallidus*	✓	
Western small-footed myotis	*Myotis ciliolabrum*	✓	
Long-eared myotis	*M. evotis*	✓	
Little brown myotis	*M. lucifugus*	✓	
Fringed myotis	*M. thysanodes*	✓	
Long-legged myotis	*M. volans*	✓	
Yuma myotis	*M. yumanensis*	✓	
Big free-tailed bat	*Nyctinomops macrotis*	✓	
Pika	*Ochotona princeps*	✓	
Western pipistrelle	*Parastrellus hesperus*	✓	
Preble's shrew	*Sorex preblei*	✓	
Spotted bat	*Euderma maculatum*	✓	✓
Fish Spring pocket gopher	*Thomomys* sp.	✓	
San Antonio pocket gopher	*Thomomys* sp.	✓	
Pallid bat	*Antrozous pallidus*	✓	
Pygmy rabbit	*Brachylagus idahoensis*	✓	✓
Townsend's big-eared bat	*Corynorhinus townsendii*	✓	
Townsend's western big-eared bat	*C. t. townsendii*		✓
Big brown bat	*Eptesicus fuscus*	✓	
California bighorn sheep	*Ovis canadensis californiana*		✓
Rocky Mountain bighorn sheep	*O. c. canadensis*		✓
Birds			
Greater sandhill crane	*Grus canadensis*	✓	
Northern goshawk	*Accipiter gentilis*	✓	✓
Greater Sage-Grouse	*Centrocercus urophasianus*	✓	✓
Peregrine falcon	*Falco peregrinus anatum*	✓	✓
Bald eagle	*Haliaeetus leucocephalus*	✓	✓

Table 3-14
BLM and Forest Service Sensitive Species

Common Name	Scientific Name	BLM	Forest Service
Mountain quail	*Oreortyx pictus*		✓
Flammulated owl	*Otus flammeolus*		✓
Golden eagle	*Aquila chrysaetos*	✓	
Western burrowing owl	*Athene cunicularia*	✓	
Ferruginous hawk	*Buteo regalis*	✓	
Swainson's hawk	*B. swainsoni*	✓	
Western snowy plover	*Charadrius nivosus*	✓	
Pinyon jay	*Gymnorhinus cyanocephalus*	✓	
Loggerhead shrike	*Lanius ludovicianus*	✓	
Juniper titmouse	*Baeolophus ridgwayi*	✓	
Bank swallow	*Riparia riparia*	✓	
Sage thrasher	*Oreoscoptes montanus*	✓	
Brewer's sparrow	*Spizella breweri*	✓	
Reptiles and Amphibians			
Yosemite toad	*Bufo canorus*		✓
Sierra Nevada yellow-legged frog	*Rana sierrae*		✓
Northern sagebrush lizard	*Sceloporus graciosus graciosus*	✓	
Fish			
Bonneville cutthroat trout	*Oncorhynchus clarki utah*	✓	✓
Meadow Valley wash desert sucker	*Catostomus clarkii* ssp. 2	✓	
Wall Canyon sucker	*Catostomus murivallis*	✓	
Cui-ui	*Chasmistes cujus*	✓	
White River springfish	*Crenichthys baileyi baileyi*	✓	
Desert dace	*Eremichthys acros*	✓	
Independence Valley tui chub	*Gila bicolor isolata*	✓	
Newark Valley tui chub	*G. b. newarkensis*	✓	
Hot Creek Valley tui chub	*G. b.* ssp. 5	✓	
Railroad Valley tui chub	*G. b.* ssp. 7	✓	
Northern leatherside chub	*Lepidomeda copei*	✓	
Inland Columbia Basin redband trout	*Oncorhynchus mykiss gairdneri*	✓	
Relict dace	*Relictus solitarius*	✓	
Moapa speckled dace	*Rhinichthys osculus moapae*	✓	
Monitor Valley speckled dace	*R. o.* spp. 5	✓	
Meadow Valley speckled dace	*R. o.* ssp. 11	✓	
White River speckled dace	*R. o.* ssp. 7	✓	
Oasis Valley speckled dace	*R. o.* ssp. 6	✓	
Pahranagat speckled dace	*R. o. velifer*	✓	
Bull trout	*Salvelinus confluentus*	✓	
Plants			
Meadow pussytoes	*Antennaria arcuata*		✓
Eastwood milkweed	*Asclepias eastwoodiana*		✓
Broad-pod freckled milkvetch	*Astragalus lentiginosus* var. *latus*		✓

Table 3-14
BLM and Forest Service Sensitive Species

Common Name	Scientific Name	BLM	Forest Service
Lamoille Canyon milkvetch	*A. robbinsii* var. *occidentalis*		✓
Toquima milkvetch	*A. toquimanus*		✓
Currant milkvetch	*A. uncialis*		✓
Grouse Creek rockcress	*Arabis falcatoria*		✓
Ophir rockcress	*A. ophira*		✓
Upswept moonwort	*Botrychium ascendens*		✓
Dainty moonwort	*B. crenulatum*		✓
Slender moonwort	*B. lineare*		✓
Moosewort	*B. tunux*		✓
Goodrich biscuitroot	*Cymopterus goodrichii*		✓
Arid draba	*Draba arida*		✓
Serpentine draba	*D. oreibata* var. *serpentina*		✓
Pennell draba	*D. pennellii*		✓
Nevada willowherb	*Epilobium nevadense*		✓
Snake Mountain erigeron	*Erigeron cavernensis*		✓
Sunflower Flat buckwheat	*Eriogonum douglasii* var. *elkoense*		✓
Toiyabe buckwheat	*E. esmeraldense* var. *toiyabense*		✓
Lewis's buckwheat	*E. lewisii*		✓
Basin jamesia	*Jamesia tetrapetala*		✓
Grimes lathyrus	*Lathyrus grimesii*		✓
Maguire lewisia	*Lewisia maguirei*		✓
Elegant penstemon	*Penstemon concinnus*		✓
Mt. Moriah penstemon	*P. moriahensis*		✓
Bashful penstemon	*P. pudicus*		✓
Rhizome beardtongue	*P. rhizomatosus*		✓
Inconspicuous phacelia	*Phacelia inconspicua*		✓
Small-flower phacelia	*P. minutissima*		✓
Whitebark pine	*Pinus albicaulis*		✓
Marsh's bluegrass	*Poa abbreviata* ssp. *marshii*		✓
Williams combleaf	*Polyctenium williamsii*		✓
Sagebrush cinquefoil	*Potentilla johnstonii*		✓
Nevada primrose	*Primula nevadensis*		✓
Nachlinger silene	*Silene nachlingerae*		✓
Railroad Valley globemallow	*Sphaeralcea caespitosa* var. *williamsiae*		✓
Alpine goldenweed	*Tonestas lyalli*		✓
Charleston ground daisy	*Townsendia jonesii* var. *tumulosa*		✓
Currant Summit clover	*Trifolium andinum* var. *podocephalum*		
Leiberg's clover	*T. leibergii*		
Rollins clover	*T. macilentum* var. *rollinsii*		✓

Sources: BLM 2011d; Forest Service 2011c

3.5.5 Management Indicator Species (Forest Service)

The NFMA directs the Forest Service to select appropriate species of plants, invertebrates, and vertebrates as management indicator species to manage for

maintenance and improvement of important habitats in the forest. Requirements to identify and use management indicator species in the decision area and project-level planning were identified under NFMA planning regulations in 1982-219.19(a) (1).

Management indicator species are those that respond to habitat changes, are scarce or unique, are of high economic interest, or are listed as federal or state threatened or endangered species. By monitoring and assessing population trends of management indicator species, managers can determine if management actions are affecting species populations and thereby habitats. A Forest Service-specific Biological Evaluation and Wildlife Specialists Report is in **Appendix Q** of this document.

3.6 WILD HORSES AND BURROS

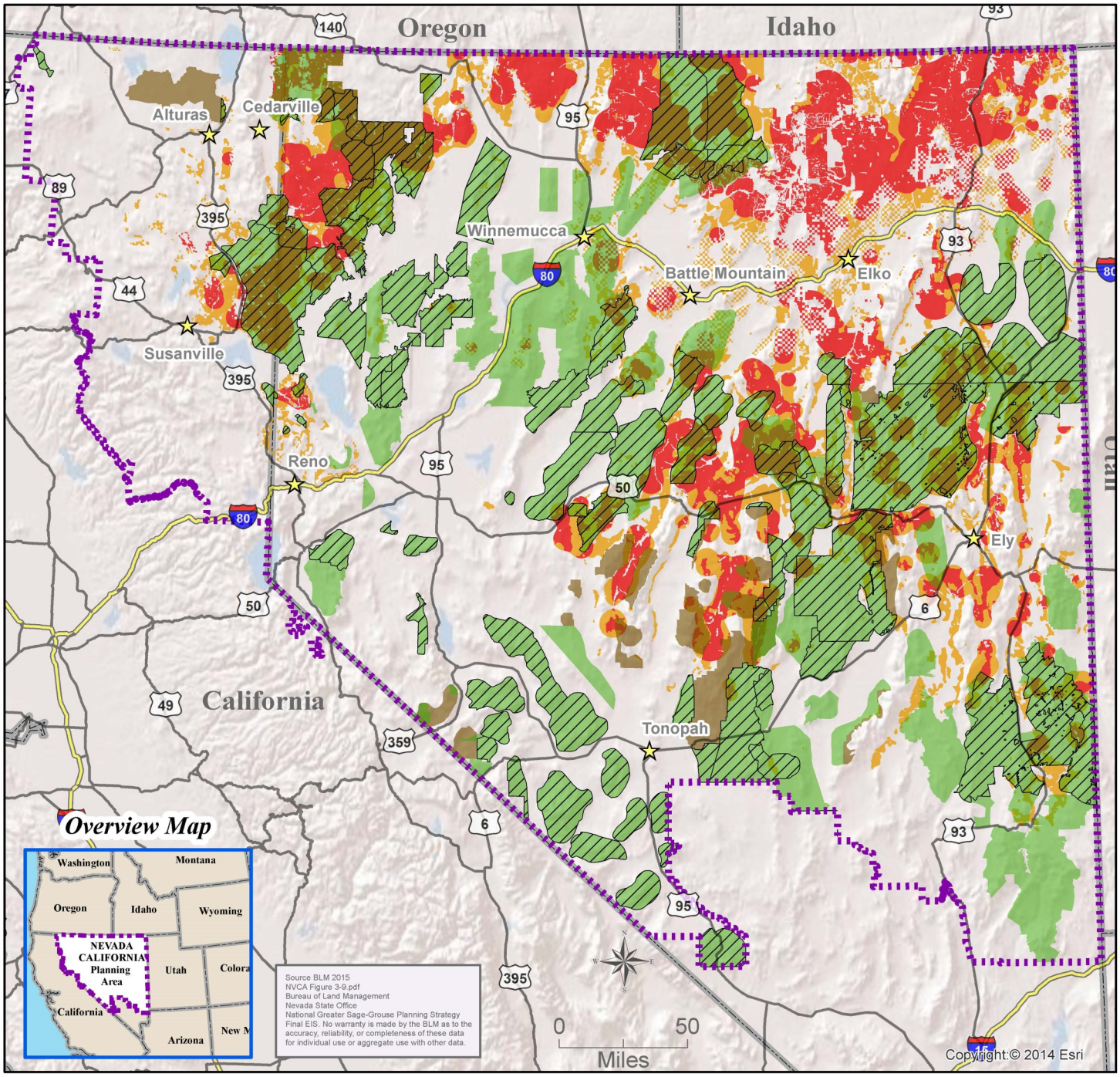
The BLM and Forest Service protect, manage, and control wild horses and burros, in accordance with the Wild Free-Roaming Horses and Burros Act of 1971 (PL 92-195, as amended by Congress in 1976, 1978, 1996, and 2004). The act mandates the BLM and Forest Service to "prevent the range from deterioration associated with overpopulation" and "remove excess horses in order to preserve and maintain a thriving natural ecological balance and multiple use relationships in that area." FLPMA directs the BLM and Forest Service to manage wild horses and burros as one of numerous multiple uses and resources, including mining, recreation, domestic grazing, and fish and wildlife. Wild horse and burro management is governed by 43 CFR, Part 4700 (BLM) and 36 CFR, Part 222, Subpart B (Forest Service).

One of the BLM's and Forest Service'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 and Forest Service policies and regulations also direct that wild horses and burros are to be managed as self-sustaining populations of healthy animals at minimal feasible levels.

Following passage of the act, BLM HAs and HMAs and Forest Service wild horse and burro territories (WHBTs) were identified in the planning area (see **Figure 3-9**). Herd areas and territories are locations where wild horse and burro populations were found when the act was passed; HMAs and WHBTs are areas in these identified herd areas, in their entirety or part, where it was established and affirmed through LUPs that sufficient forage, water, cover, and space existed to support the long-term management of healthy wild horse or burro populations.

Since the passage of the act in 1971, management knowledge regarding wild horse and burro population levels has increased. For example, it has been determined that wild horses are capable of increasing their numbers by 18 percent to 25 percent annually, resulting in the doubling of wild horse populations about every 4 years (Wolfe et al. 1989; Garrott et al. 1991). This

Herd Areas, Herd Management Areas
and USFS Wild Horse and Burro Territories



Legend

- Herd Management Areas
- Herd Areas
- USFS Wild Horse and Burro Territories
- Preliminary Priority Habitat (PPH)
- Preliminary General Habitat (PGH)
- City / Town
- Interstate
- US Route
- States
- Planning Area

has resulted in the BLM shifting program emphasis beyond just establishing an AML and conducting wild horse and burro gathers to include a variety of management actions that further facilitate the achievement and maintenance of viable and stable wild horse and burro populations and a "thriving natural ecological balance."

Management actions resulting from shifting program emphasis include increasing population growth suppression, adjusting sex ratios, and collecting genetic baseline data to support genetic health assessments. The Forest Service has been a cooperating agency to these additional management efforts.

Wild horses and burros are a long-lived species with survival rates estimated between 80 and 97 percent (Wolfe 1980; Eberhardt et al. 1982; Garrott and Taylor 1990). Wild horse and burro numbers appear to be limited principally by water availability and winter forage. Predation and disease have not substantially regulated wild horse and burro population levels in or outside the planning area; throughout the HMAs few predators exist to control wild horse and burro populations. Some mountain lion predation occurs but does not appear to be substantial. Coyotes are not prone to prey on wild horses and burros unless they are young or extremely weak.

Being a non-self-regulating species, there will be a steady increase in wild horse and burro numbers for the foreseeable future, which will continue to exceed the carrying capacity of the range. Animal movement and distribution are controlled by fencing and the distribution of watering sources.

3.6.1 Current Conditions

In the planning area, there are 15,989,900 acres of wild horse and burro herd areas, HMAs, and WHBTs in PPH, and PGH. **Table 3-15** displays data compiled in a baseline environmental report produced by the USGS for the BLM (Manier 2013; USGS 2014).

Table 3-15
Acres of Wild Horse and Burro Areas and Territories in Greater Sage-Grouse Habitat

Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
BLM	III	2,930,800	3,048,400	5,979,200
	IV	1,107,600	312,200	1,419,800
	V	2,478,600	656,200	3,134,800
Forest Service	III	136,800	255,900	392,700
	IV	0	0	**0**
	V	0	0	**0**

Sources: Manier 2013; USGS 2014

There are 168 HAs and territories in the planning area that overlap 6,653,800 acres of PPH and 4,272,700 acres of PGH. These identified HAs, in their

entirety or part, were the basis for current identified HMAs, as established and affirmed through LUPs.

The BLM manages 64 HMAs and the Forest Service manages 11 WHBTs in the planning area, which overlap both PPH and PGH. Wild horse and burro populations in HMAs and WHBTs are managed to achieve and maintain established AMLs and corresponding forage allocations (measured in animal unit months [AUMs]).

The AML is defined as the maximum number of wild horses or burros that can be sustained in a designated HMA or WHBT that achieves and maintains a thriving natural ecological balance. The AML for each HMA and WHBT, in most cases, is expressed as a range with an upper and lower limit. The AUM allocation for wild horses and burros in HMAs and WHBTs is based on the upper limit of the AML range.

Initial AMLs and the boundaries of each HMA and WHBT were established through previous LUPs to ensure that public land resources, including wild horse habitat, are maintained in satisfactory, healthy condition and that unacceptable impacts on these resources are minimized. The AML ranges are based on best available science and rangeland monitoring studies. HMA and WHBT acreages by habitat type, along with current AMLs, are shown in **Table 3-16**.

Table 3-16
Herd Management Areas and Forest Service Territories in GRSG Habitat

HMA or WHBT	BLM Field Office or Forest Service Ranger District	Acres[1]			AML[2]	Estimated Population[3]
		Total[5]	PPH	PGH		
BLM California						
Bitner	Surprise	53,700	49,900	3,600	15-20	40
Buckhorn	Surprise	76,300	59,600	6,800	59-85	247
Carter Reservoir	Surprise	23,400	500	13,300	25-35	95
Coppersmith	Surprise	73,100	37,900	1,600	50-75	108
Fort Sage[4]	Eagle Lake	15,600	300	3,500	55-65	67
Fox Hog	Surprise	127,100	112,100	13,400	120-220	288
High Rock	Surprise	94,700	94,700	0	78-120	142
Massacre Lakes	Surprise	39,900	32,600	5,300	25-35	-186
New Ravendale	Eagle Lake	32,200	8,000	24,000	10-25	64
Nut Mountain	Surprise	40,200	40,000	0	30-55	65
Round Mountain	Eagle Lake		0	7,200	0	0
Twin Peaks	Eagle Lake	756,300	416,800	125,500	448-758 H 72-116 B	1,783 H 386 B
Wall Canyon	Surprise	41,200	41,100	0	15-25	37
BLM Nevada						
Antelope	Schell	327,300	73,200	108,000	155-324	496
Antelope Valley	Wells	504,100	49,900	72,000	150-259	950

Table 3-16
Herd Management Areas and Forest Service Territories in GRSG Habitat

HMA or WHBT	BLM Field Office or Forest Service Ranger District	Acres[1]			AML[2]	Estimated Population[3]
		Total[5]	PPH	PGH		
Augusta Mountains	Humboldt	177,600	9,500	13,200	185-308	557
Bald Mountain	Mount Lewis	139,900	22,000	26,500	129-215	283
Black Rock Range East	Black Rock	93,400	55,400	22,900	56-93	83
Black Rock Range West	Black Rock	93,200	53,700	10,600	56-93	273
Buffalo Hills	Black Rock	131,900	61,600	17,600	188-314	413
Calico Mountains	Black Rock	160,800	7,100	99,000	200-333	340
Callaghan	Mount Lewis	156,200	99,400	47,600	134-237	433
Clan Alpine	Stillwater	302,200	9,900	10,100	619-979	869
Desatoya	Stillwater	161,700	74,400	66,400	127-180	250
Diamond	Mount Lewis	165,600	23,700	52,100	151	251
Diamond Hills North	Tuscarora	71,600	12,800	7,100	37	115
Diamond Hills South	Egan	19,300	1,600	10,600	10-22	217
Dogskin Mountains	Sierra Front	6,500	0	0	10-15	37
Eagle	Schell	660,300	65,100	138,400	100-210	1,042
Fish Creek	Mount Lewis	252,800	29,800	44,400	107-180	305
Flanigan	Sierra Front	17,100	6,600	8,100	80-125	170
Fort Sage[4]	Sierra Front	2,000	200	2,900	36	115
Fox-Lake Range	Humboldt	177,700	0	3,100	122-204	488
Goshute	Wells	267,300	0	10,400	74-123	628
Granite Peak	Sierra Front	4,000	0	2,200	11-18	26
Granite Range	Black Rock	103,800	34,800	33,700	155-258	198
Hickison	Mount Lewis	57,300	12,600	9,500	45 B	134 B
Jackson Mountains	Humboldt	283,800	0	13,800	130-217	425
Little Fish Lake	Tonopah	28,700	24,500	1,700	39	60
Little Humboldt	Tuscarora	17,200	17,200	0	32-80	24
Little Owyhee	Humboldt	457,800	216,800	37,800	194-298	806
Maverick-Medicine	Tuscarora	323,500	58,600	88,700	166-276	916
McGee Mountain	Black Rock	41,200	100	24.300	25-41	72
New Pass-Ravenswood	Mount Lewis	285,900	12,600	17,400	545-566	692
North Monitor	Mount Lewis	11,500	1,600	3,900	8	61
Owyhee	Tuscarora	339,100	209,800	59,500	139-231	203
Pancake	Egan	849,600	113,300	119,400	240-493	1,3333
Reveille	Tonopah	105,500	0	11,000	83-138	93
Roberts Mountain	Mount Lewis	100,000	84,600	12,600	150	443
Rock Creek	Tuscarora	121,400	30,100	57,900	150-250	381
Rocky Hills	Mount Lewis	84,000	25,800	18,700	86-143	131

Table 3-16
Herd Management Areas and Forest Service Territories in GRSG Habitat

HMA or WHBT	BLM Field Office or Forest Service Ranger District	Acres[1]			AML[2]	Estimated Population[3]
		Total[5]	PPH	PGH		
Sand Springs West	Tonopah	152,300	0	1,000	34-56	190
Seven Mile	Mount Lewis	97,600	25,200	13,000	30-50	221
Seven Troughs	Humboldt	148,900	2,500	13,600	94-156 H 28-46 B	439 H 118 B
Shawave Mountains	Humboldt	107,100	0	500	44-73	320 H, 73 B
Silver King	Schell	575,500	14,700	45,400	60-128	713
Snowstorm Mountains	Humboldt	117,100	76,900	24,200	90-140	589
South Shoshone	Mount Lewis	133,100	53,200	22,500	60-100	403
Spruce-Pequop	Wells	240,700	9,800	4,600	48-82	592
Stone Cabin	Tonopah	406,300	7,100	16,500	219-364	455
Tobin Range	Humboldt	198,200	41,100	39,100	22-42	58
Triple B	Egan	1,232,400	316,700	273,500	250-518	1,328
Warm Springs Canyon	Black Rock	91,700	85,700	4,300	105-175 H 14-24 B	205 H 55 B
Whistler Mountain	Mount Lewis	43,200	9,300	16,500	24	20
Forest Service						
Butler Basin	Austin	53,500	5,200	18,100	60-100	440
Cherry Spring	Ruby Mountains	23,000	200	500	40-68	53
Dobbin Summit	Austin	48,600	7,300	40,400	1-3	0
Hickison Burro	Austin	16,600	700	4,600	16-45 B	130 B
Kelly Creek	Austin	20,800	200	1,900	8-16	26
Little Fish Lake	Tonopah	84,800	35,300	7,600	81-93	658
Monitor	Tonopah	338,900	5,600	33,500	51-90	402
Monte Cristo	Ely	93,500	5,200	27,900	72-96	194
Quinn	Tonopah	32,000	0	900	inactive	0
Seven Mile	Tonopah	5,700	100	500	1-3	42
Shoshone	Tonopah	85,300	3,000	20,000	inactive	
Stone Cabin	Tonopah	1,500	700	0	1-3	0
Tierney	Tonopah	77,100	5,600	30,400	inactive	0
Toiyabe	Tonopah	87,800	8,300	9,600	inactive	0
Toquima	Tonopah	143,500	22,100	49,800	15-30	221

Source: BLM and Forest Service GIS 2015
Notes:
H = Wild Horse
B = Wild Burro
[1]Rounded to nearest hundred acres
[2]AML and population number refers to wild horses, unless noted.
[3]Estimated population as of February 2015
[4]Fort Sage HMA lies in both California and Nevada, each with separate established AML.
[5]Due to GIS mapping accuracy, only HMAs/WHBTs with greater than 40 acres of GRSG habitat are listed.

The HMAs, WHBTs, and associated wild horse and burro populations in the planning area are managed in the established AML and management objectives identified in the LUP, HMA plan, or territory management plan. The AML, objectives, and management actions may be modified in future multiple-use decisions for the grazing allotments contained in an HMA or WHBT.

The estimated population size of wild horses and burros in each HMA/WHBT is based on aerial population inventories, which occur on average every two to three years. WHBTs in HMA/WHBT complexes are generally inventoried on the same schedule under cooperative agreement between BLM and Forest Service. These population inventories provide information pertaining to population numbers, foaling rates, distribution, and herd health.

Population estimates in the planning area (February 2015) show a total estimated population of over 25,789 wild horses and burros. Population estimates indicate that the number of horses and burros substantially exceeds the aggregated AML of 11,872 wild horses and burros. Wild horse and burro populations at the end of 2014 were exceeding the AML in 55 of 64 HMAs and 8 of 11 WHBTs.

As stated in the 2013 National Academy of Sciences' (NAS) report "Using Science to Improve the BLM Wild Horse and Burro Program: A Way Forward," it is the committee's judgment that the reported annual population statistics are probably substantial underestimates of the actual number of horses occupying public lands, inasmuch as most of the individual HMA population estimates are based on the assumption that all animals are detected and counted in population surveys—that is, perfect detection.

A large body of scientific literature focused on inventory techniques for horses and many other large mammals clearly refutes that assumption and shows estimates of the proportion of animals missed on surveys ranging from 10 to 50 percent, depending on terrain ruggedness and tree cover (Caughley 1974a; Siniff et al. 1982; Pollock and Kendall 1987; Garrott et al. 1991a; Walter and Hone 2003; Lubow and Ransom 2009). The committee went on to state that a reasonable approximation of the average proportion of horses undetected in surveys throughout western rangelands may be 20 to 30 percent. An earlier National Research Council committee and the Government Accountability Office also concluded that reported statistics were underestimates.

Various factors, including drought conditions, historic grazing, wildland fires, and uncontrolled wild horse and burro population growth, may adversely affect habitat and, in some instances, herd health. As the populations of wild horses and burros continue to increase they tend to spread outside the boundaries of the HMA/WHBT in search of sufficient water and forage resources and space, which increases the habitat needs and impacts in those areas.

Wild horses and burros also compete with wildlife species for various habitat components, especially when populations exceed AML, they expand beyond the boundaries of the HMA/WHBT, or when habitat resources become limited (e.g., reduced water flows, low forage production, or dry conditions).

Although determined by population monitoring, it is generally necessary to gather excess wild horses and burros on a three- to four-year schedule to ensure that numbers remain in the AML. Unfortunately, this has not been consistently possible because of insufficient funding and holding space; therefore, AMLs are frequently exceeded.

Following gathers, some animals are selected for return to the HMA or WHBT; excess horses or burros are placed in the adoption program and in long-term holding and are also made available for sale. Wild horses and burros that establish home ranges outside of HMA, WHBT, or herd area boundaries are removed during gathers. Wild horses and burros are removed from private lands at the request of the landowner after reasonable efforts to keep the animals off private lands have failed.

Trends

Current conditions in the planning area show that wild horse and burro populations continue to grow; most are exceeding AMLs and continue to expand into areas outside of established boundaries, impacting private and public lands and GRSG habitat. Wild horses and burros will continue to be removed to maintain AMLs and rangeland health. Implementing population growth suppression (PGS) will continue to be a priority management tool to help maintain and achieve AMLs.

3.7 WILDLAND FIRE AND FIRE MANAGEMENT

Fire is an inherent component of ecosystems and historically has had an important role in promoting plant succession and the development of plant community characteristics. Control of fires and other land use practices during the last century has changed plant communities by altering the frequency, size, and severity of wildland fires.

The Federal Wildland Fire Management Policy was developed by the Secretaries of the DOI and the USDA in 1995 in response to dramatic increases in the frequency, size, and catastrophic nature of wildfires in the United States.

The 2001 review and update of the policy consisted of findings, guiding principles, policy statements, and implementation actions and replaced the 1995 Federal Wildland Fire Management Policy. Known as the 2001 Federal Wildland Fire Management Policy (DOI et al. 2001), this update "recommends that federal fire management activities and programs are to provide for firefighter and public safety, protect and enhance land management objectives and human welfare, integrate programs and disciplines, require interagency collaboration, emphasize the natural ecological role of fire, and contribute to ecosystem

sustainability." The policy provides nine guiding principles fundamental to the success of the federal wildfire management program and the implementation of review recommendations. The Guidance for Implementation of Federal Wildland Fire Management Policy (Forest Service 2009d) is the most recent guiding principle for these documents. These umbrella principles compel each agency to review its policies to ensure compatibility.

The management of BLM-administered and National Forest System lands includes the control of wildland fires, the use of fire through prescribed burning, and the use of fire through the management of wildland fires in order to meet land management goals.

Wildland fire management on BLM-administered and National Forest System lands is guided by a fire management plan (FMP) that considers the three elements mentioned and includes firefighter and public safety and cost effectiveness. Wildland fires occur from natural causes, such as lightning, or are human caused. Prescribed fire is used for beneficial purposes (such as reducing hazardous fuel accumulation or restoring ecosystem health) in a controlled manner under a specific prescription and planned effort.

Wildfires can be managed for multiple objectives, either by a full suppression response or to achieve land management objectives or combinations of both. The response to a wildfire is based on an evaluation of risks to firefighter and public safety; the circumstances under which the fire has occurred, including weather and fuel conditions; natural and cultural resource management objectives; and resource protection priorities.

Fire is a management tool used to maintain or increase age class diversity in vegetation communities (e.g., big sagebrush/grassland); rejuvenate fire-dependent vegetation communities (e.g., aspen); maintain or increase vegetation productivity, nutrient content, and palatability; and maintain or improve wildlife habitat, rangeland, and watershed condition. Fire is also considered a management tool for timber slash disposal, seedbed preparation, hazardous fuel reduction, disease or insect control, grazing management, thinning, or species manipulation in support of forest management objectives.

Management activities use collaborative planning, fuels project prioritization and selection, and community assistance actions to help mitigate wildfire risks to communities and their values; to protect and enhance threatened and endangered species and their habitat; and to ensure that fuels reduction treatments and projects conform to and support FMP and LUP objectives.

The actions that the BLM and Forest Service undertake will be with the appropriate level of NEPA analysis and documentation. BLM and Forest Service staff must also determine whether such actions may affect cultural resources and endangered or threatened species or their habitats. If the agency review reveals the potential for impacts, the agency will follow proper consultation

procedures; ensure the appropriate use of Fire Regime Condition Class, LANDFIRE (USGS 2006a), or other local data to describe existing vegetative condition; and ensure priority is given to planning those activities, projects, treatments, and community assistance actions that best meet DOI and USDA priorities.

All fuels reduction activities include the following guiding principles:

- Employee and public safety is the first priority in every fuels reduction and community assistance activity.
- The role of wildland fire as an essential ecological process and natural change agent will be identified and incorporated into the land use planning process and the fire management program.
- Education and outreach on wildland fire risk mitigation will be developed and targeted toward the public, with emphasis on communities with high risk.
- Fire program managers will work with line managers, resource specialists, and cooperators to identify treatment areas, develop plans, and implement fuels treatments and conduct community assistance activities.
- The fuels reduction and community assistance program will comply with applicable national, state, and local laws and regulations and departmental and BLM manuals, policy, and direction.
- Education plans and marketing strategies will be developed to increase awareness of, and the need for, prescribed fire and other fuels treatments with internal and external audiences.
- Fuels reduction treatments are monitored to determine whether short- and long-term (beyond three years) objectives are being met (effectiveness monitoring).
- Effectiveness of treatments is reported when intersected by a wildland fire.
- Community assistance grant funding provided through assistance agreements and contracts to cooperating entities will be open to all eligible recipients.

Current Condition

Wildfire management in the planning area is directed by an interagency effort between the BLM, Forest Service, and other federal, state, and local agencies. Wildfire can result in the loss of seasonal habitats and a food source for GRSGs. It has contributed to converting sagebrush communities into marginal or nonhabitat cheatgrass or medusahead grasslands, and has been identified as a primary threat to GRSGs and their habitat (USFWS 2010a). Current direction for fire management in GRSG habitat on BLM-administered lands is provided in

WO IM-2014-114—Sage-Grouse Habitat and Wildland Fire Management. Correlating direction of fire management in GRSG habitat on National Forest System lands is provided in the Forest Service's July 3, 2013, Sage-Grouse Conservation Methods Letter.

In sagebrush ecosystems, fire has been identified as one of the primary factors linked to loss of sagebrush-steppe habitat. Wildland fire has been increasing the loss of habitat due to an increase in its frequency. This has been facilitated by the incursion of nonnative annual grasses, primarily cheatgrass, into the sagebrush ecosystems (Miller and Eddleman 2000; Brooks et al. 2004). In areas where cheatgrass invasion has occurred, fuel profiles have changed, resulting in increased surface fire intensities, shorter fire return intervals, and larger fire sizes (Knapp 1996; Epanchin-Niell et al. 2009; Rowland et al. 2010; Baker 2011; Condon et al. 2011). Without sufficient rehabilitation efforts, these larger burned areas are prone to even more cheatgrass invasion. This interaction of annual grasses and fire is apparent by the increase in the average decadal acres burned in GRSG habitat.

In addition, suppression actions and some grazing practices in the late nineteenth and early twentieth centuries have facilitated the expansion of native conifers into GRSG habitat by decreasing the fire return interval (Miller and Rose 1999; Miller et al. 2011). **Table 3-17** and **Figure 3-10** display the extent of pinyon /juniper interface in GRSG habitat.

Table 3-17
Acres of Sagebrush and Pinyon-Juniper Interface in GRSG Habitat

Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
BLM	III	310,400	286,300	596,700
	IV	263,900	65,700	329,600
	V	302,500	105,900	408,400
Forest Service	III	43,600	119,900	163,500
	IV	82,300	34,100	116,400
	V	0	0	0
Other	III	44,100	35,200	79,300
	IV	92,400	32,200	124,600
	V	73,600	41,000	114,600

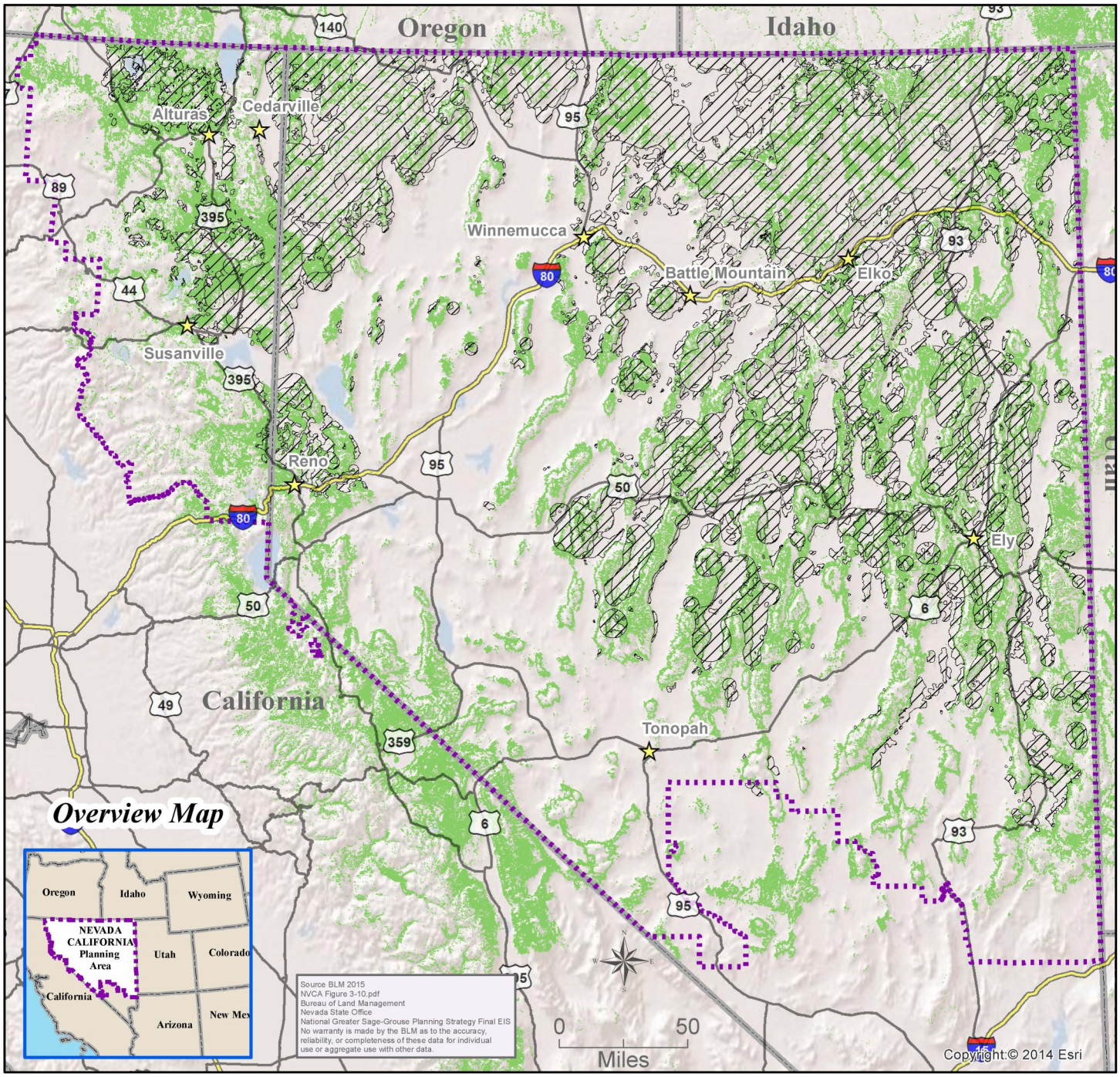
Source: Manier et al 2013, USGS 2014

Fire Regime

Fire regime is a general classification of the role fire would play across the landscape in the absence of modern human intervention, but including the influence of aboriginal burning (Agee 1993; Brown 1995). The natural or historical fire regimes are classified by number of years between fires (frequency) and the severity of the fire on the dominant overstory vegetation.

Nevada and Northeastern California Greater Sage-Grouse Final EIS

Areas with Sagebrush and Pinyon-Juniper Conifer Interface



Legend

- City/Town
- Interstate
- US Route
- States
- Planning Area
- Preliminary Priority and General Habitat
- Sagebrush/Pinyon Juniper Interface

National and state BLM fire policy requires that current and desired resource conditions related to fire management be described in terms of three condition classes and five fire regimes (**Table 3-18** and **Table 3-19**).

Table 3-18
Fire Regime Groups and Descriptions

Group	Frequency	Severity	Severity Description
I	0-35 years	Low/mixed	Generally low-severity fires replacing less than 75 percent of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75 percent of the overstory
II	0-35 years	Replacement	High-severity fires replacing greater than 75 percent of the dominant overstory
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 replacement-severity; can include any severity type in this frequency range

Source: Hann et al. 2008

Table 3-19
Fire Regime Condition Classes

Fire Regime Condition Classes	Attributes
Condition Class 1	• Fire regimes are in or near a 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 in a historical range.
Condition Class 2	• Fire regimes have been moderately altered from their historical range. • The risk of losing key ecosystem components has increased to moderate. • Fire frequencies have departed (either increased or decreased) from historical frequencies by more than one return interval. This results in moderate changes to one or more of the following: fire size, frequency, intensity, severity, and 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, and landscape patterns. • Vegetation attributes have been significantly altered from their historical range.

Source: Hann et al. 2008

The Fire Regime Condition Classification System measures the degree to which vegetation departs from reference conditions, or how the current vegetation differs from a particular reference condition. Departures from reference condition could be a result of changes to key ecosystem components such as vegetation characteristics, fuel composition, fire frequency, fire severity, and pattern, as well as other associated disturbances such as insects and disease mortality. The classification system is used to categorize existing ecosystem conditions and to determine priority areas for treatment, as mandated by national direction (Hann and Bunnell 2001). While the fire regime of a particular area is not likely to change except in the very long term, the condition class can be changed through fire management and other vegetation management actions.

Extreme departure from the historic fire regime results in changes to one or more of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g., death from insects and diseases, grazing, and drought).

Vegetative condition class quantifies the amount that current vegetation has departed from the simulated historical vegetation reference conditions. Three condition classes describe low departure, moderate departure, and high departure. 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 (USGS 2006b) is based on departure of current vegetation conditions from reference vegetation conditions only, whereas the Interagency Fire Regime Condition Class Guidebook approach includes departure of current fire regimes from those of the reference period.

In the planning area, there are two major changes in fire regimes. The first occurred when nonnative annual grasses (e.g., cheatgrass) were introduced to the region in the late nineteenth century. These annual grasses have spread rapidly into areas of low to mid elevation. These warm and dry sites have low resilience to disturbances. Effective precipitation limits site productivity. The level of a site's resilience will further decrease if the site productivity, herbaceous perennial species, and ecological conditions all decrease.

Resistance to annual grasses decreases as soil temperature increases, but establishment and growth are highly dependent on precipitation. The largest number of acres burned typically follows a year or two after warm and wet winters and springs promote the growth of annual grasses, increasing fine fuel loads.

The second major change in fire regimes has occurred from conifer encroachment in the mid to high elevations, with a reduction of grass, forbs, and shrub species. The increase in trees or woody fuel, and a decrease in fine fuel loads are decreasing fire frequency. Extreme burning conditions (high winds,

high temperatures, and low relative humidity) in high density (Phase III) stands are resulting in large and severe fires that result in significant losses of above- and below-ground organic matter and have detrimental ecosystem effects (Miller et al. 2013).

Table 3-20 and **Table 3-21** summarize the current fire regime classification of all lands in GRSG habitat in the planning area. Approximately 28 percent of the vegetation in GRSG habitat is Condition Class III—highly departed and 70 percent is Condition Class II—moderately departed.

Table 3-20
Fire Regime Groups in PPH and PGH (Acres)

Fire Regime	I	II	III	IV	V
PPH—BLM	39,490	21,288	3,937,121	6,484,328	806,379
PGH—BLM	28,981	10,319	1,342,977	2,415,454	600,523
PPH—Forest Service	20,237	14,680	393,007	693,884	33,311
PGH—Forest Service	5,208	2,092	186,280	291,643	42,169
PPH—Other[1]	25,612	3,982	1,016,606	1,729,375	225,535
PGH—Other[1]	17,535	982	240,848	554,261	141,062

Sources: LANDFIRE Fire Regime Groups Layer (USGS 2006a); BLM and Forest Service GIS 2015
[1]Other represents tribal, other federal agencies, state, and private lands

Table 3-21
Condition Classes in PPH and PGH (Acres)

Population Area	Condition Class I	Condition Class II	Condition Class III
PPH—BLM	2,738,714	6,112,877	2,466,204
PGH—BLM	709,390	2,747,367	954,754
PPH—Forest Service	439,012	625,637	119,476
PGH—Forest Service	126,557	360,075	52,572
PPH—Other[1]	745,562	1,420,459	792,305
PGH—Other[1]	101,020	548,300	301,679

Source: LANDFIRE Vegetation Condition Class Layer (USGS 2006b), BLM and Forest Service GIS 2015
[1]Other represents tribal, other federal agencies, state, and private lands.

Fuels Treatments

The primary purpose of hazardous fuels management is to reduce the extent, intensity, and severity of wildland fire if it encounters a treatment area during the lifespan of the treatments. To be effective, fuels treatments must reduce fireline intensities under the conditions most likely to result in harm. That is, they have to work across a range of weather conditions likely to occur during a wildland fire.

Depending on the ecosystem, reduced extent, intensity, and severity can have beneficial ecological effects. For example, wildland fires burning less intensely may mimic historical fire effects more closely, helping to restore or enhance native, fire-adapted vegetation. In addition, less severe fires damage or kill fewer economically valuable trees and less soil erosion occurs following fires.

Strategically placed fuel treatments can have broader landscape effects that extend beyond the perimeter of the area physically treated, either through affecting fire behavior directly or by facilitating ecologically sensitive containment strategies. Such treatments can affect the spatial distribution of fires, leading to more desirable vegetation composition and structure. This increases the resistance to invasive species (e.g., cheatgrass) and can help preserve structure that is limited on the landscape (i.e., sagebrush).

Reduced intensity also means that suppression efforts are more likely to be effective and can be conducted more safely in areas where wildland fires are unwanted or threaten communities. Fuel treatments near homes and communities also are an effective, proactive way of reducing the likelihood of structure ignition and enhancing the safety of firefighters and the public. The three primary means of managing fuels are prescribed fire, managing wildland fire for ecological purposes and resource objectives, and non-fire treatments involving mechanical, biological, or chemical methods. Treatments can occur in isolation or in combination, depending on management objectives and resource constraints. (The Science Analysis of The National Cohesive Wildland Fire Management Strategy 2015)

Prescribed fires and other fuels treatments have also occurred throughout the planning area as a management tool for fuels and to help meet resource management goals for other land and resource uses such as vegetation and range management. **Table 3-22** lists the amount of BLM treatments by type and how many acres were treated, while **Table 3-23** lists the amount of Forest Service treatments by type and how many acres were treated.

Table 3-22
BLM Fuels Treatments (2008-2014)

Treatment Type	Number of Treatments	Acres Treated
Prescribed fire	72	11,940
Mechanical	351	98,459
Chemical	48	18,642
Total	**471**	**129,041**

Sources: National Fire Planning Operations Reporting System. Data included 2008 to 2014; BLM and Forest Service GIS 2015
Note: A 1-mile buffer was used on the coordinates of the treatments.

Table 3-23
Forest Service Fuels Treatments (2008-2012)

Activity	Treatments	Acres
Prescribed fire treatments	2,038	129,862
Mechanical treatments (not including pre-commercial or commercial thinning activities)	1,656	100,711
Total	**3,694**	**230,573**

Source: Forest Service 2013b

Fire Occurrence

Between 1992 and 2014, over 6.8 million acres of GRSG habitat in the planning area were affected by wildfire (see **Table 3-24**).

Wildland fire has historically occurred in the planning area and tends to occur between late April and September. Of the fires in PPH and PGH in the planning area, the vast majority of the fires are caused by lightning and the vast majority of acres burned are the result of lightning. **Table 3-25** lists the number of fires by size class that have occurred in the GRSG habitat in the planning area over the past 22 years. This table illustrates that most fires are suppressed at a small size, and only a few spread large. However, these rare but large fires consume most of the acres burned. **Table 3-26** lists the percent of human- and lightning-caused fires and acreage burned by agency and habitat type.

Table 3-24
Acres of Wildland Fire in Greater Sage-Grouse Habitat

Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH	Acres in OHMA	Total
BLM	III	297,815	372,217	739,585	1,409,617
	IV	1,101,630	709,891	506,367	2,317,888
	V	654,933	318,884	305,298	1,279,115
Forest Service	III	3,996	4,991	4,713	13,700
	IV	107,319	102,542	53,839	263,700
	V	0	0	3,073	3,073
Other	III	0	0	0	482,900
	IV	0	0	0	920,500
	V	0	0	0	182,000

Sources: Short 2013; BLM and Forest Service GIS 2015; USGS 2014

Table 3-25
Fire Occurrence Starts (1992 to 2014)

Population Areas	A: 0 to 0.25 Acres	B: 0.26 to 9.9 Acres	C: 10 to 99 Acres	D: 100 to 299 Acres	E: 300 to 999 Acres	F: 1,000 to 4,999 Acres	Proposed Plan: 5,000+ Acres
PPH—BLM	631	344	153	64	59	60	44
PGH—BLM	1133	484	139	47	56	42	34
OHMA—BLM	1079	416	152	66	39	53	31
PPH—Forest Service	47	44	16	6	6	2	1
PGH—Forest Service	76	35	9	3	4	7	3
OHMA—Forest Service	71	26	13	1	6	1	2

Source: Short 2013, BLM GIS WFMI 2015

Table 3-26
Causes of Fires (1992—2014)

	PPH—BLM	PGH—BLM	OHMA—BLM	PPH—Forest Service	PGH—Forest Service	OHMA—Forest Service	Total
Total starts	1,355	1,935	1,836	122	137	120	5,505
Total acres	2,054,378	1,400,987	1,551,248	111,315	107,533	61,625	5,287,086
Human acres	52,308	59,478	50,406	12,810	66,733	36,430	278,165
Natural acres	1,310,679	742,439	547,339	44,917	12,631	8,964	2,666,969
Unknown acres	691,391	599,070	953,503	53,588	28,169	16,231	2,341,952
Human percent	3	4	3	12	62	59	5
Natural percent	64	53	35	40	12	15	50
Unknown percent	34	43	61	48	26	26	45

Sources: Source: Short 2013, BLM GIS WFMI 2015

Trends

Recent scientific research has shown a trend toward increased large fire frequency, longer wildland fire durations, and longer wildland fire seasons since the mid-1980s (Westerling et al. 2006). This may involve both climate change and previous land use effects in California. The spread of cheatgrass and other annual grasses will continue to serve as a catalyst for large fire growth in the planning area. Climate change may also alter the range of invasive plants, potentially expanding this threat into more GRSG habitat.

In the absence of vegetation management, there is an increased potential for further loss of biological diversity in the advent of future high-severity, large fires that damage or eliminate components of the ecosystem (Martin and Sapsis 1991). "No treatment" or "passive management" can perpetuate the potential for high-severity fire (Stephens et al. 2009), thereby increasing the loss of habitat.

Where fuels cannot be managed to match historical levels, adjustments must be made in human communities to accommodate a new normal in fire occurrence and extent. For forested systems, this likely means a progressive transition from historical FRG I or III to a new FRG IV and less frequent, higher-intensity fires.

Higher-intensity fires lead to higher suppression difficulty, increased risks to firefighter and public safety, and more severe social or ecological damage. Changes in rangeland and shrubland systems also can lead to increased, more continuous fire extent, often with greatly increased rates of spread, which also increase suppression difficulty and risk to firefighters. Additionally, changes in fire frequency can lead to an undesirable mix of new species that move into these systems (e.g., invasive grasses, such as cheatgrass, or encroachment by woody species, such as juniper; D'Antonio and Vitousek 1992; Brooks et al. 2004; Miller et al. 2013; Chambers et al. 2014)

Figure 3-11 shows those areas of the sub-region with the highest fire potential; **Table 3-27** shows the acreage with a high probability for wildfire in GRSG habitat in the planning area.

Table 3-27
Acres with High Probability of Wildland Fire in GRSG Habitat

Surface Management Agency	Management Zone	Acres[1] in PPH	Acres[1] in PGH	Acres in OHMA	Total
BLM	III	2,611,900	2,547,300	2,518,400	7,677,600
	IV	2,815,900	1,025,000	669,000	4,509,900
	V	1,304,000	603,800	374,600	2,282,400
Forest Service	III	102,400	102,900	141,400	346,700
	IV	478,600	193,200	176,500	848,300
	V	0	0	0	0
Other	III	474,700	588,400	509,100	1,572,200
	IV	1,060,800	664,600	297,400	2,022,800
	V	445,400	286,000	123,100	854,500

Sources: Finney et. al. 2010; USGS 2014
[1]Derived from Forest Service FSim burn data

3.8 LIVESTOCK GRAZING

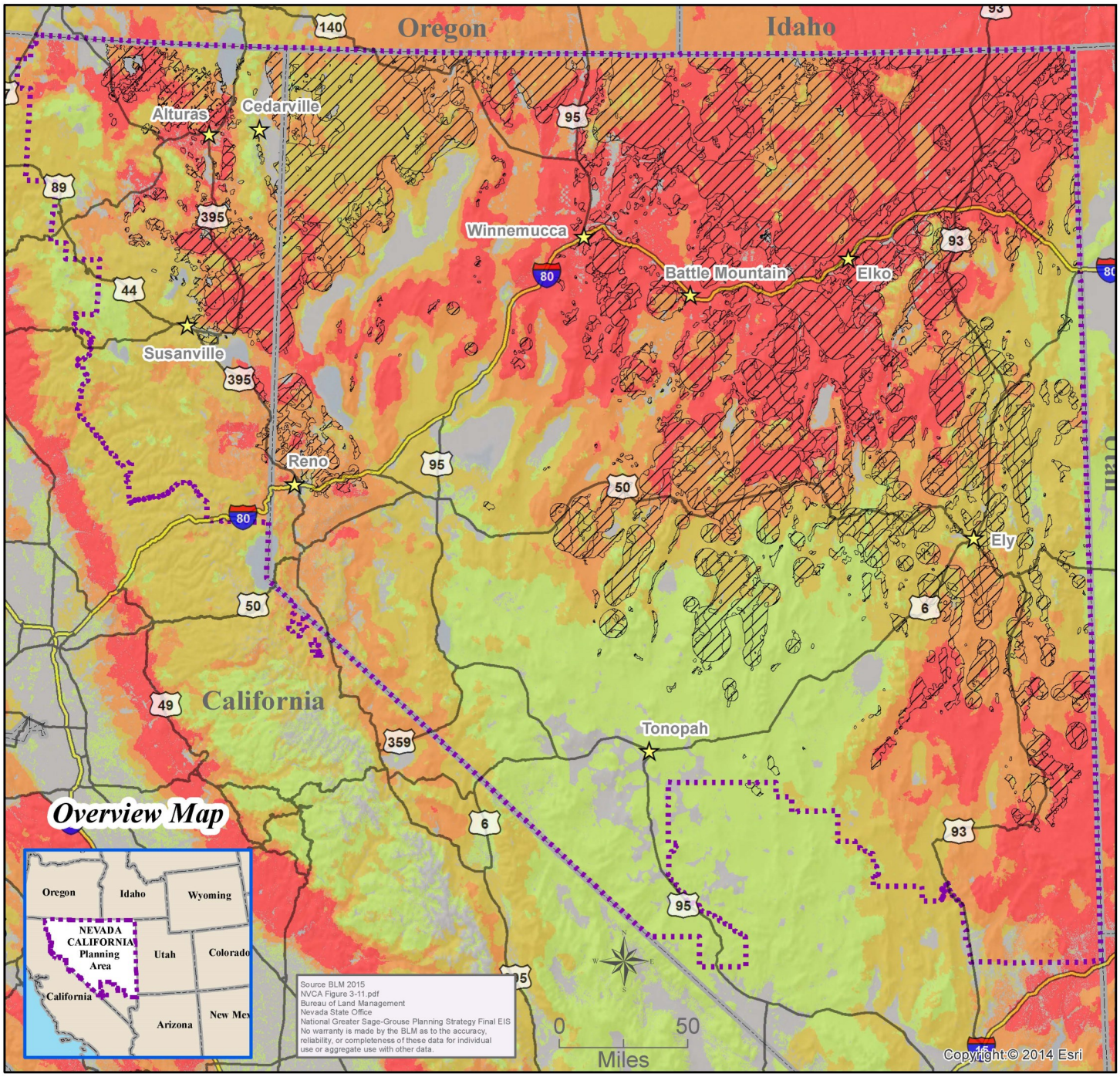
BLM

The primary laws that govern grazing on public lands are the Taylor Grazing Act of 1934, the FLPMA, and the Public Rangelands Improvement Act of 1978. The BLM manages grazing lands under 43 CFR, Part 4100, and its own manuals and handbooks, including the Nevada Rangeland Monitoring Handbook (BLM 2006). In addition, the BLM must meet or ensure progress is being made toward meeting its Standards and Guidelines for Livestock Grazing Administration (**Appendix R**) for each allotment.

Four fundamentals of rangeland health are listed in 43 CFR, Part 4180.1. They combine the basic precepts of physical function and biological health with elements of law relating to water quality and plant and animal populations and communities. The fundamentals provide the basis for developing and implementing the standards for land health.

Standards and guidelines (SandGs) establish conditions needed to sustain public land health for soils, riparian systems, upland vegetation, wildlife habitat, threatened and endangered species, and water quality. Guidelines are livestock grazing management tools, methods, strategies, and techniques designed to maintain or achieve healthy public lands, as defined by the standards. The SandGs have been implemented through land health assessments, determination documents, environmental assessments, permit renewals, and other permit changes. These standards not only pertain to impacts associated with livestock

Areas with High Fire Probability



Legend

Burn Probability

- Very High
- High
- Moderate
- Low
- Zero

- City/Town
- Interstate
- US Route
- Planning Area
- States
- Preliminary Priority and General Habitat

grazing but also to other rangeland impacts from such activities as recreation, development, wildlife grazing, and wild horse management. Sustainable livestock grazing and desired rangeland condition requires the collective management of forage, water, soil, and livestock by the BLM and the livestock owners and operators. Four resource advisory council SandGs apply to the Nevada and Northeastern California decision area **(Appendix R):**

- Mojave-Southern Great Basin
- Northeastern Great Basin
- Sierra Front-Northwestern Great Basin
- Northeastern California and Northwestern Nevada

Forest Service

The primary laws that govern grazing on lands administered by the Forest Service are the Organic Administration Act of 1897, Granger-Thye Act of 1950, Multiple Sustained Yield Act of 1960, FLPMA, Forest Rangeland Renewable Resources and Planning Act of 1974, NFMA, and Public Rangelands Improvement Act of 1978. The Forest Service manages livestock grazing under direction in 36 CFR, Part 222, Forest Service Manual 2200, and Forest Service Handbook 2209. In addition, LUPs identify the suitability of land on National Forest System units to produce forage for grazing animals and establish programmatic direction for grazing activities, including goals, objectives, desired conditions, standards and guidelines (**Appendix R**), and monitoring requirements.

Although an area may be deemed suitable for use by livestock in a LUP, a project-level analysis evaluating the site-specific impacts of the grazing activity, in conformance with NEPA, is required in order to authorize livestock grazing on specific allotments.

Current Condition

Cattle are the primary grazers on BLM-administered lands of the planning area, in identified or potential GRSG habitat; secondary grazers are sheep and some domestic horses. The season of use in the planning area varies from seasonal to year-long.

Range improvements are present on public lands in the planning area. Structural range improvements are fences and water developments, along with vegetation treatments, such as seedings and invasive weed control. Fences are typically three- to four-strand barbed wire, although other types of approved fences are present.

Water developments are reservoirs, developed springs, and wells. Developed springs and wells commonly include pipeline systems that distribute water to one or more metal, fiberglass, or rubber-tire tanks. Reservoirs and developed

springs are typically located in drainages and depressions, while wells and their associated delivery tanks are typically located on uplands. Noxious and invasive weeds are controlled through integrated weed management measures over the planning area, which is described in the Vegetation Section.

Active grazing use, management actions, and long-term rangeland health in each allotment are monitored and evaluated. Adjustments are made by agreement or decision, in accordance with legislation, regulations, and policy, to ensure that public land resource values are maintained or improved to meet LUP goals and objectives.

The primary management objectives for livestock grazing have been to improve rangeland health, to improve riparian functioning condition, and to restore native plant communities. The BLM is improving rangeland health by controlling animal numbers and season-of-use and by resting severely damaged rangeland (principally caused by wildland fires). Livestock grazing is monitored on an ongoing basis to ensure that BLM land health standards are being achieved. Where progress is lacking or inadequate, grazing practices are altered or other conditions are corrected to achieve compliance. As elsewhere, forage production and availability are subject to substantial yearly fluctuations. Droughts in particular necessitate use restrictions on annual grazing permits. Factors of human and natural origin that interfere with land health restoration and threaten efforts to achieve the desired future condition are as follows:

- Pinyon/juniper encroachment in low sagebrush, big sagebrush, and oak woodland plant communities
- Sheet erosion and pedestal formation (formed where individual plants or plant clumps retain soil while the intervening spaces are eroded)
- Competition from invasive weeds
- Decline in watercourse health and hydrologic function
- Decline in riparian vegetation, health, and function
- Soil trampling by feeding and traveling livestock, particularly along streambanks and in riparian areas, and erosion from roads and trails (especially near watercourses and riparian areas)
- Forage shrub decline due to drought
- Proliferation of exotic weeds, which are already established in most pastures (management actions, including altered grazing practices, would increase the extent and health of native perennial species, but they are not likely to restore complete dominance)

Current Livestock Management

Present management involves adhering to permit stipulations, particularly regarding livestock numbers and season-of-use restrictions. Grazing pressure is controlled with fencing, herding, and strategic placement of water. Many allotments are managed with a combination of rest and deferred grazing. This can include early-on and early-off grazing, delayed turnout, or a modified annual season-of-use. Annual adjustments are made according to forage availability and the prevalence of drought or above-average precipitation. Livestock are trucked or driven overland to and from allotments and between pastures.

The BLM and its grazing permittees are striving to maintain or improve rangeland health so that forage production is sustainable and ranching remains a viable occupation. Despite some inherent difficulties, local ranchers have begun to employ new grazing strategies that are beginning to show improvements in rangeland health. These changes have increased the extent and health of sensitive riparian and upland vegetation. Techniques include shorter grazing seasons, modified spring and summer grazing use, and intensive management of riparian areas and livestock pastures. Livestock exclosures and riparian pastures (riparian areas fenced out to promote riparian function) have been created to protect streams and riparian habitats. Improved fencing, frequent herding and moving, and season-of-use adjustments have been used to protect sensitive areas and to improve rangeland condition. Leaving greater amounts of residual vegetation has enhanced hydrologic function and watershed condition by slowing runoff, increasing infiltration, reducing erosion, and improving seedling establishment and ground cover.

BLM rangeland health information is separated into the Northeast California District and Nevada BLM sections. The Northeast California District had access to more detailed information, while the Nevada BLM information is more general. As an example, the data sets used for rangeland health assessments are different, so the category definitions are also different.

BLM California

Rangeland Health Assessments

Rangeland health assessments are used to compare the current condition of grazing allotments to rangeland health standards. Some factors of major importance to rangeland health are current and historic grazing practices, juniper encroachment, and proliferation of noxious weeds. Once evaluated, allotments are placed in one of four condition categories.

Northeastern California BLM currently permits approximately 181,500 AUMs on allotments in GRSG habitat (**Table 3-28**).

BLM Nevada

Nevada BLM currently permits approximately 1,790,000 AUMs on allotments in GRSG habitat (**Table 3-29**).

Table 3-28
Northeastern California BLM Allotments in GRSG

Northeastern California District	Category 1		Category 2		Category 3		Category 4	
	Number of Allotments	Acres	Number of Allotments	Acres	Number of Allotments	Acres	Number of Allotments	Acres
Total	22	676,594	68	1,629,199	53	359,458	11	108,301

Source: BLM 2008a, 2008b, 2008c
Category 1—Areas where one or more standards have not been met, nor has significant progress been made toward meeting the standards, and livestock grazing is a significant factor.
Category 2—Areas where all standards have been met or significant progress has been made toward meeting the standards.
Category 3—Areas where one or more of the standards is not known or the cause of the failure to meet the standards is not known.
Category 4—Areas where one or more standards have not been met, nor has significant progress been made toward meeting the standards due to causes other than (or in addition to) livestock grazing. (Allotments where livestock grazing is the primary cause for failure are also included in Category 1.)

Table 3-29
Nevada BLM Allotments in GRSG

Category 1		Category 2		Category 3		Category 4		Category 5	
Number of Allotments	Allotment Acres*	Number of Allotments	Allotment Acres*	Number of Allotments	Allotment Acres*	Number of Allotments	Allotment Acres*	Number of Allotments	Allotment Acres*
46	3,050,942	38	4,068,776	34	2,961,503	74	2,932,151	376	20,453,855

Source: BLM 2012, and BLM and Forest Service GIS 2015
Category 1—Information indicates standards met
Category 2—Determination signed, livestock a causal factor
Category 3—Determination not signed but information indicates possible grazing conflict
Category 4—One or more standards not achieved; livestock not a cause
Category 5—Determination not complete
*Acres represent the total allotment acreage with GRSG habitat acreage present in allotment perimeters.

Forest Service

The Humboldt-Toiyabe National Forest manages 225 grazing allotments in the planning area. Of these, 212 allotments, or about 95 percent, contain GRSG habitat totaling about 1,792,696acres. Livestock are permitted on National Forest System lands under term grazing permits, which cannot be leased in whole or part. A term grazing permit authorizes the number, kind, and class of livestock and the period of use and grazing allotment on which livestock are permitted to graze. Mostly cattle and sheep graze on the Humboldt-Toiyabe National Forest from early June to late September.

All allotments on the Humboldt-Toiyabe National Forest are managed under allotment management plans or annual operation instructions that implement livestock grazing S&G of the Humboldt or Toiyabe Forest LUPs, including forage utilization standards. Structural range improvements help distribute livestock across the allotments and include fences, cattle guards, corrals, pipelines, water troughs, wells, reservoirs, and ponds.

Planning Area

Table 3-30, **Table 3-31**, and **Table 3-32** list the current conditions affecting livestock grazing in the planning area. **Figure 3-12** shows BLM-administered and National Forest System lands available for grazing and the relationship of PGH and PPH to existing grazing allotments.

Current use patterns vary based on local and regional plans, conditions, and grazing allotments. Pastures on BLM-administered and National Forest System lands (management units) represent the typical planning, leasing, and evaluation units used in grazing management across GRSG range. Based on field office records of grazing allotments, allotments "not meeting wildlife land health standards due to livestock grazing" influence GRSG habitats throughout MZ IV and western portions of MZ III, although BLM-administered lands not meeting wildlife land health standards due to livestock can be found throughout the range of GRSGs.

Table 3-30
Acres of Grazing Allotments in GRSG

Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
BLM	III	3,604,200	3,657,100	7,261,300
	IV	2,802,600	1,010,300	3,812,900
	V	2,235,000	811,000	3,046,000
Forest Service	III	1,600	3,700	5,300
	IV	7,200	2,400	9,600
	V	0	0	0
Other	III	392,200	432,400	824,600
	IV	927,000	487,100	1,414,100
	V	202,600	166,900	369,500

Source: Manier et al. 2013

Table 3-31
Acres of Allotments Not Meeting Land Health Standards in GRSG Habitat

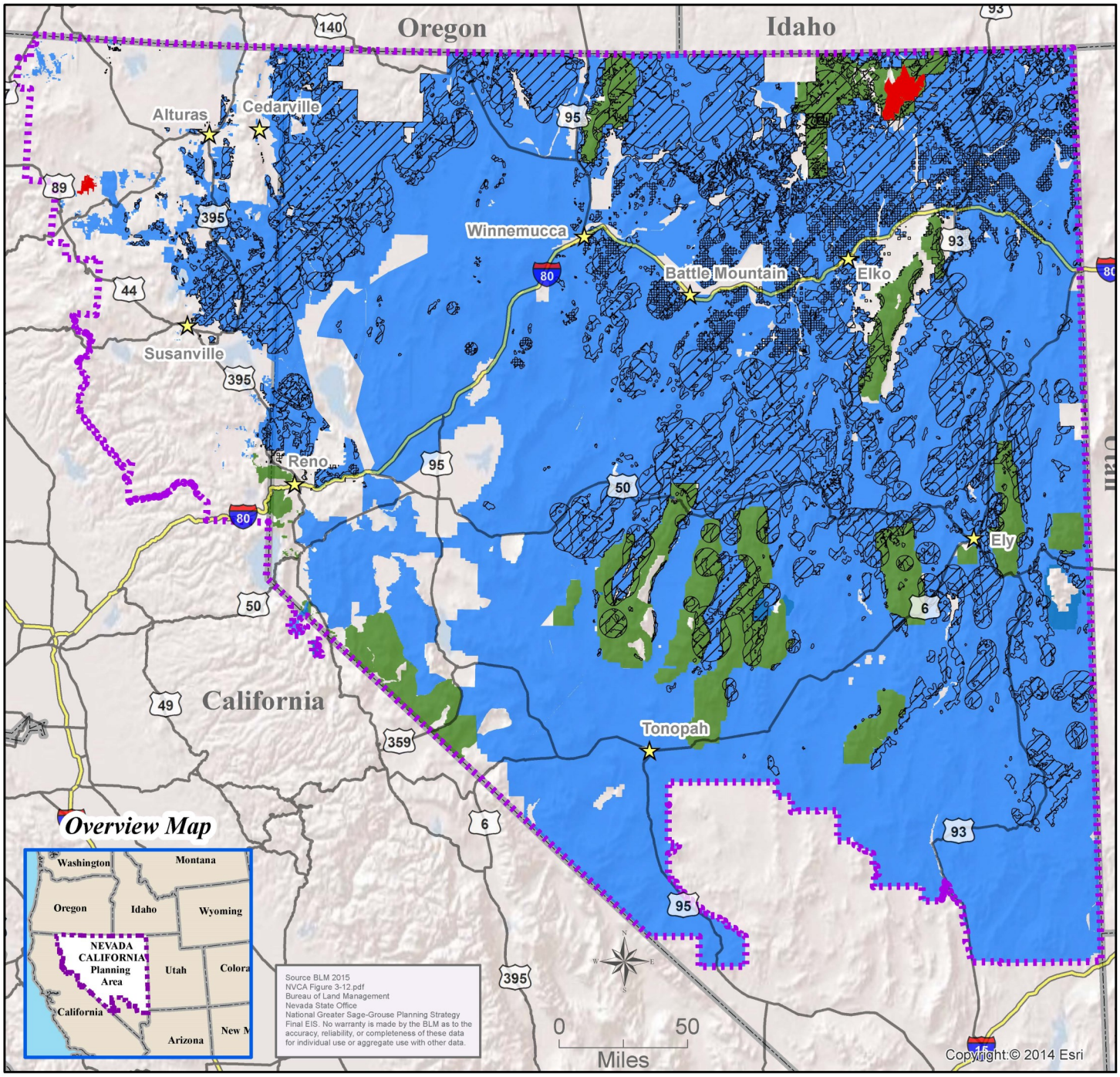
Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
BLM	III	630,200	601,300	1,231,500
	IV	455,600	225,300	680,900
	V	323,800	122,200	446,000
Forest Service	III	200	100	300
	IV	40	0	40
	V	0	0	0
Other	III	27,900	36,700	64,600
	IV	78,200	21,300	99,500
	V	11,400	7,000	18,400

Sources: Manier et al. 2013; Forest Service 2014

[1]Includes only allotments not meeting land health standards with grazing as the cause.

*The Forest Service does not use the land health concept.

Existing Lands Available for Livestock Grazing



Legend

- Livestock Grazing Unavailable
- Preliminary Priority and General Habitat
- BLM Available Grazing Allotments
- Forest Service Available Grazing Allotments
- City / Town
- Interstate
- US Routes
- States
- Planning Area

Table 3-32
Miles of Fences in GRSG

Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
BLM	III	2,200	1,600	3,800
	IV	2,000	600	2,600
	V	1,400	500	1,900
Forest Service	III	500	300	800
	IV	500	200	700
	V	0	0	0
Other	III	400	400	800
	IV	1,100	400	1,500
	V	300	200	500

Source: BLM and Forest Service 2015
[1]Derived from a dataset that identifies pasture and allotment borders on BLM-administered and National Forest System lands as potential fences.

Importantly, assessments for some lands were not available (some federal and all state, private, and tribal lands), and conditions have changed since the data were gathered (assembled in 2008 using available data), so regional scale comparisons may be misleading. Contemporary local data should supersede this information in most cases.

Approximately 2.8 million acres (17 percent) of BLM-administered GRSG range did not meet land health standards (Manier et al. 2013).

3.9 RECREATION

Conditions on BLM-Administered Lands

Recreation management is guided by BLM regulations and policies, federal and state laws, current and emerging trends in public demand for recreational activities and opportunities, and an area's physical and natural surroundings.

Current management direction is based on objectives in LUPs and LUP amendments, activity-level plans, and recreation management guidance, including Manual 8320 (BLM 2011e). The intent of the BLM's recreation-focused laws, policy, and guidelines is to meet public demand for outdoor land- and water-based recreation opportunities, while preventing or minimizing adverse impacts on the natural and cultural resources on BLM-administered lands.

Recreation Management Areas

Recreation planning guidance and the definitions for recreation management areas (i.e., SRMAs and extensive recreation management areas [ERMAs]) have changed since most LUPs in the planning area were written.

Special Recreation Management Areas

Current BLM guidance identifies SRMAs as administrative units where the existing or proposed recreation opportunities and recreation setting characteristics are recognized for their unique value, importance, or distinctiveness, especially as compared to other areas used for recreation.

SRMAs are managed to protect and enhance a targeted set of activities, experiences, benefits, and desired recreation setting characteristics. They may be subdivided into recreation management zones to further delineate specific recreation opportunities. In SRMAs, recreation and visitor service management is recognized as the predominant land use planning focus, where specific recreation opportunities and recreation setting characteristics are managed and protected on a long-term basis.

SRMAs and recreation management zones must have measurable outcome-focused objectives. Supporting management actions and allowable use decisions are required to sustain or enhance recreation objectives, protect the desired recreation setting characteristics, and constrain uses, including incompatible recreation activities, that are detrimental to meeting recreation or other critical resource objectives (e.g., cultural or threatened and endangered species).

There are seven SRMAs in the planning area. The largest single SRMA is the Black Rock High Rock Canyon National Conservation Area (NCA), encompassing 1,205,040 acres. The Loneliest Highway SRMA that follows US Highway 50 in the Ely District is 675,123 acres. The Egan Crest SRMA, also in the Ely District, is 53,445 acres. There are four SRMAs in the Elko District: Wilson Reservoir with 5,440 acres, South Fork Owyhee River with 3,500 acres, Zunino/Jiggs Reservoir with 800 acres, and the Fort Sage SRMA in the Eagle Lake Field Office with 22,000 acres.

Extensive Recreation Management Areas

Current BLM guidance defines ERMAs as administrative units that require specific management consideration in order to address recreation use, demand, or recreation and visitor service program investments. ERMAs are managed to support and sustain the principal recreation activities and the associated qualities and conditions of the ERMA. Management of ERMAs is commensurate with the management of other resources and resource uses. Supporting management actions and allowable use decisions must facilitate the visitors' ability to participate in outdoor recreation activities and protect the associated qualities and conditions. Incompatible uses, including some recreation, may be restricted or constrained to achieve interdisciplinary objectives.

Planning guidance in place when most LUPs in the planning area were written directed that all BLM-administered land not designated as an SRMA should be designated as an ERMA. However, under current recreation guidance (BLM Manual 8320—Planning for Recreation and Visitor Services [BLM 2011e]), what were formerly ERMAs would now be considered undesignated (i.e., neither an

ERMA nor an SRMA). As such, there are no areas in the planning area designated as ERMAs.

BLM-Administered Lands not Designated as Recreation Management Areas

As described above, current recreation guidance (BLM 2011e), directs that what were formerly ERMAs would now be considered undesignated; approximately 36,062,995 acres in the planning area are undesignated. These BLM-administered lands are managed to meet basic recreation and visitor services and resource stewardship needs. Recreation is not emphasized but may occur. The recreation and visitor services are managed to allow recreation uses that are not in conflict with the primary uses of these lands. Management actions and allowable use decisions may still be necessary to address basic recreation and visitor services and resource stewardship needs.

Forest Service

The Multiple Use Sustained Yield Act of 1960 (16 USC, Section 528, Public Law 86-517) directs the Forest Service to manage recreation as a resource on par with timber, water, and wildlife resources. As the science of outdoor recreation management has evolved, managers have placed more emphasis on providing for experience opportunities rather than specific recreation activities. Accordingly, a primary objective of Forest Service recreation management is to provide and secure an environment for visitors to achieve desired experiences while balancing other social, economic, and environmental factors.

The recreation opportunity spectrum (ROS) is a widely used planning and management tool used to delineate and define outdoor recreation settings and related experience opportunities. The ROS arrays recreation settings on a spectrum from primitive to urban. A given ROS class or category describes the level of development, use, and management that exists or is desired for the area where that class is prescribed.

There are six ROS classes described in the LUPs: primitive, semiprimitive nonmotorized, semiprimitive motorized, roaded natural, rural, and urban. For each of these classes, the LUPs also describe maximum-use level guidelines defined in terms of people at one time per trail mile and per acre. For winter recreation (activities that require snow cover), two general ROS classes are used: motorized and nonmotorized.

Table 3-33 summarizes the various ROS classes in the planning area and in PPH and PGH.

Table 3-33
Recreation Opportunity Spectrum Classes

Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH
BLM	Primitive	0	0
	Rural	0	0
	Roaded natural	200	300
	Semiprimitive motorized	400	100
	Semiprimitive nonmotorized	100	100
	Urban	0	0
Forest Service	Primitive	15,700	33,600
	Rural	9,500	600
	Roaded natural	164,000	190,400
	Semiprimitive motorized	288,600	122,000
	Semiprimitive nonmotorized	334,500	536,900
	Urban	200	0
Other	Primitive	700	700
	Rural	2,800	0
	Roaded natural	13,900	8,400
	Semiprimitive motorized	27,400	9,000
	Semiprimitive nonmotorized	22,300	11,100
	Urban	0	0

Source: BLM and Forest Service GIS 2015

3.10 COMPREHENSIVE TRAVEL AND TRANSPORTATION MANAGEMENT

Travel and Transportation Management on BLM-Administered Lands

Travel and transportation are integral parts of virtually every activity that occurs on BLM-administered lands. The BLM has taken a holistic approach to comprehensive travel and transportation management (CTTM). It is an interdisciplinary approach to travel and transportation planning and management that addresses resource uses and associated access to public lands and waters, including motorized, nonmotorized, mechanical, and animal-powered modes of travel.

Travel and transportation management planning means providing clear and specific direction that addresses public and administrative access needs on the proper levels of land and water for all modes of travel. The CTTM process addresses variability among landscapes, users' interests, equipment options, and cultural and biological resource constraints. The primary goal of CTTM is to develop a systematic network of routes with appropriately designated uses that provide opportunities for a diverse set of activities to occur on public lands, such as recreation, energy development, grazing, and wildlife management. Travel management objectives serve as the foundation for appropriate travel and access prescriptions.

There is considerable overlap between travel management and all other uses on BLM-administered lands. For example, many people visit BLM-administered lands for recreation. For these visitors, a route system may serve as either a means to reach a destination where the activity occurs (e.g., a road to a trailhead or parking area) or as the focus of the recreation activity itself (e.g., a four-wheel driving, hiking, or horseback riding trail).

To reduce the duplication of narrative between travel management and the other sections of this document, this section addresses only public travel and access (i.e., OHV management area designations, route designations, types of travel, and seasonal area limitations). The interrelated recreation components, such as OHV use, are addressed under **Section 3.9**, Recreation.

Modes of Travel

Visitors to public lands use roads and trails for a variety of activities involving various modes of travel. Motorized travel in the planning area ranges from standard passenger vehicles driving on maintained roads to OHVs operating on primitive roads and trails. OHV is synonymous with off-road vehicle, as defined in 43 CFR, Part 8340.0-5(a):

> "Off-road vehicle means any motorized vehicle capable of, or designed for, travel on or immediately over land, water, or other natural terrain, excluding: 1) Any nonamphibious 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."

OHVs commonly used in the planning area include off-road motorcycles, all-terrain vehicles, utility terrain vehicles, jeeps, specialized 4-by-4 trucks, and snowmobiles. Other modes of travel include mountain biking, cross-country skiing, snowshoeing, horseback riding, pack animal driving, hiking, boating, hang-gliding, paragliding, ballooning, and wheelchairs. The type and amount of use and the location of roads and trails influence physical, social, and administrative recreation setting and the overall quality of the recreation experience.

Travel Designations

Executive Order 11644 and 43 CFR, Part 8340, both require the BLM to designate all BLM-administered lands nationally as open, closed, or limited for OHV use.

Open

Areas designated as open are those where all types of vehicle use are permitted at all times anywhere in the area. Use is subject to any operating regulations and vehicle standards established in other parts of the CFR.

Limited
Areas designated as limited are those restricted at certain times, in certain areas, or to certain vehicular use. These restrictions may be of any type, but can generally be accommodated in the following categories: numbers of vehicles, types of vehicles, time or season of vehicle use, permitted or licensed use only, use on existing roads and trails, and use on designated roads and trails.

Closed
Areas designated as closed are where cross-county motorized vehicle use is prohibited. OHVs may be allowed in closed areas for certain reasons, but only with the approval of the authorized officer.

Federal Regulations
Route designation criteria are described in 43 CFR, Part 8342.1, and state:

> The authorized officer shall designate all public lands as open, limited, or closed to off-road vehicles. All designations shall be based on the protection of the resources of the public lands, the promotion of the safety of all the users of the public lands, and the minimization of conflicts among various uses of the public lands; and in accordance with the following criteria:
>
> (a) Areas and trails shall be located to minimize damage to soil, watershed, vegetation, air, or other resources of the public lands, and to prevent impairment of wilderness suitability.
>
> (b) Areas and trails shall be located to minimize harassment of wildlife or significant disruption of wildlife habitats. Special attention will be given to protect endangered or threatened species and their habitats.
>
> (c) Areas and trails shall be located to minimize conflicts between off-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands, and to ensure the compatibility of such uses with existing conditions in populated areas, taking into account noise and other factors.
>
> (d) Areas and trails shall not be located in officially designated wilderness areas or primitive areas. Areas and trails shall be located in natural areas only if the authorized officer determines that off-road vehicle use in such locations will not adversely affect their natural, esthetic, scenic, or other values for which such areas are established.

National Guidance
On a national level and in response to increasing demand for motorized and mechanized recreation trails on public lands, the BLM first developed an OHV strategy and then a mountain bike strategy. These strategies emphasize that the BLM should be proactive in seeking travel management solutions that conserve natural resources, while providing for ample recreation opportunities.

The BLM released the current version of the Land Use Planning Handbook (H-1601-1, BLM 2005a) in March 2005. Guidance on determining open, limited, and closed OHV area designations during the planning process was incorporated into the Comprehensive Trails and Travel Management Section (Appendix C, Section II D).

Additional CTTM guidance continued to be developed and culminated with the release of the Travel and Transportation Management Manual (1626, BLM 2011f) in July 2011. Current policy states that open areas will be limited to a size that can be effectively managed and geographically identifiable and that expansive open areas allowing cross-country travel will not be designated in LUP revisions or new travel management plans.

The Travel and Transportation Handbook (H-8342, BLM 2012m) was released in March 2012. It provides detailed guidance using the designation criteria in 43 CFR, Part 8342.1 for area and route selection. It includes guidance for developing other implementation plans, including sign plans, education and outreach plans, law enforcement plans, and maintenance plans.

Travel Management on National Forest System Lands

The Forest Service published its Travel Management Rule in 2005 (Forest Service 2005). It required each National Forest to designate roads, trails, and areas open or closed to motor vehicles. Designations were made in accordance with criteria described in Executive Order 11644 and included the type of vehicle and, if appropriate, time of year for motor vehicle use. A given route, for example, could be designated for use by motorcycles, ATVs, or street-legal vehicles. Once designation was complete, the rule prohibited motor vehicle use off the designated system.

In addition to the CFR, the Forest Service developed CTTM planning guidance, including the Travel Management Manual, FSM 7700 (Forest Service 2009e), and the Travel Planning Handbook, FSH 7709.55 (Forest Service 2009f).

Federal Regulations

The criteria for Forest Service route designation are found in 36 CFR, Part 212.55(a), General criteria for designation of National Forest System roads, National Forest System trails, and areas on National Forest System lands and state:

> In designating National Forest System roads, National Forest System trails, and areas on National Forest System lands for motor vehicle use, the responsible official shall consider effects on National Forest System natural and cultural resources, public safety, provision of recreational opportunities, access needs, conflicts among uses of National Forest System lands, the need for maintenance and administration of roads, trails, and areas that would arise if the uses under consideration are

designated; and the availability of resources for that maintenance and administration.

(b) Specific criteria for designation of trails and areas. In addition to the criteria in paragraph (a) of this section, in designating National Forest System trails and areas on National Forest System lands, the responsible official shall consider effects on the following, with the objective of minimizing:

(1) Damage to soil, watershed, vegetation, and other forest resources;

(2) Harassment of wildlife and significant disruption of wildlife habitats;

(3) Conflicts between motor vehicle use and existing or proposed recreational uses of National Forest System lands or neighboring Federal lands;

(4) Conflicts among different classes of motor vehicle uses of National Forest System lands or neighboring Federal lands. In addition, the responsible official shall consider:

(5) Compatibility of motor vehicle use with existing conditions in populated areas, taking into account sound, emissions, and other factors.

Current Condition

Travel planning is complete for all National Forest System lands in the planning area. National Forest System lands with a designated route system are considered the same as the limited designation on BLM-administered lands. Current closed areas in the planning area are generally designated wilderness and some ACECs.

Current acreage for open, closed, and limited OHV area designations for the planning area are listed in **Table 3-34**. Most acres in both PPH and PGH have an open OHV area designation. Miles of roads, including interstate and state highways, secondary roads, and local roads are listed in **Table 3-35** and **Table 3-36**. This does not include two-track primitive roads; inventory data for two-track primitive roads is incomplete at this time. Miles and acres of railroads are shown in **Table 3-37** and **Table 3-38**.

Table 3-34
Travel Area Designations on BLM and Forest Service Lands[1]

	PPH (Acres)	PGH (Acres)	Total
Open	6,939,500	5,205,900	12,145,400
Closed	230,800	290,800	521,600
Limited	2,382,200	1,454,100	3,836,300
Total	9,552,500	6,950,800	16,503,300

Source: BLM and Forest Service GIS 2015
[1]Acres rounded to nearest 100 acres

Table 3-35
Miles of Roads in GRSG Habitat

Surface Management Agency	Management Zone	Miles in PPH	Miles in PGH	Total
BLM	III	8,200	8,400	16,600
	IV	4,100	1,500	5,600
	V	3,900	1,400	5,300
Forest Service	III	500	800	1,300
	IV	700	200	900
	V	0	0	0
Other	III	1,700	1,900	3,600
	IV	2,300	600	2,900
	V	1,800	400	2,200

Source: BLM and Forest Service GIS 2015

Table 3-36
Acres of Roads in GRSG Habitat

Surface Management Agency	Management Zone	Acres[1] in PPH	Acres[1] in PGH	Total
BLM	III	10,300	22,600	32,900
	IV	3,300	1,600	4,900
	V	1,700	1,800	3,500
Forest Service	III	600	3,700	4,300
	IV	1,000	100	1,100
	V	0	0	0
Other	III	4,900	15,600	20,500
	IV	3,900	4,500	8,400
	V	2,600	2,500	5,100

Source: BLM and Forest Service GIS 2015
[1]Assumes footprint of 240 feet for interstate highways, 84 feet for paved primary and secondary highways, and 41 feet for other roads, such as graded county roads. This does not include two-track primitive roads.

Table 3-37
Miles of Railroad in GRSG

Surface Management Agency	Management Zone	Miles in PPH	Miles in PGH	Total
BLM	III	40	30	70
	IV	10	10	20
	V	0	0	0

Table 3-37
Miles of Railroad in GRSG

Surface Management Agency	Management Zone	Miles in PPH	Miles in PGH	Total
Forest Service	III	0	0	0
	IV	0	0	0
	V	0	0	0
Other	III	40	100	140
	IV	10	30	40
	V	0	0	0

Source: BLM and Forest Service GIS 2015

Table 3-38
Acres of Railroad in GRSG

Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
BLM	III	300	300	600
	IV	90	80	170
	V	0	0	0
Forest Service	III	0	0	0
	IV	0	0	0
	V	0	0	0
Other	III	300	600	900
	IV	40	200	240
	V	0	0	0

Source: BLM and Forest Service GIS 2015

3.11 LAND USE AND REALTY

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

Lands and realty actions can be divided between land tenure adjustments and land use authorizations (LUAs). Land tenure adjustments focus primarily on land acquisition and disposal (including easement acquisition), while LUAs consist of ROWs, communication sites, and other leases and permits. Wind and solar renewable energy development are also authorized by ROW grants through the Lands and Realty Program but are addressed separately in this document. "ROW Avoidance" and "ROW Exclusion" areas are identified throughout this document. The term ROW would encompass all land use authorizations, such as ROWs, leases, permits, and Forest Service special use authorizations. See the definition of ROW avoidance and exclusion in Chapter 8.

Forest Service forest plan prescriptions are similar to BLM ROW exclusion and avoidance areas. Prescriptions can restrict or prohibit certain uses in a planning area. Also note that the Forest Service grants special use authorizations (granting ROWs, permits, easements, and leases), while the BLM grants ROWs on their respective agency-administered lands. Lastly, the Forest Service completes landownership adjustments (purchase, exchange, donation, and ROW acquisition), while the BLM conducts land tenure adjustments (disposals and acquisitions).

Potentially affecting the Lands and Realty Program are LUP decisions related to land designations and land classifications, as well as limitations or restrictions on land use authorizations, stipulations, or land tenure changes (acquisition or disposal of BLM or National Forest System lands) in the planning area.

Current Condition

The planning area, which is the geographical area for which land use and resource management plans are developed and maintained, includes acres in Siskiyou, Modoc, Lassen, Shasta, Plumas, Sierra, Nevada, and Alpine Counties in northeastern California. The planning area also includes 16 of the 17 counties in Nevada, Clark County being the exception in the southern part of the state. These lands are owned or administered by multiple federal, state, and local agencies, tribes, and private landowners.

Due to the configuration of landownerships and their proximity to each other, land tenure adjustments and evaluation of ROW applications is often complex. **Table 1-1** shows the acreage and overall percent ownership for each landowner in the planning area.

Table 3-39 through **Table 3-42** list data compiled in a baseline environmental report produced by the USGS and the BLM (Manier et al. 2013; USGS 2014). In each table, acreages and mileages are shown by surface management agency and whether they are in PPH and PGH. These tables were originally created through the BER report. The numbers and data in the tables have changed for this sub-regional effort due to the 2014 habitat mapping update.

Table 3-39
Number of Communication Towers in GRSG Habitat

Surface Ownership or Management Agency	Management Zone	Communication Towers in PPH	Communication Towers in PGH	Total
BLM	III	40	70	110
	IV	30	30	60
	V	20	30	50

Table 3-39
Number of Communication Towers in GRSG Habitat

Surface Ownership or Management Agency	Management Zone	Communication Towers in PPH	Communication Towers in PGH	Total
Forest Service	III	0	0	0
	IV	10	0	10
	V	0	0	0
Other	III	50	200	250
	IV	50	70	120
	V	10	20	30

Source: BLM and Forest Service GIS 2015

Table 3-40
Miles of Transmission Lines in GRSG Habitat

Surface Ownership or Management Agency	Management Zone	Miles in PPH	Miles in PGH	Total
BLM	III	100	160	260
	IV	100	40	140
	V	70	40	110
Forest Service	III	4	3	7
	IV	10	3	13
	V	0	0	0
Other	III	10	100	110
	IV	90	50	140
	V	20	20	40

Source: BLM and Forest Service GIS 2015

Table 3-41
Acres of Utility Corridors in GRSG Habitat

Surface Ownership or Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
BLM	III	33,000	74,400	107,400
	IV	25,100	9,700	34,800
	V	33,700	21,200	54,900
Forest Service	III	0	100	100
	IV	0	0	0
	V	0	0	0

Table 3-41
Acres of Utility Corridors in GRSG Habitat

Surface Ownership or Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
Other	III	9,700	30,400	40,100
	IV	10,700	11,300	22,000
	V	9,500	16,400	25,900

Source: BLM and Forest Service GIS 2015

Table 3-42
Acres of ROW Exclusion/Avoidance Areas in GRSG Habitat

	Acres in PPH	Acres in PGH	Total
BLM LUA Exclusion Areas	179,400	148,500	327,900
FS LUA Exclusion Areas	52,100	140,400	192,500
BLM LUA Avoidance Areas	918,800	341,900	1,260,700
FS LUA Avoidance Areas	60	0	60

Source: BLM and Forest Service GIS 2015

Conditions on BLM-Administered Lands

Land Tenure

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

The FLPMA also requires that lands disposed of through sale are specifically identified in the relevant LUP. California BLM has historically processed more land exchanges than land sales. However, in recent planning efforts, the California BLM has identified numerous parcels for disposals by sale. Since land sales take considerably less time to process, the BLM has been using sales to dispose of land that is difficult to manage. Since the mid-1990s, Nevada BLM also moved to completing land sales instead of land exchanges because of the reduced time and cost. Lands suitable for disposal must be identified in a LUP. Any lands to be disposed of that are not identified in the current LUP require a LUPA before disposal can occur.

Disposal

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

be managed more effectively. Desert land entries is also a form of disposal of public lands for agriculture purposes.

The Ely RMP currently identifies 28,000 acres of public land for disposal in GRSG habitat, in accordance with the White Pine County Conservation, Recreation, and Development Act of December 20, 2006.

Land exchanges are generally initiated in direct response to public demand or by the BLM to improve management of the public lands. Lands need to be formally determined as suitable for exchange. In addition, lands considered for acquisition would be those lands that meet specific land management goals identified in the LUP. Nonfederal lands are considered for acquisition through exchange of suitable public land on a case-by-case basis, where the exchange is in the public interest and where acquisition of the nonfederal lands will contain higher resource or public values than the public lands being exchanged.

Acquisition

Acquisition of land and interests in land are important components of the BLM's land tenure adjustment strategy. Land and interest in lands are acquired for the following purposes in the public interest:

- To improve management of natural resources through consolidation of federal, state, and private lands
- To secure key property necessary to protect endangered species, promote biological diversity, increase recreational opportunities, and preserve archaeological and historical resources
- To implement specific acquisitions authorized or directed by acts of Congress and allow for expansion of communities and consolidation of non-Federal landownership.

Acquisition of other agency or private lands can be pursued to facilitate various resource management objectives. Acquisitions, including easements, can be completed through exchange, Land and Water Conservation Fund purchases, condemnation, or donations.

Withdrawals

Withdrawn lands are reserved and set aside from application of some, or all, of the public land and mining laws. This is done to provide for a specific designated use or to protect specific resource values, such as water power and reservoir sites, designated recreation areas, and Federal Reserve water rights (which may include a land withdrawal).

The segregation effects of withdrawals can vary in time and which agency is responsible for administrative jurisdiction. The withdrawal may be extended, modified, or eliminated through revocation or relinquishment.

Withdrawals are used to preserve sensitive environmental values, protect major federal investments in facilities, support national security, and provide for public health and safety. Withdrawals that are authorized in accordance with FLPMA are limited to a 20-year term, after which the holding agency must apply for the withdrawal to be extended. Terms established for legislative withdrawals are made at the discretion of Congress.

Land Use Authorizations

Land Use Authorizations (LUAs) are specific to lands and realty actions. They include those land uses authorized under 43 CFR, Parts 2800 and 2900. ROWs, permits and leases are generally authorized for long-term land uses (three years or more), and some ROWs (e.g., site testing) and permits (e.g., filming permits) are used to authorize short-term uses (less than three years). All LUA applications will be reviewed using the criteria of following existing corridors or infrastructure wherever practical and avoiding the proliferation of separate authorizations.

ROW Avoidance and Exclusion Areas

ROW exclusion and avoidance areas are established and designated in the governing LUP to protect or minimize development of specific lands. See **Table 3-42**.

Exclusion areas are closed to any ROW development, including leases and permits. Avoidance areas are open to ROW, lease, and permit development as long as the project meets the ROW avoidance stipulations in the governing LUP that identifies the criteria that must be met for the project to be authorized on or across those lands.

ROWs

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

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 public lands in a manner that accomplishes the following:

- Protects the natural resources associated with public lands and adjacent lands, whether private or administered by a government entity
- Prevents unnecessary or undue degradation to public lands
- Promotes the use of ROWs in common, considering engineering and technological compatibility, national security, and area LUPs

- Coordinates, to the fullest extent possible, all BLM actions with local, state, Native American, and other federal agencies, interested individuals, and appropriate quasi-public entities (43 CFR, Part 2801.2)

Private individuals and groups, as well as various businesses and government entities, can hold these authorizations.

In the subregion there are specific ROW projects that are currently authorized, however, not fully constructed. Since these authorizations were granted before the completion of this Proposed LUPA/Final EIS, they have valid and existing rights. The Southwest Intertie transmission project (500 kV) is an example of a ROW that has been authorized but only partially constructed. It has been constructed from Las Vegas to Ely, Nevada, and is authorized to be constructed from Ely, Nevada, to Twin Falls, Idaho, in the future.

Communication Sites

Communication sites are normally situated on mountain and ridgetops and contain equipment for various public and private tenants, including phone companies, local utilities, and local, state, and other federal agencies.

Leases and Permits

Leases and permits may be authorized for use, occupancy, and development in accordance with Section 302 of FLPMA 43 CFR, Part 2920. These are generally used for activities that are not authorized as a ROW, such as commercial filming, small site uses, and Recreation and Public Purpose (R&PP) leases.

Corridors

Utility corridors are identified during the planning process with the intent of concentrating utility lines in manageable locations on BLM-administered lands. The corridors may contain power lines, fiber-optic communication cables, and gas pipelines; they may also hold other ROWs that may be pertinent to the operations, such as substations or regeneration stations.

Identifying corridors does not necessarily mandate that facilities be located in the corridor, especially if they are not compatible with other resource uses, values, and objectives in and near the corridors, or if the corridors are already at maximum capacity with existing structures.

There are numerous existing designated corridors in the sub-region. There are currently 1,322,800 acres of utility corridors in GRSG habitat, including 209,500 acres of utility corridors designated as part of the West-wide Energy Corridor Programmatic EIS (PEIS). The BLM completed the PEIS in response to Section 368 of the 2005 Energy Policy Act. West-wide energy corridors are commonly referred to as Section 368 Energy Corridors. (See **Table 3-41** for an overview of the number and acreages of utility corridors.)

Conditions on National Forest System Lands

Humboldt-Toiyabe National Forest

Several aspects of public land management must be considered in the land and resource management planning process, including landownership adjustments (i.e., purchase, exchange, donation, and ROW acquisition) and special use authorizations (granting ROWs, permits, easements, and leases).

Landownership Adjustment

The landowner must be willing to engage in a land ownership adjustment and, if that is the case, the Forest Service must ensure that market value is obtained for lands or interests in lands to protect the public and the private property owner's interests. The Forest Service identifies parcels that meet the criteria for land adjustment.

Other parcels not currently identified are evaluated under the merits of each proposal. The objectives of the National Forest System landownership adjustment program are to achieve the optimum landownership pattern for the protection and management of resource uses, settle land title claims, and provide resource administrators with title information about the use of and resources on the land they administer.

National Forest System lands are exchanged to achieve a desired national forest landownership pattern that supports forest land and resource goals and objectives, addresses fragmentation, reduces future management costs, and responds to urban and community needs. Nonfederal lands are considered for acquisition through exchange of suitable National Forest System lands on a case-by-case basis.

One of the objectives in all land exchanges is keeping the surface and subsurface or mineral estate intact on both the disposed and acquired lands to benefit the future owners and their uses of their land.

Land purchase can be pursued to facilitate various resource management objectives. Lands considered for purchase would be those lands that meet specific land management goals identified in the Forest Plan. The Forest Service purchases land primarily through revenues generated from sale of BLM lands via the Southern Nevada Public Land Management Act. SNPLMA provides for the revenue from the sale of BLM lands to be made available to other federal agencies (e.g., the Forest Service) to buy environmentally sensitive lands, or interests in lands, in the State of Nevada. There is some priority to lands in Clark County, Nevada, but SNPLMA has been used to acquire lands across the state by all land management agencies. Other similarly legislated land acts in the State of Nevada are also in place to protect critical resource areas and provide increased public recreation opportunities.

Land donations, when determined to be in the public interest, are to consolidate National Forest System lands and protect critical resource areas. Acquisition of road and trail ROWs often provides legal public access to National Forest System lands that are otherwise inaccessible. Opportunities for landownership adjustments are equally distributed across the affected Ranger Districts on National Forest System lands.

The Forest Service acquires ROWs through exclusive easements that permit full multiuse of National Forest System lands served. This includes access for public users, with the least impact on private lands crossed, as long as it is economically and environmentally feasible and the private property owner is willing. The agency assists and cooperates with private landowners in acquiring needed ROWs to develop private land access along with National Forest System access. This is under the provision that such acquisition is needed and is compatible with National Forest System management objectives set out in forest plans.

Special Use Authorizations. SUAs authorize uses of public lands by individuals, companies, organized groups, other federal agencies and state or local levels of government in a manner that protects natural resource values and public health and safety. They authorize uses that contribute to the nation's infrastructure for generating and transmitting energy resources. This includes electric transmission facilities, oil and gas pipelines, hydropower facilities, and wind and solar facilities.

SUAs (granting ROWs, permits, easement, and leases) on National Forest System lands are necessary for all improvements such as roads, trails, telephone lines, power lines, pipelines, ditches, and fences over private or other lands not administered by the Forest Service.

To the extent possible, linear ROWs, such as roads and pipelines, are routed where impacts would be least disturbing to environmental resources, considering the point of origin, point of destination, and purpose and need of the project. Although established corridors exist, this does not preclude the location of transportation and transmission facilities in other areas if environmental analysis indicates that the facilities are compatible with other resource values and objectives. Further identification of corridors may not necessarily mandate that transportation and transmission facilities be located in these areas if they are not compatible with other resource uses, values, and objectives in and near the corridors or if the corridors are saturated.

SUAs are issued with surface reclamation stipulations and other mitigating measures. Restrictions and mitigating measures may be modified on a case-by-case basis, depending on impacts on resources. Areas closed to mineral leasing, having an NSO restriction, or otherwise identified as unsuitable for surface disturbance or occupancy are generally avoidance or exclusion areas for ROWs.

The 1986 amendment to FLPMA, known as the Ditch Bill, provides permanent easement for agricultural water systems in use before 1976. Water users had 10 years from passage of the bill to apply for easements for existing structures located on National Forest System lands. Currently, 23 easements have been issued under this law, with an estimated 7 additional applications being processed.

There are three summer home groups, with a total of 98 cabins, on the Humboldt-Toiyabe National Forest. In many areas, this use has existed since 1925. Permits for the recreation residences are issued for 20 years. The purpose was to encourage use of the national forests by allowing individuals to build cabins and occupy them for a portion of the year. Several thousand permits were issued nationwide. The current national policy is not to issue any additional permits but to continue to acknowledge the recreational values associated with the existing residences and to reissue existing permits when the current permit tenure expires. It is the intent of the Humboldt-Toiyabe National Forest to conduct the proper environmental analysis and reissue existing permits when the current permit tenure expires.

Table 3-43 lists the number of each type of special use permit on National Forest System land. This table is for illustrative purposes and is representative of the entire Forest; some uses may not be present in GRSG habitat.

Table 3-43
Number of Special Use Authorizations on the Humboldt-Toiyabe National Forest

Use	Number of Permits
Power lines	73
Road permits	103
Ditches	23
Communication permits	158
Transmission lines	121
Dams and reservoirs	15
Recreation residences	98
Clubs and cabins	4
Cultural use	3
Oil and gas pipelines	6
Monument	2
Ski area	2
Target range	2
Concession campground	5
Resorts	6
Group use	8
Filming	15
Telephone	59
Weather monitoring stations	9
Water monitoring	6
Wells of spring developments	10

Table 3-43
Number of Special Use Authorizations on the Humboldt-Toiyabe National Forest

Use	Number of Permits
Stream gauging stations	5
Stock water	2
Research/education	35
Outfitters and guides	63
Recreation events	18
Organization camps	5
Fences	8
Other improvements/permits	11
Warehouse/storage yard	6
Weir	4
Water treatment	1
Visitor center/museum	3
Military training	5
Hydroelectric project	1
Airport	1
Railroad	1
Water storage	17
Tramway	1
Debris/siltation impoundment	5
Disposal site	4
Total	**924**

Source: Forest Service 2013c

Trends on BLM-Administered Lands

Land Tenure Adjustments

Field offices in California and Nevada have been consolidating their lands to benefit the public and increase the economic viability of local communities. This includes acquiring lands to create a more contiguous land base and disposing of lands that are difficult to manage and serve no benefit to the public or the agency.

Land Use Authorizations

LUA applications are increasing in response to the accelerated interest for access, utility development, and other land uses on BLM-administered public lands.

Because of the large percentage of federal lands, compared with state, local government, or private lands, land tenure actions and LUAs are expected to continue well into the future.

Trends on National Forest System Lands

Humboldt-Toiyabe National Forest

As opportunities for land adjustments become available and there is a willing seller, these cases will be evaluated on a case-by-case basis, with consideration given for resource values and land adjustment priorities in the state given the limited funding available. Two land adjustments in GRSG habitat are being evaluated on the Mountain City Ranger District—the disposal of the Mountain City Administrative Site and the small tract sale at the Rizzi Ranch.

Special land use applications are increasing as more people make use of National Forest System lands. Recreational residence permits are anticipated as a flat trend because current national policy is not to issue any additional permits and to reissue existing permits when the current permit tenure expires.

3.12 RENEWABLE ENERGY RESOURCES

The BLM and the Forest Service are working with communities, state regulators, industry, and other federal agencies to build a clean energy future by providing sites for environmentally sound development of renewable energy facilities on public lands. Renewable energy on BLM-administered and National Forest System lands includes solar, wind, and biomass resources and siting of transmission facilities necessary to deliver renewable energy to the consumer. As demand has increased for clean and viable energy to power the nation, consideration of renewable energy sources available on public lands has come to the forefront of land management planning.

Renewable energy resources all have different requirements related to economic development; however, some issues are common to all renewable energy resources, including distance to existing power transmission facilities and compatibility with existing federal land use. Wind and solar resource facilities are permitted through the Lands and Realty Program with a ROW grant.

In cooperation with the National Renewable Energy Laboratory, the BLM assessed renewable energy resources on public lands in the western United States (BLM and DOE 2003). The BLM reviewed the potential for concentrated solar power, photovoltaics, wind, and biomass energy on BLM-administered, Bureau of Indian Affairs, and National Forest System lands in the western United States, except in Alaska. In December 2005, the BLM signed a ROD for the Wind Programmatic EIS (BLM 2005b), and in October 2012, it signed a ROD for Solar Energy Development in Six Southwestern States (BLM 2012h).

The BLM's renewable energy policy is directed by regulations, executive orders, and various instruction memorandums. Section 501(a)(4) of the FLPMA, 43 USC, Section 1761(a)(4); FSM 2701.1, para. 15, authorizes the Forest Service to issue SUAs for the use and occupancy of National Forest System lands for generation, transmission, and distribution of electric energy. The Energy Policy

Act of 2005 recognizes the Forest Service's role in meeting the renewable energy goals of the United States.

Consistent with Forest Service policies and procedures, the use and occupancy of National Forest System lands for renewable energy production, such as wind energy development, are appropriate and will help meet the energy needs of the United States. Permits for solar energy power facilities are issued only if non-National Forest System lands are not available and if adverse impacts can be minimized. Permits for geothermal energy power facilities are issued only if feasibility studies have determined that it is not feasible to transmit geothermal water to a power-generating facility on non-National Forest System lands and if adverse impacts can be minimized.

For BLM-administered lands, solar and wind projects are authorized via the ROW process. Wind and solar renewable resource production are permitted by special use authorizations on National Forest System land. ROW applications are generally accepted and processed on a first-come, first-served basis. ROW regulations (43 CFR, Part 2804.23[c]) provide authority for offering public lands under competitive bidding procedures for ROW authorizations. The BLM initiates a competitive process if a land use planning decision has specifically identified an area for competitive leasing. The BLM may also consider other public interest and technical factors in determining whether to offer lands for competitive leasing. Competitive bidding follows procedures required by 43 CFR, Part 2804.23(c).

Although geothermal is a renewable energy source, it is managed as a leasable fluid mineral and therefore is discussed in **Section 3.13**, Mineral Resources.

Current Condition

California and Nevada are at the forefront for permitting renewable energy on public lands. The BLM has approved numerous renewable energy projects in the two states. It also has pending applications in the planning area. However, the lack of power transmission infrastructure continues to be a challenge in developing renewable energy sources. Pending renewable energy facilities in the planning area are described in **Chapter 5**, **Table 5-39**, Reasonably Foreseeable Future Actions.

Wind Energy

In the planning area, California and Nevada have more than 150 megawatts of developed wind capacity. In recent years, there has been new interest in wind-site testing, monitoring activities, and development on public lands in California and Nevada.

Since 2008, California and Nevada BLM have received 90 wind testing ROW applications for locations in the subregion. These ROWs have an authorized term of 3 years. At the end of the 3-year testing period, the applicant must either terminate the grant or file for development. Many of the applications that

were filed have either been withdrawn or terminated. At this time in the subregion, there are four pending utility-scale wind energy development ROW applications totaling 36,000 acres. These applications are in the planning process and have not been granted a ROW. There are five pending wind testing applications, totaling 18,000 acres, and 11 authorized wind testing ROW grants, totaling 108,000 acres (BLM 2015b).

There are 245,102 acres of wind energy ROWs in PPH and PGH (see **Table 3-44**); however, there is currently only one active industrial-scale wind energy generation facility in the planning area.

Table 3-44
Acres of Wind Energy ROWs in GRSG Habitat

Surface Ownership	Management Zone	Acres in PPH	Acres in PGH	Total
BLM	III	32,400	49,800	82,200
	IV	3,300	3,400	6,700
	V	75,700	67,700	143,400
Forest Service	III	0	200	200
	IV	0	2	2
	V	0	0	0
Other	III	2,600	2,700	5,300
	IV	2,200	1,500	3,700
	V	2,600	1,000	3,600

Source: BLM and Forest Service GIS 2015

Wind energy developments on National Forest System lands have not been proposed as of this time. The Forest Service has not identified avoidance, exclusion, or open areas for wind energy development because, to date, wind energy development on National Forest System lands has been minor.

Solar Energy

There are solar projects in California and Nevada, but there are no solar energy ROWs in the planning area (Manier et al. 2013). A programmatic solar EIS was completed in 2012 for six southwestern states, which included California and Nevada. This EIS established exclusion areas for Solar ROWs based on GRSG habitat, which encompasses most of the acres in the planning area. Solar energy zones were established with access to existing or planned transmission, incentives for development in those zones and a process through which to consider additional zones and solar projects. The SEZs took into consideration resource conflicts such as GRSG.

Biomass

Currently, there is no significant commercial energy economy for pinyon/juniper biomass in the planning area, other than for incidental use as a firewood fuel, for

heating of a school in White Pine County (BLM 2007d), and for a cogeneration biomass and geothermal plant in Lassen County.

Trends

In California and Nevada, greater pressure to develop renewable energy resources on public lands is expected as a result of public energy policy coming from individual states or the federal government. The development of more energy-efficient technologies for wind, biomass, and solar power will continue to grow because of increasing regulation of other energy sources, increased price of fossil fuels, and the increasing demand for energy products.

Although areas throughout California and Nevada have the potential to contribute wind-generated energy, future development is most likely to occur outside of the planning area. The potential on National Forest System lands for wind energy development is high in many locations, but the terrain and lack of accessibility to the grid makes it generally unsuitable for development.

An emerging market may exist in 5 to 10 years. At that time there may be field portable energy concentrating technology; longer-term and larger area land treatment contracts that provide a commercially reliable source of pinyon/juniper feedstock; an established adequate land treatment and biomass transportation service industry; a sustained pinyon/juniper biomass feedstock demand; and commercially viable stationary plant or field mobile bioenergy generation facilities.

The development of these resources can diversify and improve the area's energy reliability and will increase the demand for more ROWs and facility authorizations. The demand for renewable energy-related ROWs will likely increase nationally. The most likely trend for using solar, wind, and biomass energy resources will be to continue to develop more of these types of alternative sources; ways may be developed to make them more efficient to take the pressure off the fossil fuel resource and to be less dependent on nonrenewable energy sources.

3.13 MINERAL RESOURCES

The BLM administers all federally owned minerals that lie beneath both federal and non-federal lands. For this LUPA, the BLM and Forest Service are not making decisions on federal minerals beneath surfaces managed by other federal agencies; therefore, only federal minerals beneath BLM-administered, National Forest System, private, and state surface are discussed in **Chapters 3** and **4** as being part of the decision area.

Leasable Minerals

Leasable minerals, as defined by the Mineral Leasing Act (February 1920) and 43 CFR, Parts 3000-3599 (1990), include leasable solid and leasable fluid minerals. Leasable fluid minerals are oil, natural gas (including methane, coal bed natural gas, and carbon dioxide), and geothermal resources. Leasable solid minerals

include coal, native asphalt, phosphate, sodium, potassium, and sulfur. The rights to explore for and produce these minerals on public land are acquired through leasing.

In addition to the Mineral Leasing Act, the Federal Onshore Oil and Gas Leasing Reform Act of 1987 regulates oil and gas leasing activities on National Forest System lands. This act expands the authority of the Secretary of Agriculture in the management of oil and gas resources on National Forest System lands. Without Forest Service approval, the BLM cannot issue leases for oil and gas on National Forest System lands. With the exception of geothermal activities on unleased lands, the BLM must approve all surface-disturbing activities on National Forest System lands before operations begin. The BLM and Forest Service reserve the right to require additional mitigation measures, in the form of COAs, at the time an APD or GDP is approved, if doing so is necessary for protection of other resources.

Fluid Leasable Minerals

Fluid leasable minerals are oil (including oil shale) and gas (including shale gas) and geothermal. 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. Geothermal is also governed by the Geothermal Steam Act of 1970, as amended. The rights to explore for and produce fluid minerals on public land may only be acquired through leasing.

Not all lands are open to fluid mineral leasing; the BLM will not issue leases for lands in the National Park System, National Recreation Areas, fish hatcheries or wildlife management areas administered by the DOI, Indian trust or restricted lands in or outside the boundaries of Indian reservations, Wilderness Areas, or Wilderness Study Areas administered by BLM, Forest Service, or other surface management agencies. In addition, leases are not issued if the BLM or Forest Service determines that issuing the lease would unnecessarily or unduly degrade public lands and resources.

Leases are issued through competitive and noncompetitive processes. Competitive leases are offered through a bid process in areas nominated by interested parties. Parcels that do not sell competitively are made available for over-the-counter purchase noncompetitively for the following two years. During the leasing process, the BLM may apply lease stipulations and notices. The Forest Service may also provide stipulations to be added to a lease as a condition of their consent to leasing. A lease stipulation is a provision that modifies standard lease rights. Stipulations are in addition to restrictions applied to field operations by federal regulations and become part of the lease, superseding any inconsistent provisions of the standard lease forms. The intent of a lease notice is to inform the lessee of a certain law or regulation that may impede their lease development.

Fluid Mineral Stipulations

During the leasing process, the Forest Service and BLM may apply stipulations to leases in order to protect other resource values or land uses (e.g., cultural resources and wildlife) by establishing authority for timing delays, site changes, or the denial of operations in the terms of the standard lease contract. There are three types of stipulations: no surface occupancy, controlled surface use, and timing limitations. These are defined as follows:

- No Surface Occupancy (NSO). On lands covered by the NSO stipulation, use or occupancy of the land surface for fluid mineral exploration or development is prohibited to protect identified resource values. 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. NSO is the most restrictive type of stipulation.
- Controlled Surface Use (CSU). Under the CSU stipulations, use and occupancy is allowed (unless restricted by another stipulation), but identified resource values require special operational constraints that may modify the lease rights. While less restrictive than an NSO, a CSU stipulation allows the BLM or surface managing agency to require special operational constraints, to shift the surface-disturbing activity, or to require additional protective measures (e.g., special construction techniques for preventing erosion in sensitive soils) to protect the specified resource or value.
- Timing Limitations (TLs). A TL stipulation prohibits surface use during specified periods to protect identified resource values. This stipulation does not apply to the operation and maintenance of production facilities unless the findings of analysis demonstrate the continued need for such mitigation and that less stringent, project-specific mitigation measures would be insufficient.
- As required by WO IM 2010-117, each BLM state with an oil and gas program had to develop standard stipulations. Standard fluid mineral stipulations are conditions that can be included in revisions and amendments to LUPs and RMPs, so that stipulation language is uniform across the state.

Most but not all stipulations attached to leases at the time of sale have a provision, specified in the individual LUP, for granting exceptions, modifications, or waivers. An exception is a case-by-case exemption from a lease stipulation. The stipulation continues to apply to all other sites in the leasehold to which the restrictive criterion applies. A modification is a fundamental change to the provisions of a lease stipulation, either temporarily or for the term of the lease. A modification may, therefore, include an exemption from or alteration to a stipulated requirement. Depending on the specific modification, the stipulation may or may not apply to all other sites in the leasehold to which the restrictive

criteria applied. A waiver is a permanent exemption from a lease stipulation. The stipulation no longer applies anywhere in the leasehold.

In addition to the designations and stipulations described above, federal regulations give the BLM the authority to ensure that oil, gas, and geothermal activities are conducted in a manner that minimizes impacts on other resources and resource uses and protects human health and safety. These protections are accomplished through the BLM's inspection and enforcement program, as well as through the attachment of COAs to each APD and GDP approved. This is in conjunction with the NEPA process and during review of individual applications for permit to drill and of sundry notices submitted in conjunction with proposed changes in well pad design and operation. These COAs typically include BMPs and other required mitigation measures, including attachment of TLs up to 60 days in duration.

The federal fluid mineral regulations do not allow the BLM to attach new stipulations to a lease after its issuance, without the consent of the lessee. Similar, the BLM may not apply COAs and other post-leasing restrictions that result in a de facto application of a new lease stipulation. Thus, for example, the BLM cannot apply a project-specific COA that is equivalent to an NSO on the lease since such restriction would violate the valid existing property rights conveyed with the leasehold.

Table 3-45 shows current management applicable to actions on BLM-administered and National Forest System lands.

Current Conditions

Oil and Gas

There are two major oil producing basins in the planning area: Railroad Valley and Pine Valley. There is a potential for a third production area in the Elko District being explored and developed by Noble Energy. There is no commercial natural gas development being produced in the planning area. On BLM-administered and National Forest lands, 14,642,300 acres are open to oil and gas leasing standard stipulation. Acres closed to oil and gas leasing total 1,884,300 (BLM and Forest Service GIS 2015).

Ely District Office. The highest oil producing region in Nevada is Railroad Valley. It is an elongated valley trending north to south, approximately 80 miles long and up to 20 miles wide. The Grant Canyon No. 3 well in Railroad Valley was one of the most prolific onshore oil wells in the continental United States, flowing up to 4,300 barrels of oil per day (Nevada Bureau of Mines and Geology, undated). In addition to the high potential area of Railroad Valley, much of the Ely District Office is identified as moderate potential and low potential for petroleum. Recent interest has focused on and will likely continue to focus on the Chainman Shale and the Pilot Shale.

Table 3-45
Stipulations Related to GRSG Habitat

Stipulation Type	Elko District Office	Ely District Office	Winnemucca District Office	Battle Mountain District Office	Carson City District Office	Northern California Field Offices	Forest Service
Seasonal	Seasonal restrictions from disturbance in GRSG crucial winter habitat apply from November 1 to March 15. This stipulation does not apply to operating facilities.	No surface activity would be allowed in winter range for GRSGs from November 1 through March 31. **Exception:** An exception to this stipulation may be granted by the BLM Authorized Officer, in consultation with NDOW, if the operator submits a plan that demonstrates that impacts from the proposed action are minimal or can be adequately mitigated. **Modification:** The boundaries of the stipulated area may be modified if the BLM Authorized Officer, in consultation with NDOW, determines that portions of the area no longer contain GRSG winter habitat. The dates for the timing restriction may be modified if new	NV-WDO-WILD-02, TL (2002/2008) Timing limitations on known or potential GRSG habitat. Before entry on any lease areas, which include known or potential habitat, the lessee (operator) shall contact the appropriate BLM Field Office to discuss any proposed activities. During the times specified below, development or exploration activities must be avoided in known or potential nesting, brood-rearing, and winter habitat, and within 0.6 mile of known or potential habitat (PMUs). The times specified are in accordance with interim Nevada Guidelines or as determined by field office and wildlife personnel. Nesting habitat and brood-rearing habitats: April through August Winter habitats: October through March.	**Tonopah:** No surface use is allowed in GRSG winter habitat from February 15 to May 15. This stipulation does not apply to operations and maintenance of production facilities. **Mount Lewis:** Same as seasonal range.	Seasonal restriction on activities from March 1 to July 30 on GRSG habitat in the Pine Nut Mountains.	**Alturas:** NSO in ¼-mile of active GRSG leks. Seasonal restrictions from March 1 to June 15 in GRSG habitat. From March 1 to June 15, maintenance would not be permitted between 3:00 a.m. and 9:00 a.m.. Exhaust noise from pump jacks must be muffled so as not to exceed 75 decibels measured at 30 feet from the source of the noise. Exceptions to this requirement will be considered for areas of no or low GRSG strutting activity, or unoccupied habitat, including leks. Maintain 7-inch grass height in nesting habitat. Limit prescribed fire in nesting habitat. Prohibit sagebrush removal. **Eagle Lake**: Maintain 7-inch grass height in nesting habitat.	**Stipulation:** Controlled Surface Use **Objective:** To require that activities be located or designed to avoid or minimize the potential for adverse effects on GRSG summer habitat and to ensure that the viability of GRSG is not adversely affected. **Waiver:** None **Exception:** None **Modification:** A modification of the stipulation may be granted if new habitat studies or surveys show that a portion of the area does not contain summer habitat or the habitat is not occupied; the SLT would then apply.

Table 3-45
Stipulations Related to GRSG Habitat

Stipulation Type	Elko District Office	Ely District Office	Winnemucca District Office	Battle Mountain District Office	Carson City District Office	Northern California Field Offices	Forest Service
		information indicates the dates are not valid for the leasehold. **Waiver:** The stipulation may be waived if the BLM Authorized Officer, in consultation with NDOW, determines that the entire leasehold no longer contains winter range for GRSGs.				Limit prescribed fire in nesting habitat. Prohibit sagebrush removal. **Surprise:** Within 0.30 mile of leks, reduce human activity in early morning and late evening from March 1 to May 15. Maintain 7-inch grass height in nesting habitat. Limit prescribed fire in nesting habitat. Prohibit sagebrush removal.	
Brood-rearing	Seasonal protection from disturbance. Seasonal restrictions from disturbance on GRSG brood rearing areas apply in 0.5 mile or other appropriate distance, based on site-specific conditions	No Stipulation.	Timing limitations on known or potential GRSG habitat. Before entering any lease areas that include known or potential habitat, the lessee (operator) shall contact the appropriate BLM Field Office to discuss any proposed activities. During the times specified below, avoid all development or exploration in known or potential nesting, brood-rearing, and winter habitat, and in 0.6 mile of known or	**Tonopah:** No Stipulation. **Mount Lewis:** Same as seasonal range.	No Stipulation.	**Alturas:** Seasonal restrictions from March 1 to June 15 in GRSG habitat. From March 1 to June 15, maintenance would not be permitted between 3:00 a.m. and 9:00 a.m. Prohibit broadcast spraying in 3.75 miles of nesting and brood-rearing habitat. Prohibit insecticide use in brood-rearing habitats. **Eagle Lake:** Prohibit broadcast spraying in	**Stipulation:** Timing Limitation: March 15 to July 15 **Objective:** To protect occupied or potential habitat for nesting and early brood-rearing. **Waiver:** None. **Exception:** None. **Modification:** A modification of the stipulation/lease restriction may be granted if new habitat studies or surveys show that a portion

Table 3-45
Stipulations Related to GRSG Habitat

Stipulation Type	Elko District Office	Ely District Office	Winnemucca District Office	Battle Mountain District Office	Carson City District Office	Northern California Field Offices	Forest Service
	from May 15 to August 15, inclusive. This restriction does not apply to operating facilities.		potential habitat (PMUs). The times specified are per interim Nevada Guidelines or as determined by field office and wildlife personnel. Nesting habitat and brood-rearing habitats: April through August Winter habitats: October through March			3.75 miles of nesting and brood-rearing habitat. Prohibit insecticide use in brood-rearing habitats. **Surprise:** Prohibit broadcast spraying in 3.75 miles of nesting and brood-rearing habitat. Prohibit insecticide use in brood-rearing habitats.	of the area does not contain nesting/early brood-rearing habitat or the habitat is not occupied; the SLT would then apply.
GRSG Leks	Seasonal protection from disturbance. NSO is permitted in 0.5 mile, or other lesser, appropriate distance, based on site-specific conditions of GRSG leks.	No surface use would be allowed within 0.25 mile of a GRSG lek. **Exception:** An exception to this stipulation may be granted by the BLM Authorized Officer, in consultation with NDOW, if the operator submits a plan that demonstrates that impacts from the proposed action would not affect breeding activity nor degrade the integrity of the habitat associated	No surface occupancy within 2 miles of known leks at all times.	**Tonopah:** No surface use is allowed within 0.25 mile radius of a GRSG lek in all valleys throughout the BLM Battle Mountain Resource Area. This stipulation does not apply to operations and maintenance of production facilities. No surface activity is allowed with 2 miles of a GRSG lek from March 1 through May 15. This stipulation does not apply to operations and	Spring restrictions on GRSG strutting grounds north of Cold Springs in the Dixie and Edwards Creek Valley Area.	**Alturas:** Seasonal restrictions from March 1 to June 15 in GRSG habitat. From March 1 to June 15, maintenance would not be permitted between 3:00 a.m. and 9:00 a.m. Exhaust noise from pump jacks must be muffled so as not to exceed 75 decibels, measured at 30 feet from the source of noise. Exceptions to this requirement will be considered for areas of no or low GRSG strutting activity or unoccupied habitat,	**Stipulation:** No Surface occupancy—2-mile radius buffer around leks. **Objective:** To preclude disturbance to all leks. **Waiver:** None. **Exception:** None. **Modification:** A modification of the stipulation/lease restriction may be granted if field studies show that a lek has not been used in the last 5 years; the SLT would then apply.

Table 3-45
Stipulations Related to GRSG Habitat

Stipulation Type	Elko District Office	Ely District Office	Winnemucca District Office	Battle Mountain District Office	Carson City District Office	Northern California Field Offices	Forest Service
		with the GRSG lek. **Modification:** The boundaries of the stipulated area may be modified if the BLM Authorized Officer, in consultation with NDOW, determines that portions of the area can be occupied without adversely affecting the GRSG lek. **Waiver:** The stipulation may be waived if the BLM Authorized Officer, in consultation with NDOW, determines that the lek has been inactive for at least 5 consecutive years or the habitat has changed such that there is no likelihood the lek will become active.		maintenance of production facilities. **Mount Lewis:** Same as seasonal range.		including leks. Restrict OHV use within 2 miles of leks. Restrict aerial gunning of predators within 2 miles of leks. Limit prescribed fire in leks and nesting habitat. Prohibit transmission line within 2 miles of leks. No fences within 2 miles of leks. **Eagle Lake:** NSO restrictions on lands 0.25 to 0.60 mile from leks. Structures that could serve as raptor perches would not be allowed within 2 miles of active leks. Closed to exploration and development of leasable minerals within 0.25 mile of leks. Restrict OHV use within 2 miles of leks. Restrict aerial gunning of predators within 2 miles of leks. Limit prescribed fire in leks and nesting habitat.	

Table 3-45
Stipulations Related to GRSG Habitat

Stipulation Type	Elko District Office	Ely District Office	Winnemucca District Office	Battle Mountain District Office	Carson City District Office	Northern California Field Offices	Forest Service
						Prohibit transmission line within 2 miles of leks. No fences within 2 miles of leks. **Surprise:** Within 0.30 mile of leks, reduce human activity in early morning and late evening from March 1 to May 15. Restrict OHV use within 2 miles of leks. Restrict aerial gunning of predators within 2 miles of leks. Limit prescribed fire in leks and nesting habitat. Prohibit transmission line within 2 miles of leks. No fences within 2 miles of leks.	

Sources: BLM and Forest Service 2008; Forest Service 2007b

Battle Mountain District Office. A portion of the Railroad Valley, described above, lies in the Battle Mountain District Office; this portion is not identified as GRSG habitat. In addition to the high potential area of Railroad Valley, a small portion of the remaining area of the Battle Mountain District Office is identified as moderate and low potential for petroleum and contains GRSG habitat. Recent interest has focused on, and will likely continue to focus on, the Chainman Shale and the Pilot Shale.

Elko District Office. The second highest oil-producing region in Nevada is Pine Valley, which is in the Elko District Office. It is an elongated valley, trending north to south, approximately 30 miles long and 15 miles wide, in Eureka County. Production of oil in Pine Valley has been declining over recent years. Oil and gas operators have not indicated an interest in drilling new wells there. To the east and northeast of Pine Valley is an area identified as moderate potential for the presence of petroleum. Noble Energy has already drilled two exploration wells on private land 17 miles east of Elko, one on federal land 20 miles west of Jiggs, Nevada (Huntington Valley), and a third well in Marys River, 4 miles northwest of Wells, Nevada. Much of the moderate- to high-potential areas identified for petroleum in the Elko District Office are GRSG habitat.

In 2007, the Humboldt-Toiyabe National Forest issued a ROD that specified lands in the White Pine and Grant-Quinn Divisions that are available for oil and gas leases and the conditions controlling those leases (Forest Service 2007b). The decision makes available approximately 250,000 acres of National Forest System lands in the planning area for oil and gas leasing. This decision does not authorize specific lease activities in specific areas. A separate analysis compliant with the NEPA and a separate decision will be necessary to authorize those activities.

As shown on **Table 3-46** and **Table 3-47**, most of the planning area is open to oil and gas leasing. There are currently almost 8,000,000 acres of lands open to oil and gas leasing in PPH and approximately 4,800,000 acres open in PGH.

Table 3-46
Acres Open to Oil and Gas Leasing with Standard Stipulations in GRSG Habitat by MZ and Surface Management Agency

Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
BLM	III	3,477,600	3,454,700	6,932,300
	IV	2,707,500	175,800	2,883,300
	V	1,540,600	672,100	2,212,700
Forest Service	III	261,800	568,900	830,700
	IV	0	0	0
	V	0	0	0

Table 3-46
Acres Open to Oil and Gas Leasing with Standard Stipulations in GRSG Habitat by MZ and Surface Management Agency

Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
Other	III	200	0	200
	IV	0	0	0
	V	800	0	800

Source: BLM and Forest Service GIS 2015

Table 3-47
Acres Closed to Oil and Gas Leasing in GRSG Habitat by MZ and Surface Management Agency

Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
BLM	III	78,100	148,900	227,000
	IV	133,900	16,700	150,600
	V	702,100	143,700	845,800
Forest Service	III	39,500	114,700	154,200
	IV	13,100	26,900	40,000
	V	0	0	0
Other	III	200	100	300
	IV	0	37	37
	V	6,600	800	7,400

Source: BLM and Forest Service GIS 2015

Oil and Gas Potential

Table 3-48 shows the number of acres of lands with low, moderate, and high oil and gas potential in GRSG habitat. These acres would be affected by placing major to moderate constraints (e.g. closures, NSO, TL, and CSU) over them. For more information on oil and gas potential, refer to **Appendix P**, RFD for Fluid Minerals.

Table 3-48
Acres of Oil and Gas Potential in GRSG Habitat

Potential	Acres in PPH	Acres in PGH	Acres in OHMA	Acres in SFA	*Total Acres
High	228,800	227,500	328,800	0	785,100
Moderate	1,008,300	1,356,800	785,500	0	3,150,600
Low	2,555,600	2,008,200	2,167,200	2,797,400	9,528,400

Source: BLM GIS 2015

Oil and Gas Trends on BLM-Administered and National Forest Lands

Swings in the natural gas market are the likely driver in the industry's interest for oil and gas leases and the resulting requests for leasing and for filing of APDs. As prices rise, more interest in oil and gas development is expected (BLM 2009a). With moderate to high potential in several areas in the planning area, drilling is expected to increase (**Figure 3-13**).

Geothermal Resources

Geothermal resources are significant in portions of the planning area. In recent years, industry has focused its exploration and use efforts in Nevada more so than in any other state. As a result several geothermal power plants have been constructed. Recently completed geothermal power plants in Nevada are the McGinness Hills I and II Geothermal Power Plants (each with a 48-megawatt capacity) and the Don A. Campbell Geothermal Power Plant (20-megawatt capacity) at the Wild Rose Geothermal Project Area. Additionally, the Don A. Campbell II Geothermal Power Plant (20-megawatt capacity) is under construction. There are five more geothermal power plants approved or pending approval in the planning area that have not been constructed. These plants have the potential to produce approximately 280 megawatts combined.

On BLM-administered and National Forest lands, 14,642,300 acres are open to geothermal leasing standard stipulation. Acres closed to geothermal leasing total 1,884,300 (BLM and Forest Service GIS 2015). **Figure 3-14** shows the lease areas and geothermal power plants with federal Interest in the planning area.

In 2012, the Humboldt-Toiyabe National Forest issued a ROD that identified approximately 4,000 acres on the Austin/Tonopah Ranger Districts and 3,500 acres in the Ely Ranger District that are available for geothermal leasing.

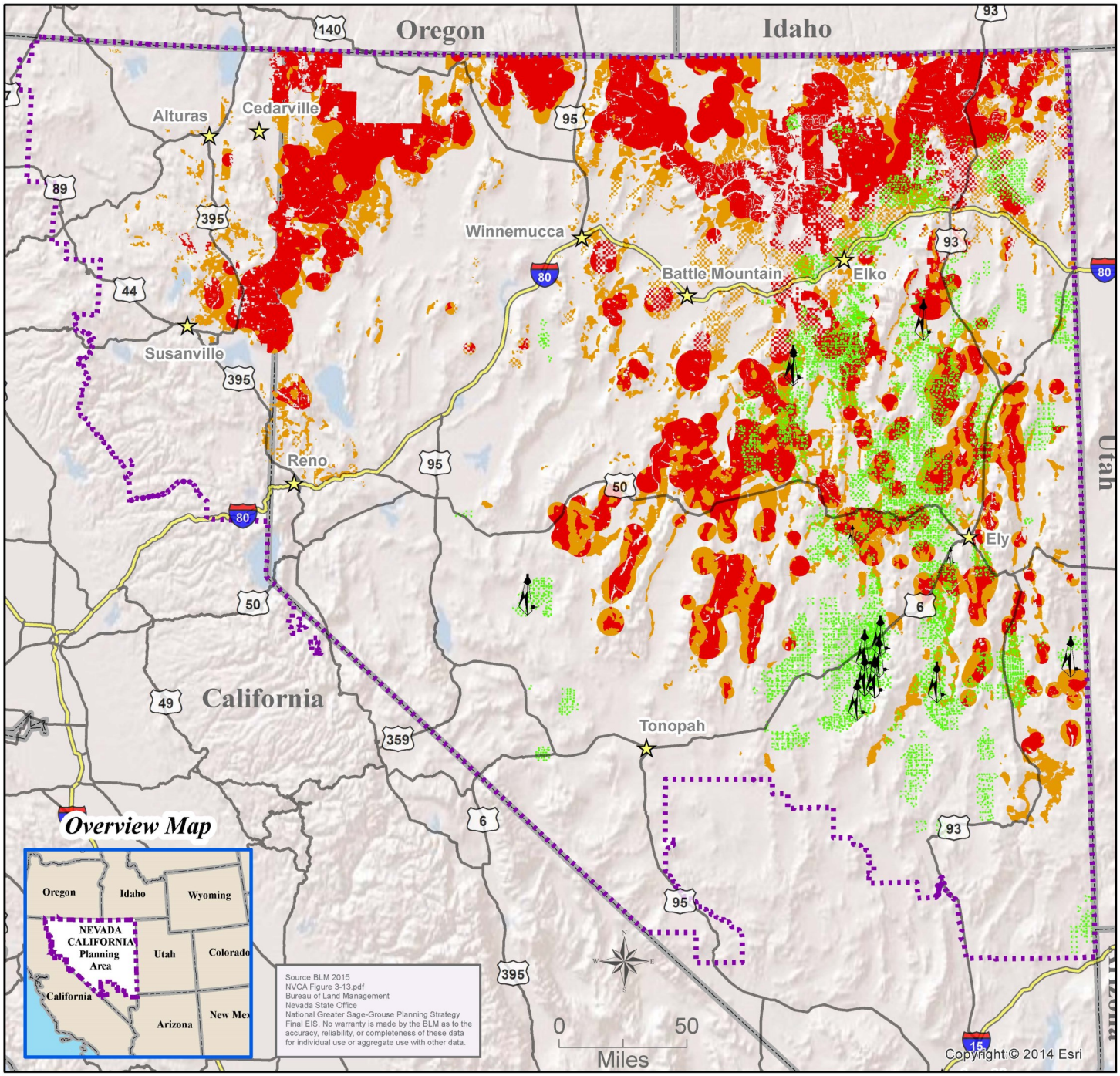
As shown by the data in **Table 3-49**, there are 9,697,800 acres open in PPH and 5,887,900 acres open in PGH.

Table 3-49
Acres Open to Geothermal Leasing in PPH and PGH by MZ and Surface Management Agency

Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
BLM	III	3,477,600	3,454,700	6,932,300
	IV	3,917,600	1,016,200	4,933,800
	V	1,540,600	672,100	2,212,700
Forest Service	III	261,800	568,900	830,700
	IV	499,400	175,800	675,200
	V	0	0	0
Other	III	0	200	200
	IV	0	0	0
	V	800	0	800

Source: BLM and Forest Service GIS 2015

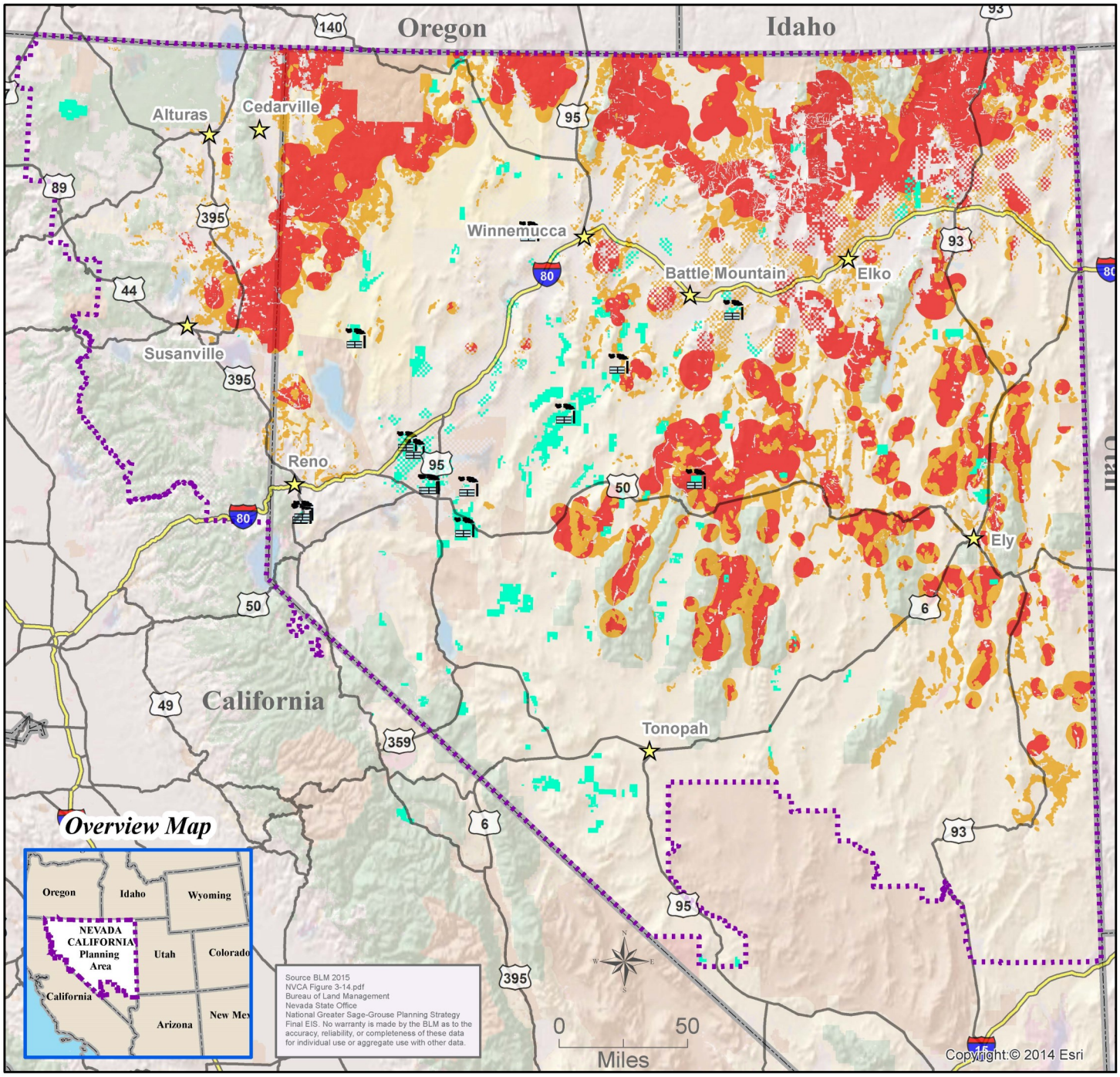
Existing Oil and Gas Leases and Wells



Legend

- Active Oil Wells
- Oil and Gas Leases
- Preliminary Priority Habitat (PPH)
- Preliminary General Habitat (PGH)
- City/Town
- Interstate
- US Route
- States
- Planning Area

Existing Geothermal Leases and Geothermal Power Plants



Legend

- Geothermal Power Plants
- Geothermal Leases
- Preliminary Priority Habitat (PPH)
- Preliminary General Habitat (PGH)
- City/Town
- Interstate
- US Route
- States
- Planning Area

As shown by the data in **Table 3-50**, in GRSG habitat there are 33,600 acres of geothermal leases in PPH and 39,100 acres in PGH.

Table 3-50
Acres of Geothermal Leases in GRSG Habitat

Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
BLM	III	12,800	13,400	26,200
	IV	19,100	22,100	41,200
	V	1,700	3,300	5,000
Forest Service	III	0	300	300
	IV	0	0	0
	V	0	0	0
Other	III	0	0	0
	IV	0	0	0
	V	0	0	0
Grand Total		**33,600**	**39,100**	

Source: BLM and Forest Service GIS 2015

Geothermal Trends on BLM-Administered and National Forest Lands

The decision area has significant geothermal potential. Based on USGS data, there is particularly high potential in northeastern portions of the planning area (Williams et al. 2008). However, the BLM has seen a decrease in geothermal leasing recently.

Table 3-51 shows the number of acres of suitable GRSG habitat in lands described as having geothermal potential in the decision area.

Table 3-51
Acres of Geothermal Potential in GRSG Habitat

Geothermal Potential in Nevada	Acres in PPH	Acres in PGH	Total Acres
High	371,300	334,200	705,500
Moderate	3,937,900	3,111,800	7,049,700
Low	4,890,000	3,145,300	8,035,300

Source: BLM and Forest Service GIS 2015

Solid (Nonenergy) Leasable Minerals

Solid leasable minerals are coal, sodium, potash, and phosphate. Similar to fluid leasable minerals, discussed above, nonenergy 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. The basic process starts with a prospecting permit under 43 CFR, Part 3500, that allows surface disturbance to

determine if a valuable mineral exists. If the permittee demonstrates the discovery of a valuable deposit of the leasable mineral for which the BLM issued the permit, the BLM may issue a preference right lease to that permittee without competition.

The rules for leasing coal (43 CFR, Part 3400) are significantly different from those of the other solid minerals but are not discussed further in this Proposed LUPA/Final EIS because there are no leasable coal deposits in the planning area.

Current Conditions

Identified solid leasable minerals in the planning area are potassium and sodium. On BLM-administered and National Forest lands, 14,642,300 acres are open to solid (nonenergy) leasable minerals. Acres closed to solid (nonenergy) leasable minerals total 1,884,300 (BLM and Forest Service GIS 2015). In the planning area there are 3,660 acres of approved solid leasable leases and prospecting permits. None of these permits are in PGH or PPH (BLM 2013b).

While solid leasable minerals are in the planning area, they are not a significant resource and there is no significant production of these minerals underway. However, several BLM districts have seen an increase in application submittals. There are 41 pending prospect permit applications (81,302 acres; BLM 2013b) in the planning area. Thirty of these pending permits are in the Battle Mountain District Office and total 58,908 acres. None of the pending permits are in PGH or PPH. There is one prospecting permit application (2,560 acres) pending for phosphate in the Elko District Office, which is in both PGH and PPH.

Ten pending prospecting permits for potassium are in the Winnemucca District Office (19,834 acres). Portions of these leases are also in PGH and PPH.

Trends on BLM-Administered and National Forest Lands

Since solid leasable minerals are not a significant resource in the planning area, and few pending and no approved prospect permit applications have portions that are in PGH or PPH, significant future activity affecting GRSG habitat is not anticipated.

Locatable Minerals

Locatable minerals include gold, silver, platinum, copper, lead, zinc, magnesium, nickel, tungsten, bentonite, uranium, vanadium, and uncommon varieties of mineral materials.

Mineral exploration and the development of locatable mineral deposits are nondiscretionary actions allowed under the General Mining Law of 1872 on all BLM-administered and National Forest System lands, unless they are withdrawn from mineral entry by Secretarial Public Land Order (PLO) or an act of Congress. Subject to valid existing rights, these areas are withdrawn from further location of mining claims or sites. Stipulations do not apply to locatable mineral development. However all operations under a BLM Plan or Forest

Service Plan of Operations are required to follow the performance standards in 43 CFR, Part 3809.420, or 36 CFR, Part 228.8. Regulations require the claimant to prevent unnecessary or undue degradation of the land. To restrict locatable mineral development, the BLM or Forest Service must petition the Secretary of the Interior for withdrawal actions, with subsequent validity exams for existing claims.

Locatable minerals acquired by staking a mining claim over the deposit and obtaining the necessary permits to explore or mine. In a mining claim, the surface lands remain open to the public for other multiple uses. Placer claims, which are for minerals found in geologic sediments rather than in veins, are also managed under the General Mining Law of 1872. Miners locate claims in order to develop the mineral values in a specified area.

Current Conditions

Mineral exploration and locatable mineral deposit development are allowed unless they are withdrawn from mineral entry by Secretarial PLO or an act of Congress. There are 2,846,600 acres withdrawn from further location of mining claims or sites in the planning area. The remaining 52,232,300 acres in the planning area are open to locatable mineral exploration and development (**Table 3-52**).

Table 3-52
Locatable Minerals

	Acres in Planning Area	Acres in PPH	Acres in PGH	Total Acres PPH and PGH
Withdrawn from locatable mineral entry	2,846,600	230,700	290,900	521,600
Open to locatable mineral exploration or development	52,232,300	9,342,600	6,662,400	16,005,000

Source: BLM and Forest Service GIS 2015

Gold, silver, and copper are the primary mineral resources in the planning area and are therefore the focus of discussion for this section.

In **Table 3-53**, acres are presented by surface management agency and their presence in PPH and PGH in the planning area.

Table 3-53
Acres Open to Locatable Mineral Exploration in GRSG Habitat

Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
BLM	III	3,505,500	3,651,200	7,156,700
	IV	2,908,700	1,139,500	4,048,200
	V	2,162,000	1,122,200	3,284,200

Table 3-53
Acres Open to Locatable Mineral Exploration in GRSG Habitat

Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
Forest Service	III	263,200	565,400	828,600
	IV	503,200	184,100	687,300
	V	0	0	0
Other	III	0	200	200
	IV	0	0	0
	V	1,400	300	1,700

Source: BLM and Forest Service GIS 2015

Conditions on BLM-Administered Lands

The BLM administers 45,359,000 acres of federal mineral estate in the planning area.

Mining claims for gold, silver, and copper are found throughout the planning area. The largest concentration of mining claims is in north-central Nevada.

Conditions on National Forest System Lands

The Forest Service administers 9,719,900 acres of federal mineral estate in the planning area. Mining claims for gold, silver, and copper may be found throughout the planning area. However, mining projects are not as common on National Forest System land as on BLM-administered land.

Trends on BLM-Administered Lands

The price of gold, silver, and copper have risen over the last few years, and there is increased interest in developing ore deposits for these minerals and expanding existing mines in the decision area, particularly in Nevada. As technology has improved, there has also been interest in processing mining tailing piles in previously mined areas to extract additional minerals. There have been approximately 6,727 notices and 576 plans of operation submitted in Nevada and 1,012 notices and 944 plans of operation submitted in California since 1981 (LR2000). Before 1981, no regulations existed giving the BLM the authority to regulate mining operations. Therefore, the total number and locations of previously mined areas in the planning area is undocumented.

The number of notices and plans of operation received by the California and Nevada BLM from 2004 to 2013 is shown in **Table 3-54**.

This table does not show a defined trend for the number of notices and plans of operation being reviewed by the California BLM. However, the number of notices received by the Nevada BLM show a general increase and then a decrease. This trend may be explained by the increase and subsequent decrease in metal prices for gold, silver, and copper.

Table 3-54
Notices and Plans of Operations Received by the California and Nevada BLM

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
California										
Notices	23	26	5	13	14	24	35	21	21	25
Plans	20	6	12	5	13	19	9	14	12	12
Nevada										
Notices	182	146	207	136	149	233	217	318	276	223
Plans	42	22	11	11	16	37	46	50	49	60

Source: Public Land Statistics 2004-2014

Trends on National Forest System Lands

Most development on National Forest System lands has been in the form of exploration projects. The trend for locatable mineral development has remained fairly constant between 2004 and 2013 and is expected to remain constant.

Mineral Materials

Mineral materials include sand, gravel, and construction materials that are sold or permitted under the Materials Act of 1947. Mineral materials are sold at a fair market value or through free use permits to governmental agencies. Local government agencies and nonprofit organizations may obtain these materials free of cost for community purposes. These operations can occur for a specific time frame or can be permitted for a 10-year term.

The BLM sells material out of community pits at fair market value using a mineral material negotiated contract or cash sale. The Forest Service also disposes of mineral materials by free use or sale. Disposal of mineral materials is discretionary, as is the sale or disposal of mineral materials. The BLM and Forest Service may choose to not allow mineral material production to protect resources. County and state road construction divisions are significant users of gravel and sand resources. Sand and gravel, as construction aggregate, is an extremely important resource. The extraction of the resource varies directly with the amount of development nearby (e.g., road building and maintenance and urban development), as sand and gravel is necessary for that infrastructure development. Even more so than other resources, however, the proximity of both transportation and markets are key elements in the development of a deposit.

California and Nevada are producers of significant quantities of construction sand and gravel, crushed stone, dimension stone, and common clays. Occurrence potential for these resources and other mineral materials spans the two states, with heavier concentrations on their northern halves.

Conditions on BLM-Administered and National Forest System Lands

Most of the decision area is open to salable mineral material development. Specific closures of areas to salable mineral materials, such as ACECs or crucial

or essential wildlife habitat, exist throughout the planning area. Some LUPs contain use and development restrictions in terms of seasonal timing limitations in relation to GRSG habitat and leks, similar to oil and gas leasing; however, this is not consistent across the planning area. These are identified mostly in the more recent LUPs and use similar buffers (e.g., 2 miles). No LUPs in the planning area contain specific goals, objectives, or management actions relative to conservation or protection of GRSGs beyond the use restrictions identified above.

Sand and gravel are the primary mineral materials found in the planning area and are therefore the focus of discussion for this section. **Table 3-55** lists data compiled in a baseline environmental report produced by the USGS for the BLM. Acres are presented by surface management agency and their presence in PGH and PPH in the planning area.

Table 3-55
Acres of Mineral Material Disposal Sites in GRSG Habitat

Surface Management Agency	Management Zone	Acres in PPH	Acres in PGH	Total
BLM	III	6,100	13,100	19,200
	IV	2,900	2,200	5,100
	V	300	900	1,200
Forest Service	III	0	200	200
	IV	0	0	0
	V	0	0	0
Other	III	400	6,100	6,500
	IV	4,000	4,800	8,800
	V	200	0	200

Source: BLM and Forest Service GIS 2015

Trends on BLM-Administered and National Forest System Lands

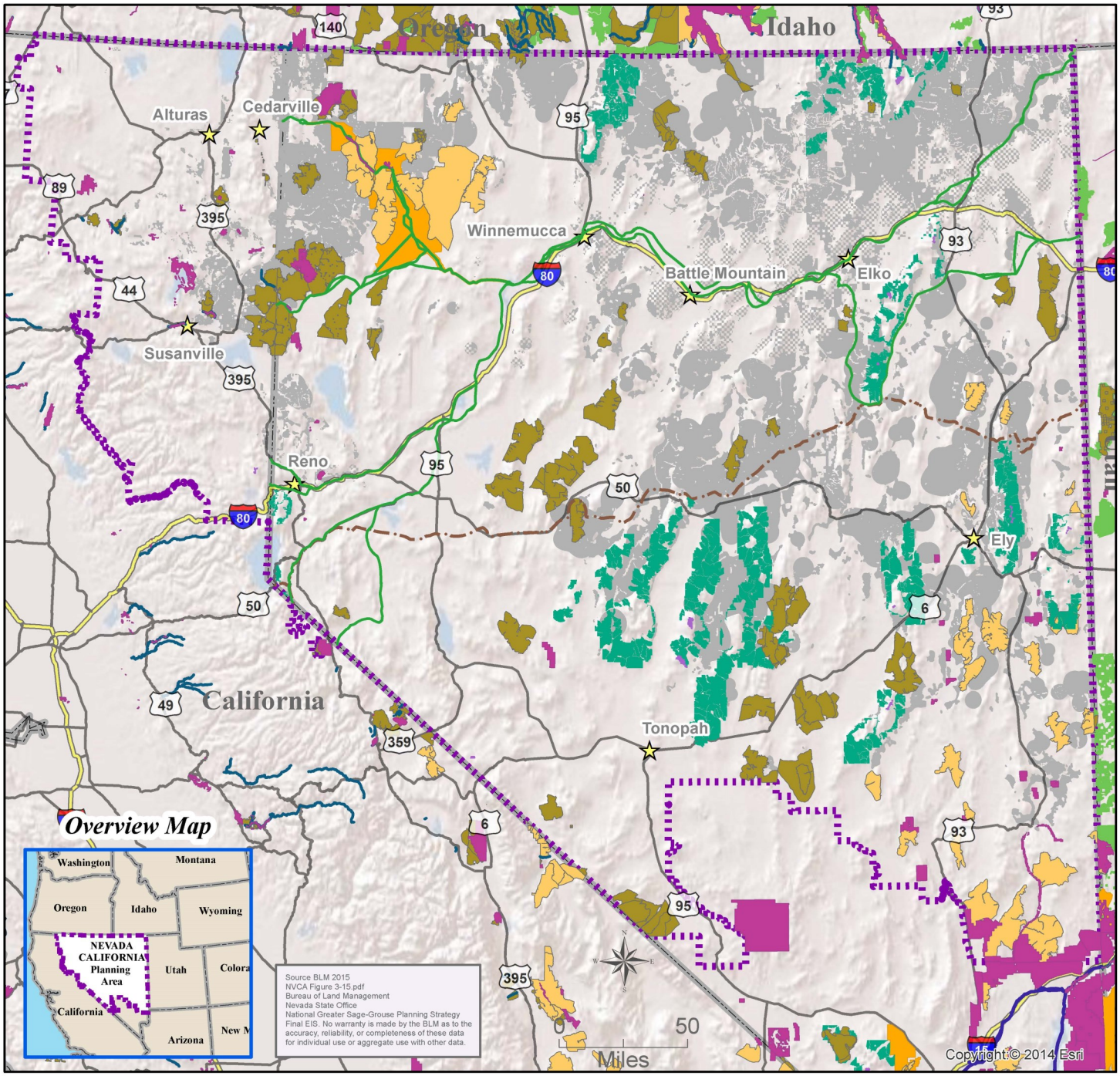
In remote areas, an increased demand for future mining of mineral materials is unlikely in areas identified as PPH or PGH. In nearby urban areas, such as Elko, Winnemucca, and Reno, demand will continue to be significant, with long-term concerns regarding the availability of mineral materials in future decades.

3.14 SPECIAL DESIGNATIONS

This section discusses existing conditions for the following BLM special designation areas: ACECs, Wilderness, WSAs, NCAs, NHTs, Byways, and WSRs.

The following areas are considered special designations on National Forest System lands and are discussed in this section: Wilderness, inventoried roadless areas, special interest areas, and research natural areas (RNAs). **Figure 3-15** provides a visual overview of the locations of special designations in relation to GRSG habitat in the planning area.

Special Designations and Other Important Resources



Legend

National Scenic and Historic Trails
- California
- Old Spanish
- Pony Express
- National Wild and Scenic Rivers
- National Wilderness Areas
- National Wilderness Study Areas
- National Monuments, Conservation Areas and Similar Designations
- NLCS Other Related Lands Polygons
- Areas of Critical Environmental Concern
- Research Natural Areas (RNAs)
- Forest Service Roadless Areas
- City / Town
- Interstate
- US Routes
- States
- Planning Area
- Preliminary Priority and General Habitat

3.14.1 Areas of Critical Environmental Concern and Research Natural Areas

An ACEC is defined in FLPMA Section 103(a) as an area on BLM-administered lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes or to protect life and ensure safety from natural hazards. BLM regulations for implementing the ACEC provisions of FLPMA are found in 43 CFR, Part 1610.7-2(b), and guidance is provided in BLM Manual 1613 (BLM 1988b).

ACECs differ from some other special management designations in that designation by itself does not automatically prohibit or restrict other uses in the area. The special management attention is designed specifically for the relevance and importance values and, therefore, varies from area to area. Restrictions that arise from an ACEC designation are determined at the time the designation is made and are designed to protect the relevance and importance values or serve the purposes for which the designation was made. The BLM identifies goals, standards, and objectives for each proposed ACEC as well as general management practices and uses, including necessary constraints and mitigation measures. In addition, ACECs are protected by the provisions of 43 CFR, Part 3809.1-4(b)(3), which requires an approved plan of operations for activities resulting in more than 5 acres of disturbance under the mining laws.

BLM RNAs are where natural processes are allowed to predominate and that are preserved for the primary purposes of research and education. Under current BLM policy, RNAs must meet the relevance and importance criteria of ACECs and are, therefore, designated as ACECs. The ACEC procedures also are used to designate outstanding natural areas (ONAs), which may also be included as part of designated ACECs.

Current Condition

There are approximately 256,000 acres in 29 currently designated BLM ACECs in the planning area; of this, approximately 113,700 acres contain PPH and PGH GRSG habitat. These ACECs are shown on **Table 3-56**.

Appendix S details the evaluation of relevance and importance criteria for ACECs nominated as part of this effort.

Table 3-56
Designated Areas of Critical Environmental Concern in GRSG Habitat

ACEC Name	District/Field Office	ACEC Total Acres	Relevant and Important Values of the ACEC	Acres in PPH	Acres in PGH	Total Acres in Habitat
Ash Valley	Alturas Field Office	1,200	Threatened and endangered species	-	100	100
Baking Powder Flat	Ely District	13,600	Vegetation	700	2,100	2,800

Table 3-56
Designated Areas of Critical Environmental Concern in GRSG Habitat

ACEC Name	District/Field Office	ACEC Total Acres	Relevant and Important Values of the ACEC	Acres in PPH	Acres in PGH	Total Acres in Habitat
Bitner	Surprise Field Office	1,900	Cultural and wildlife	1,900	-	1,900
Blue Mass Scenic Area	Ely District	1,000	scenic and cultural	-	-	0
Buffalo Creek Canyons	Eagle Lake and Surprise Field Offices/Winnemucca District	35,800	Cultural and scenic	17,700	6,800	24,500
Carson Wandering Skipper	Carson City District	330	Biological	-	-	0
Condor Canyon	Ely District	4,500	Spinedace critical habitat	-	4,500	4,500
Eagle Lake Basin	Eagle Lake Field Office	32,100	Cultural and wildlife	-	5,800	5,800
Emigrant Trails	Alturas Field Office	1,700	Cultural	-	200	200
High Rock Canyon	Winnemucca District	6,000	Cultural, scenic, wildlife	6,000	-	6,000
Honeymoon Hill/City of Rocks	Ely District	3,900	Cultural	1,900	1,100	3,000
Incandescent Rocks	Carson City District	1,100	Scenic	-	100	100
Lower Meadow Valley Wash	Ely District	24,900	Threatened and endangered wildlife	-	-	0
Lower Smoke Creek	Eagle Lake Field Office	900	Watershed and cultural	-	100	100
Massacre Rim	Surprise Field Office	48,400*	Cultural and wildlife	46,300	1,500	47,800
Mountain Peaks	Alturas Field Office	3,800	Scenic and vegetation	-	1,500	1,500
North Dry Valley	Eagle Lake Field Office	10,400	Cultural, geologic, wildlife	-	900	900
Old Growth Juniper	Alturas Field Office	3,200	Vegetation	-	900	500
Osgood Mountains Milkvetch	Winnemucca District	100	Vegetation	-	-	0
Pah Rah Basin Petroglyph	Carson City District	3,900	Cultural	-	1,400	1,400
Pine Dunes	Eagle Lake Field Office	2,900	Geologic and vegetation	-	2,600	2,600
Schlesser Pincushion	Ely District	4,900	Threatened and endangered species—vegetation	-	-	0
Shoshone Ponds	Ely District	1,200	Vegetation and threatened and endangered fish	-	200	200

Table 3-56
Designated Areas of Critical Environmental Concern in GRSG Habitat

ACEC Name	District/Field Office	ACEC Total Acres	Relevant and Important Values of the ACEC	Acres in PPH	Acres in PGH	Total Acres in Habitat
Solider Meadows	Winnemucca District	2,100	Cultural	-	-	0
Swamp Cedar	Ely District	3,200	Vegetation and historical	-	-	0
Upper Bruneau Canyon	Elko District/Twin Falls District	7,100	Cultural, wildlife, and scenic	5,500	1,300	6,800
White River Valley	Ely District	13,100	Threatened and endangered species	-	1,100	1,100
Willow Creek	Eagle Lake Field Office	2,200	Cultural and scenic	-	1,600	1,600
Yankee Jim	Alturas Field Office	1,700	Cultural and vegetation	400	500	900

Source: BLM and Forest Service GIS 2015
*Nevada acreage

3.14.2 Wilderness

In 1964, Congress passed the Wilderness Act (Public Law 88-577), establishing the National Wilderness Preservation System, a national system of lands, for the purpose of preserving a representative sample of ecosystems in a natural condition for the benefit of future generations. Wilderness areas are generally defined as natural environments that have not been significantly modified by human activity.

With few exceptions, most designated wilderness areas in Nevada have been managed as Wilderness Study Areas since 1979. Through congressional action regarding the establishment of NCAs or through proposed county land bills, some WSAs have been designated as wilderness. Designation has not been limited to WSAs; also included are several areas that were not previously managed for wilderness.

Current Condition

Currently, there are 40 Wilderness Areas (23 managed by the BLM and 17 managed by the Forest Service) in GRSG habitat in the planning area (see **Table 3-57**).

Table 3-57
Wilderness Areas

Wilderness Area	Acres of PPH	Acres of PGH	Wilderness Total Acres with GRSG Habitat
BLM Wilderness			
Becky Peak	1,600	7,900	9,500
Black Rock Desert	200	9,900	10,100

Table 3-57
Wilderness Areas

Wilderness Area	Acres of PPH	Acres of PGH	Wilderness Total Acres with GRSG Habitat
Bristlecone	-	-	0
Calico Mountains	-	19,400	19,400
East Fork High Rock Canyon	52,600	-	52,600
Far South Egans	500	24,000	24,500
Fortification Range	-	-	0
Goshute Canyon	400	9,000	9,400
Government Peak	-	-	0
High Rock Canyon	46,500	-	46,500
High Rock Lake	1,600	32,300	33,900
Highland Ridge	-	300	300
Little High Rock Canyon	40,900	7,500	48,400
Mount Grafton	6,300	15,500	21,800
North Black Rock Range	27,900	2,800	30,700
North Jackson Mountains	-	400	400
Pahute Peak	-	8,200	8,200
Parsnip Peak	-	1,500	1,500
Pine Forest Range	4,800	3,400	8,200
South Egan Range	100	2,900	3,000
South Jackson Mountains	-	3,100	3,100
White Rock Range	-	3,200	3,200
Worthington Mountains	-	-	0
Forest Service Wilderness			
Alta Toquima Wilderness	3,800	8,100	11,900
Arc Dome Wilderness	5,000	12,000	17,000
Bald Mountain Wilderness	1,000	3,300	4,300
Currant Mountain Wilderness	-	-	0
Currant Mountain Wilderness Addition	-	300	300
East Humboldt Wilderness	7,700	8,700	16,400
Grant Range Wilderness	-	500	500
High Schells Wilderness	2,400	18,100	20,500
Jarbidge Wilderness	1,200	8,100	9,300
Jarbidge Wilderness Addition	10,800	16,000	26,800
Mount Moriah Wilderness	-	-	0
Red Mountain Wilderness	-	200	200
Ruby Mountains Wilderness	7,700	9,300	17,000
Santa Rosa—Paradise Peak Wilderness	1,200	2,800	4,000
Shellback Wilderness	2,100	9,500	11,600
Table Mountain Wilderness	3,500	37,200	40,700
White Pine Range Wilderness	1,200	5,100	6,300

Source: BLM and Forest Service GIS 2015

3.14.3 Wilderness Study Areas

In 1976, Congress directed the BLM through Section 603(a) of FLPMA to identify those lands with wilderness character as potential areas to be included in the National Wilderness Preservation System. Within a 15-year time frame, BLM was to provide to Congress with recommendations of lands that consisted of the following:

> …those roadless areas of five thousand acres or more and roadless islands of public lands, identified during the inventory required by Section 201(a) of this act as having wilderness characteristics described in the Wilderness Act of September 3, 1964 and shall from time to time report to the President his recommendation as suitability or non-suitability of such area or island for the preservation of wilderness…

Since that time, these lands, now identified as Wilderness Study Areas (except those that have been released from Wilderness study by Congress), are managed in accordance with Section 603(c) of FLPMA, so as not to impair their suitability for preserving wilderness. The BLM's policy on managing WSAs is set forth in BLM Manual 6330, Management of Wilderness Study Areas (BLM 2012d).

The BLM manages approximately 50 million acres of public lands in Nevada and northeastern California. Statewide inventories resulted in approximately 4,680,000 acres in 113 areas in Nevada and in northeastern California being designated as Wilderness Study Areas in 1979-1980. Since the inception of the WSAs, various congressional actions have designated 2,079,020 acres of WSAs as Wilderness, which have been added to the National Wilderness Preservation System.

Current Condition

Throughout the planning area, there are 50 WSAs that contain 849,500 acres of PPH and PGH GRSG habitat. Of these, 47 are administered by BLM and three are administered by the Forest Service. On October 28, 1988, Public Law 100-550, also known as the National Forest and Public Lands of Nevada Enhancement Act of 1988, directed an exchange of administration of lands between the Forest Service's Toiyabe National Forest and the BLM's Battle Mountain District. In this exchange, the Forest Service acquired three BLM WSAs; PL 100-550 directed the Forest Service to continue WSA management on these lands in accordance with previous BLM management.

There are 18 other WSAs in Nevada and two WSAs in California that do not contain GRSG habitat; these 20 WSAs are not addressed further in this document. Only those WSAs that contain GRSG habitat are shown in **Table 3-58**. All WSAs are managed under specific guidance regarding activities and other resource management actions, which are provided in BLM Manual 6330, Management of Wilderness Study Areas. Under this guidance, all activities are required to meet nonimpairment criteria, meaning that all uses and facilities must be temporary and not create surface disturbance, unless one of the seven classes of allowable exceptions exists.

Table 3-58
Wilderness Study Areas

	Acres of PPH	Acres of PGH	Total Acres of GRSG Habitat
BLM Wilderness Study Areas—Nevada/California			
Augusta Mountains	-	2,600	2,600
Badlands	9,300	-	9,300
Bitterbrush	-	300	300
Blue Eagle	-	-	0
Bluebell	-	4,900	4,900
Buffalo Hills	44,300	3,400	47,700
Cedar Ridge	5,000	3,000	8,000
China Mountain	7,900	100	8,000
Clan Alpine Mountains	-	4,100	4,100
Desatoya Mountains	11,600	37,000	48,600
Disaster Peak	12,700	-	12,700
Dry Valley Rim	81,600	5,000	86,600
Five Springs	47,000	-	47,000
Fox Range	-	2,500	2,500
Goshute Peak	-	900	900
Job Peak	-	-	0
Kawich	-	2,200	2,200
Lahontan Cutthroat Trout	9,200	2,700	11,900
Little Humboldt River	35,300	3,000	38,300
Massacre Rim	26,000	7,900	33,900
Mount Limbo	-	3,000	3,000
North Fork Little Humboldt River	67,900	500	68,400
Owyhee Canyon	21,500	-	21,500
Palisade Mesa	-	-	0
Park Range	-	-	0
Pit River Canyon	-	300	300
Pole Creek	-	-	0
Poodle Mountain	70,800	22,100	92,900
Pueblo Mountains	600	-	600
Red Spring	-	400	400
Riordan's Well	-	4,100	4,100
Roberts Mountain	6,300	5,300	11,600
Rough Hills	6,500	-	6,500
Selenite Mountains	-	1,700	1,700
Sheldon Contiguous	300	-	300
Simpson Park	29,900	7,800	37,700
Skedaddle	47,900	4,300	52,200
South Fork Owyhee River	8,100	-	8,100
South Pequop	-	-	0
South Reveille	-	200	200
South Warner Contiguous	-	2,000	2,000
The Wall	-	-	0
Tobin Range	-	3,200	3,200

Table 3-58
Wilderness Study Areas

	Acres of PPH	Acres of PGH	Total Acres of GRSG Habitat
Tule Mountain	-	2,500	2,500
Tunnison Mountain	8,700	8,500	17,200
Twin Peaks	52,700	25,600	78,300
Wall Canyon	45,800	1,400	47,200
Forest Service Wilderness Study Areas			
Antelope Range	9,300	2,500	11,800
Fandango	5,100	2,500	7,600
Morey Peak	-	700	700

Source BLM and Forest Service GIS 2015

3.14.4 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, Sections 1271-1287). This designation is to preserve the river or river section in its free-flowing condition, preserving water quality and protecting its outstandingly remarkable values (ORVs) and tentative classification. River segment ORVs may include scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. The BLM's policy goal for a suitable river is to manage its free-flowing condition, water quality, tentative classification, and any ORVs until Congress designates the river or releases it for other uses.

There are two suitable Wild and Scenic River segments in the planning area. A 2-mile segment of Twelve Mile Creek in the northwestern corner of the state is managed by the Surprise Field Office; a short segment of the East Fork of the Carson River in California is managed by the Forest Service.

The Forest Service segment of the East Fork of the Carson River has a tentative classification of scenic and has been analyzed through the planning process in the Humboldt-Toiyabe Forest Management Plan for the Sierra Nevada Division (Carson and Bridgeport Ranger Districts). The recently released BLM Carson District Draft RMP has identified approximately 3 miles of the East Fork of the Carson River in three segments as eligible, with a tentative recreational, wild, and scenic classification, respectively. The BLM segments are an extension of the existing Forest Service suitable segment. The East Fork of the Carson River segments do not contain or cross GRSG habitat and are not analyzed further in this document.

The Oregon and California BLM have determined Twelve-mile Creek, with headwaters in Oregon and crossing into the northwestern corner of the state of Nevada as suitable, with a tentative classification of recreational under the

Lakeview RMP (Oregon) and the Surprise RMP (California). The creek enters Nevada for approximately 2 miles before crossing back into Oregon.

This river segment has been designated as suitable through the land use planning process and is documented through the Lakeview and Surprise RMPs, but it has not been designated into the National Wild and Scenic Rivers System. The Twelve-Mile Creek segment in northwestern Nevada does cross GRSG habitat. Potential impacts on the corridor of the river segment through proposed GRSG habitat improvement or restoration projects would not affect the management or tentative classification of the river segment, so Twelve-Mile Creek is not analyzed further in this document.

3.14.5 Other Special Designations

National Conservation Areas

National Conservation Areas (NCAs) are a component of the BLM's National Landscape Conservation System. Generally, NCAs are managed to conserve, protect, restore, and enhance the objects and values for which the unit was designated. The objects and values often include scientific, cultural, ecological, historical, and recreational aspects.

There are three NCAs in Nevada: Black Rock Desert-High Rock Canyon Emigrant Trails NCA, Red Rock Canyon NCA, and Sloan Canyon NCA. Of these three, only Black Rock Desert-High Rock Canyon Emigrant Trails NCA contains GRSG habitat. The other two are not analyzed further in this document.

In 2000, Congress designated the Black Rock Desert-High Rock Canyon Emigrant Trail NCA. It encompasses approximately 1.2 million acres of public lands administered by the BLM (PL 106-554, Black Rock Desert-High Rock Canyon Emigrant Trails National Conservation Area Act of 2000). Included in this acreage are approximately 380,000 acres of designated wilderness and 8,100 acres of ACEC. The focal point of the NCA is the California National Historic Trail Applegate/Nobles Emigrant Trail routes. Other resources of national significance include prehistory, paleontology, wildlife, and wild horses. The most prominent visual aspect of the NCA is the Black Rock Desert Playa.

There are approximately 404,788 acres of GRSG habitat in the Black Rock Desert-High Rock Canyon Emigrant Trail NCA. Of that, 233,149 acres are PPH and approximately 112,243 acres are PGH.

National Scenic and Historic Trails

Congress designates a National Historic Trail (NHT) as an extended long-distance trail, not necessarily managed as continuous. It follows as closely as possible and practicable the original trails or routes of travel of national historic significance. The purpose of an NHT is to identify and protect the historic route and the historic remnants and artifacts for public use and enjoyment. An NHT is

managed to protect the nationally significant resources, qualities, values, and associated settings of the areas through which such trails may pass, including the primary use or uses of the trail.

While National Scenic and Historic Trails cross lands managed by different agencies, trails and trail segments that cross BLM-administered lands are managed in accordance with BLM Manual 6280, Management of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation, which mandates that the BLM establish NHT Management Corridors (BLM 2012e). These corridors are established to assist in managing the resources, qualities, values, and associated settings and the primary use or uses for which the NHT was designated. The designation of NHT Management Corridors in the future will encompass lands that may include GRSG habitat and will include management decisions and actions that likely will have positive effects on GRSG populations.

In the planning area, there are two National Historic Trails—the California NHT and the Pony Express NHT—and one National Scenic Trail—the Pacific Crest NST.

California National Historic Trail. More than 250,000 emigrants traveled from Missouri to California during the 1840s and 1850s. More than 1,000 miles of trail ruts and traces can still be seen across 10 states on the California NHT. Congress designated nearly 2,000 miles of historic trail that was once the primary road taken by farmers, enterprising business managers, gold-seekers, and fortune hunters who chose to make a new life on the California frontier (NPS 2012). Approximately 2,113 miles of the California NHT fall in the planning area.

Pony Express National Historic Trail. The Pony Express NHT was used to carry the nation's mail from Missouri to California on horseback in the unprecedented time of only ten days. The relay system became the nation's most direct and practical means of east-west communications before the telegraph, and it played a vital role in aligning California with the Union in the years just before the Civil War. Approximately 419 miles of the Pony Express NHT fall in the planning area.

Pacific Crest National Scenic Trail. The Forest Service administers the Pacific Crest National Scenic Trail. It partners with the BLM, NPS, California State Parks, and the Pacific Crest Trail Association to manage and protect the trail (Forest Service 2012e). Approximately 200 miles of the Pacific Crest National Scenic Trail fall in the planning area. The trail does not traverse any PPH acreage in the planning area.

Forest Service Inventoried Roadless Areas

Inventoried roadless areas are undeveloped areas typically exceeding 5,000 acres that meet the minimum criteria for wilderness consideration under the

Wilderness Act. Inventoried roadless areas may contain such improvements as motorized trails, fences, outfitter camps, and evidence of historical logging activities. As required by 36 CFR, Part 219.17, inventoried roadless areas are identified during forest plan development or revision and are qualified for study if they meet the following criteria:

- They are 5,000 acres or larger
- They are less than 5,000 acres but contiguous with a Wilderness Area
- There are no classified roads (a classified road is one constructed or maintained for long-term highway vehicle use; therefore, inventoried roadless areas may contain motorized and nonmotorized trails and user-created roads)

There are approximately 2,000 acres of inventoried roadless area recommended for wilderness management by the Forest Service in the planning area. This acreage is contiguous with the Mount Rose Wilderness and does not contain GSRG habitat, so it is not analyzed further in this document. Other elements of forest lands throughout the state also contain inventoried roadless areas but are not recommended for wilderness management. As such, wilderness character criteria are not affected by management decisions for GSRG.

3.15 WATER RESOURCES

Water resources are surface and groundwater sources, including streams, springs that support riparian areas, and wetlands. Factors such as the amount of precipitation and runoff, water storage and withdrawals, pollution from outfalls, soil erosion, and overall conditions of the uplands and riparian areas affect surface water resources. Recharge, withdrawal, and infiltration of contaminants affect groundwater resources. The BLM and Forest Service management decisions regarding energy development, lands and realty actions, grazing, recreation, and forestry can result in potential impacts on water resources.

Current Condition

Overview

Surface water and groundwater discharged in the region originate from precipitation. Precipitation that falls to the land surface might infiltrate the soil or bedrock and recharge the groundwater system, evaporate, be transpired by plants, or flow as runoff through drainages. Surface water runoff that originates at higher mountain elevations generally flows in well-defined channels cut into bedrock in the mountain blocks; the runoff then discharges onto alluvial fans at the valley margin.

There are several potential outcomes for runoff that flows from the mountains into the valley bottom. As surface water moves, it is continually removed from

the surface water system by a variety of processes, including infiltration as recharge to groundwater as seepage into fractures in bedrock or permeable sediments in the drainage channel, into alluvial fans at the margins of the mountain fronts, or into basin-fill sediments in the center of the valley; it is removed from the system by evaporation or transpired by plants, both in the channel, in ponds or lakes, and at playas in the valley bottom; and it is diverted for irrigation or other beneficial uses.

Perennial surface water is supported by groundwater discharge in this region. Springs that discharge groundwater at the land surface can collect into channels to form perennial streams. Periodic rainstorms and snowmelt generate runoff that contributes to temporary streamflow increases. However, a consistent base flow for streams and springs in the region observed even after prolonged dry periods is maintained by the discharge from the groundwater system.

In the planning area, the major water features are 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 rainstorms. 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.

Surface Water

The United States is divided and subdivided into successively smaller hydrologic units called regions, sub-regions, accounting units (or basins), and cataloging units (or sub-basins). Each of these hydrologic units is identified by a unique hydrologic unit code consisting of between two and eight digits. The fourth level of classification (the cataloging unit or sub-basin) is represented by an eight-digit hydrologic unit code. **Table 3-59** lists the sub-basins in the planning area.

Surface water resources in the planning area are intermittent washes, perennial streams, ponds or reservoirs, playas, and springs. In terms of streams, ephemeral drainages represent the predominant feature type based on miles of streams in the project area. Projects for irrigation, livestock, human use, and flood control have significantly altered natural flow regimes, resulting in changes to habitat conditions, channel stability, and timing of sediment and organic material transport. Streamflow has been altered by such management activities as water impoundments, water withdrawal, road construction, vegetation manipulation, grazing, wildfire suppression, and timber harvesting.

Most surface runoff in the planning area is from snowmelt or rainfall at the higher elevations, producing peak discharges in the spring and early summer. Many of the streams in the lower elevation semiarid areas are either

Table 3-59
Hydrologic Sub-basins in the Planning Area

Sub-basin Name	Eight-Digit Hydrologic Unit Code Number	Total Sub-basin Size (Acres)	Sub-basin Size in Planning Area (Acres)	BLM/National Forest System Lands in Sub-basin in Planning Area (Acres)	Length of Streams in Sub-basin in Planning Area (Miles)	Length of Streams Crossing BLM/National Forest System Lands in Sub-basin in Planning Area (Miles)
Alvord Lake	17120009	96,800	97,100	84,900	200	100
Big Chico Creek-Sacramento River	18020157	300	2,300	0	0	0
Bruneau	17050102	511,300	433,200	80,500	800	200
Butte	18010205	151,200	150,700	17,300	100	30
Butte Creek	18020158	600	700	0	0	0
Cactus-Sarcobatus Flats	16060013	616,000	616,500	599,600	1,500	1,400
Carson Desert	16050203	1,391,500	1,392,000	547,400	2,700	1,000
Crowley Lake	18090102	40,900	40,900	3,900	100	0
Death Valley-Lower Amargosa	18090203	195,200	195,400	195,100	400	400
Diamond-Monitor Valleys	16060005	1,997,600	1,999,000	1,426,100	3,300	2,200
Dixie Valley	16060001	2,585,600	2,587,300	2,262,800	5,400	4,700
Dry Lake Valley	16060009	1,388,600	1,388,400	1,507,200	3,200	3,200
East Branch North Fork Feather	18020122	658,800	657,700	600	28,100	0
East Little Owyhee	17050106	441,200	446,300	433,100	1,100	1,100
East Walker	16050301	445,400	445,400	177,000	700	200
Escalante Desert	16030006	68,700	69,000	67,700	200	200
Eureka-Saline Valleys	18090201	4,400	4,400	4,100	0	0
Fish Lake-Soda Spring Valleys	16060010	1,572,300	1,573,400	1,366,600	3,900	3,500
Gabbs Valley	16060002	1,331,300	1,332,100	1,139,500	2,600	2,300
Goose	17040211	204,700	205,500	177,200	400	300
Goose Lake	18020001	232,800	227,500	900	0	0

Table 3-59
Hydrologic Sub-basins in the Planning Area

Sub-basin Name	Eight-Digit Hydrologic Unit Code Number	Total Sub-basin Size (Acres)	Sub-basin Size in Planning Area (Acres)	BLM/National Forest System Lands in Sub-basin in Planning Area (Acres)	Length of Streams in Sub-basin in Planning Area (Miles)	Length of Streams Crossing BLM/National Forest System Lands in Sub-basin in Planning Area (Miles)
Granite Springs Valley	16050104	1,063,600	1,063,700	737,200	2,000	1,400
Guano	17120008	268,400	260,300	55,700	500	100
Hamlin-Snake Valleys	16020301	818,500	822,700	699,800	1,800	1,400
Honey-Eagle Lakes	18080003	1,793,600	1,794,200	720,700	3,000	1,100
Hot Creek-Railroad Valleys	16060012	2,973,300	2,975,000	2,405,600	7,300	6,000
Lake Tahoe	16050101	87,400	87,500	2,500	200	0
Little Humboldt	16040109	1,139,000	1,139,900	747,000	2,500	1,600
Little Smoky-Newark Valleys	16060006	924,200	924,700	881,400	1,600	1,500
Long-Ruby Valleys	16060007	2,633,100	2,633,600	2,074,800	5,000	3,400
Lost	18010204	1,099,300	1,086,800	25,100	2,500	20
Lower Humboldt	16040108	1,659,200	1,660,100	824,800	3,600	1,600
Lower Pit	18020003	1,056,500	1,054,100	121,800	0	200
Lower Quinn	16040202	2,095,400	2,095,900	3,069,700	4,700	4,300
Lower Virgin	15010010	470,800	471,100	512,500	1,500	1,400
Madeline Plains	18080002	539,000	538,900	266,300	600	300
Massacre Lake	16040204	829,500	829,600	714,400	1,700	1,200
McCloud	18020004	77,000	75,500	0	0	0
Meadow Valley Wash	15010013	1,570,700	1,570,100	1,829,700	4,900	4,700
Middle Carson	16050202	531,100	531,000	322,200	800	400
Middle Fork Feather	18020123	735,900	734,700	11,900	0	50
Middle Humboldt	16040105	2,045,900	2,047,500	1,192,100	4,800	2,300
Middle Owyhee	17050107	1,000	1,900	1,000	0	0
Mono Lake	18090101	78,100	78,100	0	100	0

Table 3-59
Hydrologic Sub-basins in the Planning Area

Sub-basin Name	Eight-Digit Hydrologic Unit Code Number	Total Sub-basin Size (Acres)	Sub-basin Size in Planning Area (Acres)	BLM/National Forest System Lands in Sub-basin in Planning Area (Acres)	Length of Streams in Sub-basin in Planning Area (Miles)	Length of Streams Crossing BLM/National Forest System Lands in Sub-basin in Planning Area (Miles)
Muddy	15010012	316,700	316,700	433,600	1,000	900
North Fork American	18020128	200	300	0	0	0
North Fork Feather	18020121	553,800	550,900	700	0	0
North Fork Humboldt	16040102	638,800	639,100	393,900	1,700	900
Northern Big Smoky Valley	16060004	1,220,400	1,221,400	765,700	2,000	1,100
Northern Great Salt Lake Desert	16020308	253,500	257,600	164,900	600	400
Pilot-Thousand Springs, Nevada, Utah	16020307	941,600	942,700	582,400	2,300	1,300
Pine	16040104	643,300	643,700	532,400	1,200	1,000
Pyramid-Winnemucca Lakes	16050103	886,900	886,600	340,600	1,800	700
Ralston-Stone Cabin Valleys	16060011	1,765,000	1,766,400	1,408,900	5,400	4,500
Reese	16040107	1,521,100	1,522,300	1,062,400	2,700	2,000
Rock	16040106	580,100	580,500	374,000	1,800	1,100
Salmon Falls	17040213	781,200	781,800	604,400	1,400	1,000
Sand Spring-Tikaboo Valleys	16060014	1,209,500	1,210,000	1,132,000	3,000	2,700
Smoke Creek Desert	16040203	1,575,500	1,575,700	1,832,200	3,500	3,000
South Fork Humboldt	16040103	835,500	835,900	441,000	1,700	700
South Fork Owyhee	17050105	1,037,200	1,039,000	584,400	2,400	1,200
Southern Big Smoky Valley	16060003	1,311,100	1,312,000	1,017,900	3,500	3,000
Southern Great Salt Lake Desert	16020306	429,400	431,100	351,500	1,100	900
Spring-Steptoe Valleys	16060008	3,403,400	3,402,500	2,926,300	7,200	5,800

Table 3-59
Hydrologic Sub-basins in the Planning Area

Sub-basin Name	Eight-Digit Hydrologic Unit Code Number	Total Sub-basin Size (Acres)	Sub-basin Size in Planning Area (Acres)	BLM/National Forest System Lands in Sub-basin in Planning Area (Acres)	Length of Streams in Sub-basin in Planning Area (Miles)	Length of Streams Crossing BLM/National Forest System Lands in Sub-basin in Planning Area (Miles)
Surprise Valley	18080001	579,500	580,100	259,600	1,200	400
Thomes Creek-Sacramento River	18020156	0	400	0	0	0
Thousand-Virgin	16040205	568,000	567,600	209,500	1,200	400
Truckee	16050102	711,300	712,900	107,100	1,700	100
Upper Amargosa	18090202	165,200	165,400	154,200	300	200
Upper Carson	16050201	362,000	368,100	93,500	800	100
Upper Humboldt	16040101	1,761,900	1,762,600	752,800	5,000	1,900
Upper Owyhee	17050104	357,600	358,600	54,000	800	100
Upper Pit	18020002	1,718,900	1,716,000	259,100	0	700
Upper Quinn	16040201	1,905,100	1,906,800	1,426,900	3,000	2,100
Upper Yuba	18020125	350,500	350,100	0	0	0
Walker	16050303	572,200	572,300	240,600	900	300
Walker Lake	16050304	517,200	517,300	237,200	700	300
Warner Lakes	17120007	114,600	106,500	71,700	100	100
West Walker	16050302	404,500	404,700	125,100	600	100
White	15010011	1,798,300	1,798,600	1,764,200	4,500	4,000
TOTAL		**70,216,700**	**70,145,900**	**48,012,400**	**168,900**	**96,800**

Source: BLM and Forest Service GIS 2015

intermittent, with segments of perennial flow near springs, or ephemeral, with flow only during spring runoff and intense summer storms. Estimated miles of perennial streams are 15,488 and intermittent streams are 130,353. Perennial and intermittent stream reaches were defined by the USGS National Hydrography Dataset.

Water developments, such as troughs for livestock, are not influential sources of water for GRSGs. However, water developments provide additional and alternative sources of water for wildlife and livestock and can decrease the use of riparian areas as water sources, thereby resulting in improved meadow conditions.

Groundwater

Groundwater resources in the planning area include local basin-fill aquifers, deep, regional aquifers and, in some areas, geothermal aquifers. **Figure 3-16** shows a conceptual model of a groundwater flow system typically found in the planning area (Welch et al. 2007).

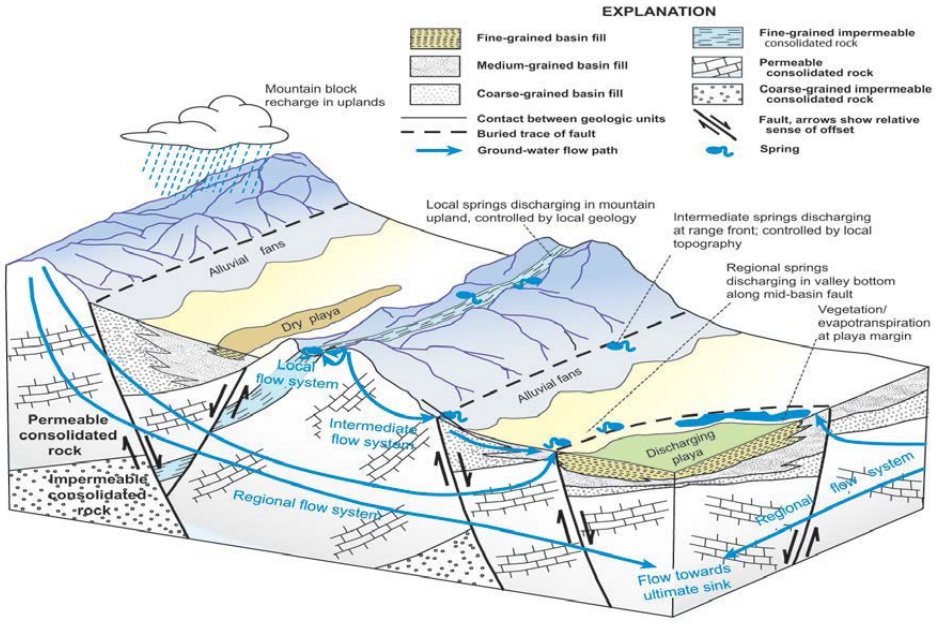
Groundwater in the planning area is primarily used for irrigation, domestic use, and livestock. The quality of the groundwater is a function of the chemical makeup of the underground formation containing the water. Most of the planning area contains good quality water, but the water is usually hard and 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 base flow they provide. The outflow from springs in summer usually helps to maintain lower water temperatures. In winter, especially in small streams, base flow helps to maintain an aquatic habitat in an otherwise frozen environment.

Approximately 16,700 springs have been inventoried in the planning area. Many have been 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. Such activities as livestock or wild horse grazing and watering, recreation use, mining, road construction, and vegetation management have affected spring systems in the past. Well drilling or blasting can affect springs by reducing the volume of water in their aquifers or by affecting subsurface flow patterns.

Figure 3-16
Conceptual Groundwater Flow System



Source: Welch et al. 2007

Riparian Areas and Wetlands

As described in **Section 3.4**, riparian areas are ecosystems that occur along rivers, streams, or water bodies. Although these areas represent only 5 percent of the planning area, riparian habitats play an integral role in restoring and maintaining the chemical, physical, and biological integrity of water resources (Fitch and Ambrose 2003).

The condition and trend of riparian areas and wetlands varies throughout the planning area (refer to **Table 3-12** and the discussion in **Section 3.4**, Riparian Areas and Wetlands).

Water Quality

Water quality on BLM-administered and National Forest System lands is regulated by the Clean Water Act (CWA), the Safe Drinking Water Act, Public Land Health Standards, the Watershed Conservation Practices Handbook, and other laws, regulations, and policy guidance at the federal, state, and local levels.

The CWA (33 USC, Section 1251 et seq.) requires maintenance and restoration of the physical, biological, and chemical integrity of Waters of the United States. Sections 208 and 319 of the CWA recognize the need for control strategies for nonpoint source pollution. Soil and water conservation practices and BMPs are recognized as the primary control mechanisms for nonpoint source pollution on BLM-administered and National Forest System lands. The EPA (1987) supports this perspective in its guidance, Nonpoint Source Controls and Water Quality Standards.

The water quality standards for the State of Nevada and the State of California support other federal laws such as the CWA, the Water Resources Planning Act, the Pollution Prevention Act, and the Safe Drinking Water Act.

Water quality, as defined by the CWA, includes all of the physical, biological, and chemical characteristics that affect existing and designated beneficial uses. Water that does not meet these standards is considered impaired. Nevada and California are required to identify impaired surface water bodies under Section 303(d) of the CWA. There are approximately 517 miles of Section 303(d)-listed streams and water bodies in the planning area.

The most common impairments for Section 303(d)-listed waters in the planning area are pH, phosphorus, mercury, iron, zinc, temperature, and arsenic. Most of these heavy metals are found naturally in planning area soils and geology. High concentrations in surface waters could be a result of nonpoint source pollution due to land use practices resulting in increased erosion or mining or could be naturally occurring. High temperatures and nutrient concentrations are typically a result of decreased riparian function, which could be a result of land use practices resulting in increased erosion, including roads and livestock use.

Causes of stream degradation are removing riparian vegetation and destabilizing stream banks. Removing riparian vegetation and the shade it provides contributes to elevated stream temperatures (Rishel et al. 1982; Brown 1983; Beschta et al. 1987). Channel widening can similarly increase solar radiation loading. The principal source of heat energy delivered to the water column is sunlight striking the stream surface directly (Brown and Krygier 1970). The ability of riparian vegetation to shade the stream throughout the day depends on vegetation height, width, density, and position relative to the stream, as well as the direction of streamflow; streamside vegetation provides less shade on a north- or south-flowing stream than on an east- or west-flowing stream.

The land use most commonly associated with stream degradation in the planning area is livestock grazing. Other land uses associated with degraded streams are roads, trails, water withdrawal, reservoir storage and release, altered physical characteristics, and wetlands alteration.

Water Availability

Water availability can vary annually, depending on the volume of water recharged and the volume of water used in the planning area. Since most of the water in the planning area originates from precipitation, yearly climatic conditions play an important role in the volume of water available in these systems. This in turn determines available riparian habitat and conditions, particularly in systems that are more dependent on snowmelt and local precipitation events. See **Section 3.21**, Climate Change, for more information on past and current precipitation conditions.

The volume of water used in the planning area depends on the quantity of water appropriated in water rights through Nevada and California water law.

Water Rights

The right to use surface and groundwater and the management of water appropriations in the planning area is administered by the Nevada Division of Water Resources and the California State Water Resources Control Board. The BLM authorizes the use of water on BLM-administered lands if it has permitted the applicant to apply the water to beneficial use.

The Nevada State Engineer's duty is to conserve, protect, manage, and enhance the state's water resources for Nevada's citizens through the appropriation and reallocation of the public waters. All water in the boundaries of the state, whether above or beneath the surface of the ground, belongs to the public and is subject to appropriation for beneficial uses.

Nevada issues water rights for various beneficial uses for both groundwater and surface water. Since it is based on prior-appropriation and beneficial use, this system of water allocation controls who uses how much water, the types of uses allowed, and when those waters can be used. Often referred to as First in time, first in right, the system stipulates that the first individual to put a water body to beneficial use is considered the senior water-rights holder and the first one allowed to use the water. Water available above the senior water-rights holder's appropriation would then be made available to subsequent water-rights holders based on priority date. Consumptive water uses in the planning area are agricultural, municipal, mining and milling, industrial, stock watering, and wildlife.

Since all water in the state is available for appropriation, Nevada water law does not necessarily protect riparian habitat or unappropriated surface waters. The water law allows for the capture of natural groundwater discharge so long as the amount captured is not greater than the perennial yield for the basin. Additionally, any appropriated surface water rights can be diverted, resulting in a reduction in riparian conditions. The Nevada State Engineer recognizes that a water right does not give the holder automatic ingress or egress across public, private, or corporate lands. Additionally, a water right permit does not waive the requirements that the permit holder obtain other permits from federal, state, and local agencies.

In Nevada, wildlife is considered a beneficial use for water rights, and the BLM and Forest Service hold wildlife water rights not only to provide a watering source for wildlife but also to maintain wildlife habitat. However, a water right is not required on surface waters to allow for a wildlife use. Nevada Revised Statute 533.367 requires all permit holders for springs or seeps to allow access to wildlife that customarily use it. The BLM usually applies for a wildlife water right only if it wants to develop the source, such as put in a trough or well, or if it feels a water right is necessary to protect the source and the associated

habitat. Wildlife guzzlers and other types of precipitation collectors do not require a water right in Nevada (Masto 2011).

In Nevada, the BLM and Forest Service have been precluded from applying for water rights for stock watering use in most cases. Under Nevada water law, the State Engineer will issue a permit to appropriate water for watering livestock only to permit applicants who are legally entitled to place livestock on the lands for which the permit is sought and who own or have an interest in the livestock (Nevada Revised Statute 533.503).

In addition, new regulations tying appurtenance to ownership of livestock is set forth in Nevada Revised Statute 533.040. These changes apply to any water application processed by the Nevada State Engineer after June 12, 2003. Such water developments as troughs for livestock are not influential sources of water for GRSGs; however, water developments provide additional and alternative sources of water for wildlife and livestock and can decrease the use of riparian areas as water sources (Wyman et al. 2006).

The California Doctrine is a system of water rights that recognizes both appropriative and riparian rights. The California Supreme Court has held that a person's riparian rights are superior to the appropriator's rights, except in cases where the water has been appropriated before the person acquired the patent to his land and after the passage of the 1866 Mining Act that recognized appropriation.

Generally, a reasonable riparian use will trump an appropriative right so long as the patent to the riparian parcel was acquired from the United States before the date of appropriation. In 1928, the California Constitution was amended to require all water use in California to be "beneficial and reasonable." Generally today, a riparian user cannot defeat an appropriative right unless the riparian user proves the appropriation is unduly interfering with the riparian user's reasonable use of the water.

Federal reserved water rights are made by presidential executive order or by an act of Congress; they are derived from federal, not state, law. When the United States reserves public land for such uses as Indian reservations, military reservations, national parks, forests, or monuments, it also implicitly reserves sufficient water to satisfy the purposes for which the reservation was created. Reservation of water is inferred if water is necessary to accomplish the purposes for which the land reservation was created. The date of priority of a federal reserved right is the date the reservation was established.

3.16 SOIL RESOURCES

The BLM and National Forest System land management and resource use decisions influence long-term soil health, stability, and productivity. Many management activities and resource uses depend on suitable soils for the type, location, and use level of that resource, including livestock grazing, mineral

activities, fire management, road and travel management (including OHV use), recreation, wildlife habitat, riparian habitat, special status species, fisheries, water quality, and forestry. Consequently, soil attributes and conditions are important to BLM and Forest Service management decisions.

Soils are defined by the interaction of the processes that form them, including parent material (geology), climate, topography, biologic organisms, and time. Of these, soil surveys indicate that climate and topography have the primary influences on soil formation (NRCS 2000).

Soils are classified by their degree of development into distinct layers/horizons and their dominant physical and chemical properties. These characteristics are used to groups soils into 1 of 12 orders that are based on defining soil properties, such as organic matter, dominant sediment particle (silt, sand, or clay), amount of mineral material present, and water and temperature regimes, and unique properties, such as salt content or volcanic ash layers. These soil characteristics, in combination with climate, determine whether sagebrush can exist in a given location and which variety of sagebrush communities are able to thrive. Since the presence of GRSGs depends on sagebrush and sagebrush type and viability depend on soil type and quality, soils are an important element in GRSG habitat.

Current Condition

Soil Productivity

Soil productivity in the planning area varies widely due to the diversity of soils and site characteristics, specifically differences in elevation and slope gradient. Some of the most productive soils are found in well-drained valley bottoms, toe-slopes, benches, and broad ridgetops. 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 pose substantial constraints to land use and management.

Management practices affect the ability of soils to maintain productivity by influencing disturbances, such as displacement, compaction, erosion, and alteration of organic matter and soil organism levels. When soil is degraded in semiarid, high desert regions, natural processes are slow to return site productivity. Preventing soil degradation is far more cost- and time-effective than remediation or waiting for natural processes. Certain management practices have reduced erosion effects and improved soil conditions; examples are proper stocking rates for livestock, grazing rotation, periodic rest from grazing, improved design, road construction and maintenance, selective logging, rehabilitation of unneeded surface disturbance, restricting vehicles to roads and trails, rehabilitating mined areas, and concentrated recreation control.

Soil Erosion

Erosion is a continuing natural process that can be accelerated by human disturbances. Factors that influence soil erosion are texture, 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. The semiarid planning area has between 17,730,500 acres of native vegetation and 189,200 acres of nonnative vegetation, allowing the soils to erode naturally in wind and during infrequent rainstorms.

Soil Types

When making land management decisions based on soil-related hazards or limitations, the BLM evaluates soil surveys available from the Natural Resources Conservation Service. Soils are mapped according to the boundaries of major land resource areas, which are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA 2012). Each soil survey describes the specific properties of soils in the area surveyed and shows the location of each kind of soil on detailed maps. The BLM evaluates soil map units to make management decisions that would likely affect soils. Each soil survey applicable to the planning area describes soil map units by the individual soil or soils that make up the unit.

3.17 CULTURAL HERITAGE RESOURCES

Cultural resource refers to historic or architectural objects, sites, structures, or places with potential public and scientific value, including locations of traditional cultural, ethnic, or religious significance to a specific social or cultural group.

Cultural resources are located, classified, ranked, and managed in order to identify, protect, and use them for public benefit. Fragile and irreplaceable, cultural resources represent an integral part of American heritage and the physical locations of human activity, occupation, or use identified through field inventories, historical documentation, and oral evidence (BLM Manual 8110, Identifying and Evaluating Cultural Resources [BLM 2004f]).

Archaeological resources are a subset of cultural resources that include any material remains of human life or activities that are at least 50 years old and are of archaeological interest (as defined in 43 CFR, Part 7.3). Native American religious concerns, a critical element noted in Appendix 5 of the BLM NEPA Handbook, H-1790-1 (BLM 2008e), are addressed in **Section 3.17**, Tribal Interests (including Native American Religious Concerns).

In the study area, prehistoric or historic cultural resource sites, structures, or objects listed on or eligible for listing on the National Register of Historic Places are managed as directed by 36 CFR, Part 800 (Protection of Historic and Cultural Properties) and the statewide protocol agreements between the BLM and the Nevada and California State Historic Preservation Offices. These

regulations and protocols stipulate that cultural resources must be assessed for integrity of location, design, setting, materials, workmanship, feeling, and association. A property may be considered eligible for listing on the National Register of Historic Places if it retains sufficient integrity of these elements and meets certain criteria outlined in National Register Bulletin 15 (NPS 1997). As listed in 36 CFR, Part 60, historic properties (including prehistoric and historic archaeological sites and places considered important to Native Americans) must meet a specific set of criteria, as follows (NPS 1997):

- The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association
- Association with events that have made a significant contribution to the broad patterns of our history
- Association with the lives of persons significant in our past
- Embodiment of the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction
- Yielding, or may be likely to yield, information important in prehistory or history

Current Condition

Cultural resources, including historic properties eligible for the National Register, are known to exist in the study area. Potential impacts on cultural resources are unknown and will be determined through future NEPA analysis and decision-making to implement the management goals and objectives set forth in this plan amendment process All future project-related activities analyzed in order to implement the goals and objectives set forth in this plan amendment will comply with Section 106 of the National Historic Preservation Act and the Statewide Protocol Agreements of Nevada and California. Therefore, no further analysis is warranted in this planning document, and cultural resources are not brought forward for detailed analysis in **Chapter 4**.

3.18 TRIBAL INTERESTS (INCLUDING NATIVE AMERICAN RELIGIOUS CONCERNS)

Numerous laws and regulations require consideration of Native American concerns and interests during the federal planning process. These are as follows:

- The National Historic Preservation Act of 1966, as amended
- The American Indian Religious Freedom Act of 1978, as amended
- Executive Order 13007, Indian Sacred Sites

- Executive Order 13175, Consultation and Coordination with Tribal Governments
- Executive Order 3317, DOI Policy on Consultation with Indian Tribes
- The Native American Graves Protection and Repatriation Act of 1990, as amended
- The Archaeological Resources Protection Act, as amended
- The 2012 MOU Regarding Interagency Coordination and Collaboration for the Protection of Indian Sacred Sites
- BLM Manual 8160, Native American Coordination and Consultation (1990d)
- BLM Handbook H-8120-1, Guidelines for Conducting Tribal Consultation (2004g)
- USDA Department Regulations 1340-007 and 1350-002
- Forest Service Manual FSM 1500, External Relations (1990)
- Forest Service Handbook Direction FSM 1509 (2004b)
- NEPA and FLPMA

These laws, regulations, policies, and executive orders provide consultation requirements and procedural guidance to ensure that the consultation process demonstrates "that the responsible manager has made a reasonable and good faith effort to obtain and consider appropriate Native American input in decision making" (BLM 1994).

Current Condition

Archaeological and Paleontological Context

GRSG bones and feathers have been found in archaeological and paleontological contexts dating back 14,000 years in the Great Basin, including the Nevada and Northeastern California Sub-region. The oldest, well-dated GRSG bones (circa 14,000 years ago) come from the Paisley Caves in south-central Oregon (Jenkins et al. 2012). Although the GRSG bones from this period cannot be confidently attributed to human hunting, humans were occupying the site beginning about 14,000 years ago, and thus GRSG hunting was a possibility near these caves. In addition, bones of GRSGs were the most common bird remains found at Smith Creek Cave in east-central Nevada (122 elements; Howard 1952). Most of these bones likely date to circa 14,000 to 12,000 years ago based on dating of other faunal elements at the site, but the GRSG bones have not been directly dated at this time.

The oldest GRSG bones definitely deposited by Native Americans in an archaeological context come from Bonneville Estates Rockshelter in eastern

Nevada (Hockett 2007) and the Paisley Caves in Oregon (Hockett and Jenkins, in press). The Bonneville Estates Rockshelter is in eastern Nevada along the Nevada-Utah border. Burned GRSG bones with stone tool cut marks were found next to hearths dating back 12,000 years ago. GRSGs were one of the most common animals exploited at this time near the rockshelter. Also common in the Bonneville Estates Rockshelter deposits of this time were those of pygmy rabbits (*Brachylagus idahoensis*), suggesting that mature stands of sagebrush once grew near the site. The flat shoreline terraces created by the Late Pleistocene high stands of Lake Bonneville (circa 17,000 to 12,000 years ago) in this region probably created ideal habitats for leks; the Native Americans who occupied the shelter hunted GRSGs off these ancient leks (Hockett 2007).

Burned GRSG bones in an undisputed cultural context dating to circa 12,000 years ago were also discovered recently at the Paisley Caves (Hockett and Jenkins, in press). Of similar age (Late Pleistocene-Early Holocene, circa 11,000 to 9,500 years ago) are the GRSG bones recovered from Danger Cave, Utah, along the Nevada-Utah border north of Bonneville Estates Rockshelter (Jennings 1957; Parmalee 1988a) and those recovered from the Connley Caves in south-central Oregon (Grayson 1977). At the Connley Caves, Grayson (1979) also argued that Native Americans hunted GRSG off leks, based on the ratio of female to male bones identified. Also noteworthy in the Late Pleistocene-Early Holocene deposits at Danger Cave was the recovery of a bone and feathers of the sharp-tailed grouse (*Tympanuchus phasianellus*).

These data suggest that GRSGs have been present in the study area, particularly in northern and eastern Nevada, for at least the past 14,000 years. Native Americans began hunting GRSGs at least 12,000 years ago. The known distribution of GRSGs between circa 14,000 to 9,500 years ago included habitats that currently do not support GRSGs, due to a lack of suitable sagebrush habitat (such as near Bonneville Estates Rockshelter), as well as habitats that continue to support sagebrush and GRSGs (such as near Smith Creek Cave). During the relatively cool and moist climates of the Late Pleistocene-Early Holocene, there were sagebrush habitats that supported active GRSG populations across northern and eastern Nevada.

Following the cool and moist Late Pleistocene-Early Holocene climatic phase, the Great Basin experienced a 4,000-year warm and relatively dry climatic phase during the Middle Holocene (also referred to as the Altithermal) between circa 9,500 to 5,100 years ago. This period witnessed a contraction, but not necessarily a complete extirpation, of sagebrush habitat near Bonneville Estates Rockshelter and the Paisley Caves that earlier supported GRSGs. This climatic phase also witnessed the northern migration of single-needle pinyon pine from areas to the south currently occupied by the Mojave Desert, as well as an expansion of Utah juniper trees, creating the classic pinyon/juniper habitat of central Nevada. Dated GRSG bones are rare for this period. However, following a several millennia absence from Bonneville Estates Rockshelter,

GRSGs were once again hunted by Native Americans and deposited in the rockshelter approximately 7,000 years ago (Hockett 2007). Middle Holocene-aged GRSG remains were also recovered from Hogup Cave, northwestern Utah, near the study area (Baldwin 1970; Parmalee 1970).

The Late Holocene Great Basin (circa post-5,100 years ago) experienced a generally cooler and wetter climate, compared to the Middle Holocene, but several significant subclimatic phases have been identified. These are the Early Late Holocene (circa 5,100 to 3,500 years ago; generally cool), Neoglacial or Neopluvial (circa 3,500 to 2,650 years ago; generally cool and wet), Late Holocene Drought (circa 2,650 to 1,650 years ago; generally warm and dry), Medieval Climatic Anomaly (circa 1,650 to 650 years ago; generally warm and wet), Little Ice Age (circa 650 to 250 years ago; generally cool), and Industrial/Modern (250 years ago to present; increasingly warm).

GRSG dated to the Late Holocene in Nevada and surrounding regions are those recovered from the Early Late Holocene deposits of Mineral Hill Cave in central Nevada (Hockett and Dillingham 2004; James 2004) and those recovered from the Early Late Holocene, Neoglacial/Neopluvial, and Medieval Climatic Anomaly deposits in Hogup Cave in northwestern Utah (Baldwin 1970; Parmalee 1970). In addition, undated Late Holocene specimens have been recovered from Last Supper Cave and Hanging Rock Shelter, both located in the Black Rock Desert region of northwestern Nevada (Grayson and Parmalee 1988; Parmalee 1988b).

Ethnographic Context

During the Industrial/Modern climatic phase of the past 250 years, GRSGs were a common food in the diet of northeastern California and Nevada Native Americans, including the Northern Paiute, Western Shoshone, Pit River, Achumawi, and Atsugewi (Fowler 1986; Garate 1975; Gilmore 1953; Olmstead and Stewart 1978; Steward 1941, 1943; Stewart 1941). GRSGs were generally hunter in the spring at leks. Deadfalls, hunting blinds, nooses, snares, and even nets with associated brush wings were all commonly used (Steward 1941, 1943). In some cases, a hunter wore a deer or antelope costume to hunt GRSGs (Kelly 1932).

There are cursory ethnographic reports of GRSG hunting for the following Paiute bands: *Agai-Panina* (Summit Lake Paiutes), *Atsa'kudökwa-tuviwarai* (Fort McDermitt Paiutes), *Kidü-dökadö*/*Gidü'tikadü* (Fort Bidwell Paiutes), *Kuyu-dökadö* (Pyramid Lake Paiute Tribe), *Küpa-dökadö* (Lovelock Colony), *Pakwi-dökadö* (Walker Lake Paiutes), *Sawa'waktödö-tuviwarai* (Winnemucca Colony), *Tagö-töka* (Duck Valley Paiutes), *Tasiget-tuviwarai* (Reno-Sparks Indian Colony), *Toe- dökadö* (Fallon Paiutes), *Tövusi- dökadö* (Yerington Paiutes), and *Wada-dökadö* (Burns Paiutes; Deur 2010; Fowler 2002; Kelly 1932; Stewart 1941). Steward (1941) has cursory accounts of GRSG hunting among Western Shoshone bands at Battle Mountain, Egan, Elko, Ely, Hamilton, Ione Valley, Morey, Ruby Valley, and Snake River.

Quantitative information on the significance of GRSGs in the Northern Paiute and Western Shoshone diet, past or present, is lacking. While the bird was hunted in the spring, the meat was dried and could be eaten as long as supplies lasted. Kelly (1932), reaffirmed by Deur (2010), notes GRSGs was and is the most commonly hunted bird by the *Kidü- dökadö*. Among the *Toe- dökadö*, it is a favorite, due to its size and flavor, but GRSGs were no longer common in the Stillwater Range (Fowler 2002).

In addition to being a food source, GRSG wings were used as fans in hunting, and the feathers were used on the ends of arrows by several Paiute and Western Shoshoni bands.

Hunting for the Native Americans in northeastern California and Nevada served more than a means of providing food. As noted by Deur (2010), Hanes (1982, 1995), and Walker and Deward (2010), hunting is a way in which Native Americans preserve part of their cultural traditions. Hunting in traditional areas is an active way of maintaining a tie to their past and a means of preserving cultural traditions. During the hunt, children are taught traditional knowledge and practices by their parents and elders. Hunting is also a means of cementing social relationships: after a successful hunt, the game is shared between the young hunters, their parents, and their extended family.

GRSGs also play prominent roles in some oral traditions. For example, the GRSG has a significant role in Northern Paiute oral traditions. Fowler (2002) and Kelly (1938) collected several variants explaining how the GRSGs saved fire during the world flood. GRSGs, the only bird (or animal in other variants) to survive the flood, protected a fire on a mountaintop, so that the succeeding animals and humans could have it when the flood waters receded. In the Owens Valley Paiute story of how pine nuts came to the world, the GRSG is a minor character that helps with the theft of the pine nuts (Steward 1936).

Leks are also considered important cultural sites by the Northern Paiutes and Western Shoshone since strutting is the basis of the Round Dance (also called Circle Dance; Bengston 2006). Round Dance locations may or may not be near leks. The timing and meaning of the Round Dance varies across the Great Basin, but the dance is tied to marking seasonal subsistence activities and is imbued with cosmological ideas related to renewal of the world and human relationships to the creator/god (Hultkrantz 1986).

Summary of Archaeological, Paleontological, and Ethnographic Evidence for Sage-Grouse in the Study Area

In general, archaeological and paleontological evidence suggest that GRSG populations expanded and contracted across the Great Basin for at least the past 14,000 years. This was in response to climatic conditions that were either favorable or unfavorable to sagebrush. GRSG bones and feathers have been recovered across the entire study region at various times in the past. GRSGs have been hunted in the study area for the past 12,000 years, and were hunted

by Native American families at historic contact. Therefore, Native Americans have hunted GRSGs in the study area from the Late Pleistocene through the Industrial/Modern climatic phases.

Consultation with Modern Native American Tribes

The BLM and Forest Service sent letters to the tribes listed in **Tables 6-1** and **6-2**, requesting a consultation to discuss the details of the GRSG planning efforts. The letters included a fact sheet about the Proposed LUPA/Final EIS and maps showing GRSG preliminary habitat and management units. Each of the tribes listed were also invited to participate in the planning process as cooperating agencies. **Tables 6-1** and **6-2** summarize the tribes consulted, as well as the results of the joint consultation efforts by the BLM and the Forest Service during the Draft and Final phases of the EIS.

Although participating as a cooperating agency is not formal government-to-government consultation, both efforts to outreach and solicit comments by the BLM and the Forest Service and suggestions from tribes (government-to-government consultation and participating as a cooperating agency) are included in **Tables 6-1** and **6-2**. Tribal concerns are summarized below. The implications of the seven alternatives to these concerns that are analyzed in this Proposed LUPA/Final EIS are discussed in **Chapter 4**.

- The Fort McDermitt Tribe is especially concerned with GRSG populations in the Double H Mountains.
- The Summit Lake Tribe is concerned that proposed road realignment projects near their reservation that were planned before GRSG planning may be negatively impacted by management actions in occupied habitat.
- The Summit Lake Tribe is concerned that the GRSG planning will negatively impact plans to expand their reservation boundaries because their reservation is surrounded by priority habitat.
- Access to pine nutting areas used by tribes needs to be maintained.
- Access to leks needs to be maintained, as tribal traditional practices include observing lekking behavior.
- Tribes are concerned how the GRSG planning will affect grazing, as some tribes raise cattle as an economic benefit.
- Crows and ravens are eating GRSG eggs, negatively affecting GRSG populations.
- Raptors roosting and perching on transmission lines are negatively affecting GRSG populations.
- Drought is negatively affecting GRSG populations.

- Four-wheel drive and OHVs creating new roads are negatively affecting GRSG populations.
- In some areas, low-flying jets breaking the sound barrier are negatively affecting GRSG populations by adversely affecting egg development and leks.
- Wind farms are not conducive to GRSG populations.
- Tribes cannot understand why licenses to hunt GRSGs are approved, while GRSG numbers are dwindling.

3.19 LANDS WITH WILDERNESS CHARACTERISTICS (BLM)

The purpose and need of the National GRSG Planning Effort is limited to making land use planning decisions specific to the conservation of greater sage-grouse habitats. No decisions related to the management of lands with wilderness characteristics will be made as part of this planning effort; therefore, management of lands with wilderness characteristics is considered outside the scope of this plan amendment process. Impacts to lands with wilderness characteristics from the alternatives being analyzed for this planning effort are presented in Chapter 4, section 4.16. 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 conducted between 2009 and 2014. For inventories that were conducted after 2011, findings were documented following guidance in 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 and 6320. Lands with wilderness characteristics inventories will be updated for any site-specific project NEPA analyses that are conducted in the planning area to determine if a project will have impacts to lands with wilderness characteristics identified through previous or updated inventory efforts.

Existing Conditions

Beginning in 2009, Nevada BLM updated several inventories for wilderness characteristics associated with specific energy-related projects. These projects include Ruby Pipeline Project, China Mountain Wind Energy Project, Gateway West Transmission Line Project, Spring Valley Wind Project, McGinness Hills Geothermal Project, and Crescent Dunes Solar Project. In addition, some citizen wilderness proposals and recently acquired lands have been inventoried for wilderness characteristics. However, these inventories are limited in scope

and location within the state. Approximately 583,199 acres in 14 units have been determined to possess wilderness characteristics and are identified as LWCs.

With the issuance of BLM manuals 6310 and 6320, District Offices undergoing LUP revision are directed to include analysis and management decisions regarding lands with wilderness characteristics. Currently, Carson City District, Battle Mountain District, and the Southern Nevada District are undergoing new planning efforts and are in the process of completing wilderness characteristic inventories. Elko District is not yet scheduled to initiate the RMP revision process and has not initiated an inventory. Winnemucca District released the Proposed RMP/Final EIS in September 2013 and has completed an area-specific inventory district-wide. The Ely District (Nevada) and Eagle Lake Field Office and Surprise Field Office (California) completed their RMPs in 2008 (BLM 2008d, BLM 2008b, BLM 2008c). These three offices did not include an inventory of wilderness characteristics or make management decisions regarding wilderness characteristics in their land use planning. However, LWC inventories will be updated for any site-specific NEPA analyses of the planning area to determine if a project will have impacts on LWCs identified through previous or updated inventorying.

To date, none of the lands identified as having wilderness characteristics have been designated as being managed for those characteristics within a final LUP. 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.

Trend

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 for protecting wilderness characteristics, the BLM anticipates that some characteristics may degrade over time depending upon on BLM-administered activities, which will be subject to project-level NEPA.

3.20 VISUAL RESOURCES

Visual resources refer to the visible features on a landscape (e.g., land, water, vegetation, animals, and structures). These features contribute to the scenic or visual quality and appeal of the landscape. Visual impact is the creation of an intrusion or perceptible contrast that affects the scenic quality of a landscape. A

visual impact can be perceived by an individual or group as either positive or negative, depending on a variety of factors or conditions (e.g., personal experience, time of day, and weather or seasonal conditions; BLM 1984).

Conditions on BLM-Administered Lands

Visual Resource Inventory

Visual resource inventory involves identifying the visual resources of an area and assigning them to inventory classes using the BLM's visual resource inventory process. The process involves rating the visual appeal of a tract of land, measuring public concern for scenic quality, and determining whether the tract of land is visible from travel routes or observation points. This process is described in detail in BLM Handbook H-8410-1, Visual Resource Inventory (BLM 1986b).

The results of the visual resource inventory become an important component of the LUP for the area. The LUP establishes how BLM-administered lands will be used and allocated for different purposes; it is developed through public participation and collaboration. Visual values are considered throughout the LUP process, and the area's visual resources are then assigned to the management classes with established objectives.

Based on the three inventory components (scenic quality, sensitivity, and distance zones), lands in the planning area are placed into one of four classes. These class assignments are informational and provide the basis for considering visual values during the LUP process.

Visual Resource Management System

The BLM VRM system categorizes visual land values into four distinct classes. These classes provide direction as to the amount of surface or landscape disturbance that is considered acceptable in each of these classes. The most restrictive class in terms of visual impacts is VRM Class I, and the least restrictive is Class IV. The objectives for each of these classes are as follows:

- Class I—The objective of this class is to preserve the existing character of the landscape. It provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
- Class II—The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- Class III—The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic

landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

- Class IV—The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and basic element repetition.

The analysis of a visual contrast rating process is used to resolve visual impacts. The process of a visual contrast rating, which involves comparing the project features with the existing landscape features using basic elements of form, line, color, and texture, is described in detail in BLM Handbook H-8431-1, Visual Resource Contrast Rating (BLM 1986c).

Conditions on National Forest System Lands

Historically, the Forest Service managed visual quality using the Visual Management System. Its key component is the establishment of visual quality objectives.

Visual quality objectives consist of five levels: preservation, retention, partial retention, modification, and maximum modification.

- Preservation—Allows ecological change only. Management activities are prohibited, except for very low visually impacting recreation facilities.
- Retention—Management activities may not be visually evident. Contrasts in form, line, color, and texture must be reduced during or immediately following the management activity.
- Partial Retention—Management activities must remain visually subordinate to the characteristic landscape. Associated visual impacts in form, line, color, and texture must be reduced as soon after project completion as possible or, at a minimum, in the first year.
- Modification—Management activities may visually dominate the characteristic landscape. However, landform and vegetation alterations must borrow from naturally established form, line, color, or texture so as to blend in with the surrounding landscape character. The objective should be met within one year of project completion.

- Maximum Modification—Management activities, including vegetation and landform alterations, may dominate the characteristic landscape. However, when viewed as background they must visually appear as natural occurrences in the surrounding landscapes or character type. When viewed as foreground or middle ground, they may not appear to completely borrow from naturally established form, line, color, or texture. Alterations may also be out of scale or contain detail that is incongruent with natural occurrences as seen in the foreground or middle ground. Contrast should be reduced within five years.

With an amendment to the Forest Service Manual Chapter 2380 in 2003, the Forest Service began transitioning from the Visual Management System to the Scenery Management System. Many National Forests still use the Visual Management System as they transition to the newer scenery management system.

Current Conditions

BLM LUPs and Forest Service Forest Management Plans have identified the visual resource management decisions in each respective document for those BLM districts and Forest Service ranger districts in the planning area. Some of these planning documents are subject to ongoing revision and others have recently been completed. All activities that affect GRSG habitat are subject to the management decisions in these LUPs.

3.21 AIR QUALITY

Meteorological and topographical characteristics in the planning area and the surrounding lands affect the transport, deposition, and dispersion of emissions in the planning area and region. Both emissions and management decisions influence air quality throughout the region, not just in the planning area boundaries. This section describes the existing air quality conditions in the planning area.

Current Condition

The EPA has the primary responsibility for regulating air quality, including seven criteria air pollutants subject to the National Ambient Air Quality Standards (NAAQS). Pollutants regulated under the NAAQS are carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter with a diameter less than or equal to 10 microns (PM_{10}), particulate matter with a diameter less than or equal to 2.5 microns ($PM_{2.5}$), and sulfur dioxide (SO_2). In addition, California and Nevada have established state standards for hydrogen sulfide (H_2S), and California has established state standards for sulfates (SO_4^{2-}) and vinyl chloride (chloroethene). Two additional pollutants, nitrogen oxides (NO_X) and volatile organic compounds (VOCs) are regulated separately because they significantly contribute to ozone formation in the atmosphere.

Air quality is determined by pollutant emissions and emissions characteristics, atmospheric chemistry, dispersion meteorology, and terrain. Air quality-related values include the effects on soil and water, such as sulfur and nitrogen deposition and lake acidification, and aesthetic effects, such as visibility.

In addition to EPA federal regulations, air quality is also regulated by individual state and local air quality management districts.

In Nevada, the Division of Environmental Protection, Bureau of Air Quality Planning (BAQP) and Bureau of Air Pollution Control (BAPC) implement air pollution controls for all of the state except for Clark and Washoe Counties. These two counties have their own air regulatory agencies to implement air pollution controls for their respective air districts (counties). These agencies are the Clark County, Health District, Air Pollution Control Division (CCDAQ), and the Washoe County District Health Department, Air Quality Management Division (WCAQMD).

In California, the California Air Resources Board (CARB) and 35 local air district agencies, covering the entire state, implement air pollution controls. In the planning area, only two California air quality management districts are involved: the Lassen County Air Pollution Control District (LCAPCD) and the Modoc County Air Pollution Control District (MCAPCD).

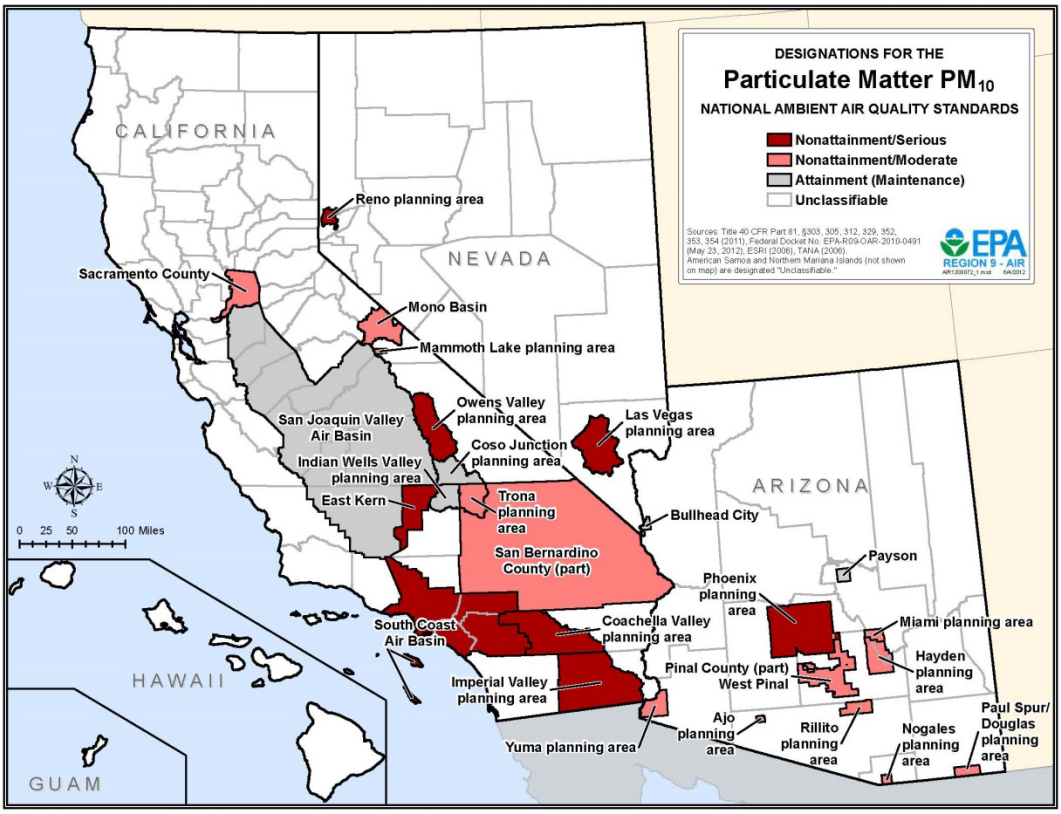
All of these agencies develop state- and air district-specific regulations and issue air quality permits for significant pollutant emission sources.

In the planning area, there is only one locality that is not in compliance with the NAAQS (federal standards). The WCAQMD is classified as nonattainment (at or above the regulatory level) for the federal and Nevada PM_{10} standards (150 micrograms per cubic meter [$\mu g/m^3$] concentration in ambient air). The WCAQMD encompasses all of Washoe County, Nevada; however, the actual subarea in nonattainment is the smaller Reno planning area (see **Figure 3-17**). The balance of the WCAQMD is in attainment of the federal and Nevada standards.

The two California counties in the planning area are in attainment (below the regulatory level) for all of the NAAQS. However, they are in nonattainment of the California PM_{10} standard of 50 grams per cubic meter.

The northern three-quarters of the WCAQMD (Washoe County) contains GRSG habitat but does not show any significant levels of the federal or Nevada regulated pollutants. The Reno planning area portion of the WCAQMD does not contain any GRSG habitat; consequently, the elevated levels of PM_{10} will not impact any known habitat of concern.

Figure 3-17
Designations for the Particulate Matter PM_{10} National Ambient Air Quality Standards



Portions of the LCAPCD and MCAPCD (California's Lassen and Modoc Counties) do contain GRSG habitat; however, since these air pollution control districts meet the federal NAAQS, the measured PM_{10} levels are not considered harmful to the GRSG habitat in these areas.

Ozone and particulate matter (PM_{10} and $PM_{2.5}$) are the most common air pollution emissions of concern in the planning area. Significant levels of these emissions commonly occur at or downwind of major metropolitan areas and industrial developments (e.g., mining and oil and gas operations). Their concentrations, although often significant on-site, are generally mitigated through dispersion downwind before reaching significant GRSG habitat. There is little information concerning the effects of PM_{10} and $PM_{2.5}$ or ozone on GRSG habitat.

3.22 CLIMATE CHANGE

Climate represents the long-term statistical characterization of daily, seasonal, and annual weather conditions, such as temperature, relative humidity, precipitation, cloud cover, solar radiation, and wind speed and direction. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over years. A region's climate is

affected by its latitude, terrain, and altitude, as well as nearby water bodies and their currents.

Climate is both a driving force and a limiting factor for biological, ecological, and hydrologic processes, as well as for resource management activities, such as disturbed site reclamation, wildland fire management, drought management, rangeland and watershed management, and wildlife habitat administration.

Climate also influences renewable and nonrenewable resource management, affecting the productivity and success of many management activities on public lands. Incorporating effective application of climate information into public lands programs, projects, activities, and decisions authorizing use of the public lands is critical for effective management.

In January 2009, the DOI issued Amendment 1 to Secretarial Order 3226 to provide guidance on how bureaus and offices can respond to emerging climate change issues. One of the order's tasks requires each bureau and office in the DOI to analyze the potential climate change impacts in planning exercises and when making decisions affecting DOI resources (Kempthorne 2009).

The BLM is developing its climate change adaptation strategy to provide guidance on how to fulfill the mandate of amendment. This strategy is due to the DOI in September 2013. The current proposal would require additional strategies to be set at the ecoregional scale.

USDA Departmental Regulation 1070-001 establishes a department-wide policy to integrate climate change adaptation planning and actions into USDA programs, polices, and operations. The Forest Service has established a national strategy for dealing with climate change. The strategy has the following two components:

- Facilitated adaptation, which refers to actions to adjust to and reduce the negative impacts of climate change on ecological, economic, and social systems
- Mitigation, which refers to actions to reduce emissions and enhance sinks of greenhouse gases so as to decrease inputs to climate warming in the short term and reduce the effects of climate change in the long term

To implement this strategy, the Forest Service integrated these two components into all its programs. The Forest Service has established a Climate Change Resource Center to assist Forest Service resource managers and decision-makers who need information and tools to address climate change in planning and project implementation on national forests.

Current Condition

The CBR ecoregion is a large arid and semiarid area covering approximately 10,855,900 acres of PPH and PGH in the decision area in Nevada, Utah, and California. Considered a cool or high elevation desert ecoregion, the CBR receives low annual precipitation with an average ranging from 7 to 12 inches (WRCC 2013; Fiero 1986).

Precipitation typically falls during the winter as snow in higher elevations, with occasional rainstorms during the summer and fall. The amount of precipitation can vary widely throughout the seasons, where a few wet seasons will be followed by several years of drought. Drought is defined as follows:

- A prolonged chronic shortage of water, as compared to the norm, often associated with high temperatures and winds during spring, summer, and fall
- A period without precipitation during which the soil water content is reduced to such an extent that plants suffer from lack of water (Bedell 1998).

Climatic conditions of the eastern Sierra Nevada and western Great Basin are influenced by the rain shadow effect. This results in relatively little precipitation due to the topography of the Sierra Nevada range, causing the prevailing winds to lose their moisture before reaching the Sierra Front. This topography-influenced weather pattern is repeatedly seen on the leeward side of other mountain ranges. Occasional summer thunderstorms can cause flash flooding and debris flows.

Temperature ranges in the ecoregion typically depend on elevation, where higher elevation areas tend to be cooler than lower elevation areas. Fall precipitation influences the soil moisture conditions before the snowpack forms and explains, in part, the effectiveness of the snowpack in producing runoff.

The daily temperature variation can range in excess of 50°F (Fiero 1986). This is a result of strong surface heating during the day and rapid nighttime cooling because of the dry air. Wind conditions reflect the elevation change and temperature gradient between basin and range. Predominantly westerly winds disperse air pollution (e.g., wildland and prescribed fires from California and poor air quality from the Truckee Meadows population center) over the Great Basin.

Over the past 100 years, this ecoregion has observed vast changes in weather, vegetation cover, and wildland fire, suggesting a change in the ecoregion's climate regime. Tang and Arnone (2013) studied trends in surface air temperatures and extreme temperatures between 1901 and 2010. The analysis showed that the annual, average, daily minimum temperature increased considerably between 1901 and 2010, while the daily maximum temperature

increased only slightly. This resulted in a considerable decrease in the daily temperature during the study period.

Overall precipitation in the CBR has increased over the past 100 years; however, timing of precipitation has changed, resulting in increased streamflows (Baldwin et al. 2003; Chambers 2008). Additionally, there has been a decline in the snowpack in the area since the 1950s, with less precipitation coming as snow and an earlier spring resulting in higher streamflows and impacting plant seasonal cycles (Mote et al. 2005; Chambers 2008).

Changes in temperature and precipitation across the CBR have changed vegetation cover and wildland fire regimes. Much of the area has seen changes in species composition, moving from one vegetation type to another and increasing quantities of invasive species. Many areas once dominated by sagebrush have seen increasing stands of pinyon/juniper, as well as cheatgrass (see **Section 3.3**, Vegetation).

Changes in wildland fire conditions throughout the CBR are considered to be a result of changing vegetation communities, as well as years of fire suppression by humans. With increasing invasive species, fires in the area tend to be flashy and large (see **Section 3.7**, Wildland Fire and Fire Management).

Climate Change Forecast

Nevada and eastern California are home to some of the driest and warmest climates, the most mountainous regions, and the fastest growing metropolitan areas of the United States. Throughout Nevada and eastern California snow-dominated watersheds provide most of the water supply for both human and environmental demands. Increasing demands on finite water supplies have resulted in the need to better monitor drought and its associated hydrologic and agricultural impacts (McEvoy et al. 2012).

The sequence of climate conditions presents variability among water years. Current climate conditions will depend on the continued annual variability in precipitation as it relates to groundwater recharge and soil stabilization, due to the duration of snow cover and the vegetation's response (Germino 2012; Wilcox et al. 2012).

According to Chambers and Pellant 2008, climate change impacts in the Great Basin are expected to result in changes in water resources, species and ecosystems, invasive species, and altered fire conditions. Warmer temperatures will result in more precipitation falling as rain instead of snow, decreasing snowpacks and altering flow conditions. This would lead to higher streamflows during the winter and lower streamflows in the spring and summer, decreasing water available for agricultural use.

Increases in temperature and precipitation can also alter vegetation communities, expanding and contracting different habitats. Invasive weed

communities are also expected to expand based on continued land uses and indirect effects from climate change.

Fire conditions are also expected to change with changing vegetation communities, expansion of invasive weeds, and warmer temperatures, which will elongate the overall fire season.

The USDA provides a water supply outlook for the western United States, including selected streamflow forecasts, a summary of snow accumulation to date, and storage in larger reservoirs. These data are monitored and used as a tool for projected forecasts of the Great Basin.

Most of the usable water in the western states originates as mountain snowfall and accumulates during winter and spring, several months before the snow melts and appears as streamflow. Since the runoff from precipitation as snow is delayed, estimates of snowmelt runoff can be made well in advance of its occurrence. The forecasts of natural runoff in this outlook are based principally on measurements of precipitation, snow water equivalent, and antecedent runoff.

Forecasts become more accurate as more of the data affecting runoff are measured. All forecasts assume that climatic factors during the remainder of the snow accumulation and melt season will interact with a resultant average effect on runoff. Early season forecasts are therefore subject to a greater change than those made on later dates (USDA 2013).

Current conditions show most of the planning area in drought conditions for ten of the past fourteen years (Drought Monitor Archives 2015). Precipitation during this period was below average, with the exceptions of 2004, 2005, 2010, and 2011, which all had higher than average precipitation. Mean average temperature has also been above average for eleven of the past twelve years, the exception being 2011, which was below average. The warmest year on record for Nevada and California since record keeping began in the late 1800's was 2014, with average daily statewide temperatures for Nevada of 53.1°F and 61.5°F for California. The second warmest year on record for Nevada was 2012, with average daily temperatures around 51.8°F. The 2015 water year is proving to be one of the driest on record. The April 1 snowpack was the lowest ever recorded at nearly every measuring site throughout Nevada and at record low levels throughout California. Current streamflow forecasts show most of the major river systems in the planning area will be less than 25 percent of average for 2015 (USDA NRCS 2015), which could result in record low streamflow volumes.

Climate change was analyzed in the CBR REA (Comer et al. 2012a), based on the current conditions in the area. This assessment consisted of a trend analysis, using PRISM and EcoClim datasets to describe natural climate variability over a baseline, from 1900 to 1980, producing 80 years of climate data. The analysis

also used several global climate models analyzed for the Intergovernmental Panel on Climate Change Fourth Assessment Report (IPCC 2007; Comer et al. 2012a). These models projected if future climate change values would exceed natural variability. They were run at two different timescales to display future forecasts, near term (2025) and future (2060).

Although climate models have improved over the past few decades, understanding of climate processes is still lacking, resulting in the use of various assumptions during model construction. The public still criticizes the use of modeled predictions from climate change models, with most frequent dispute being that the models are unreliable for use in public policy and project impact analysis. Reichler and Kim 2008 compared 57 different climate models and measured model performance and the ability to predict current climate conditions. The study concluded that current models, although not perfect, are much more accurate than their predecessors and that an increased level of confidence can be placed on their predictions (Reichler and Kim 2008).

Results for precipitation suggest no strong trend toward either wetter or drier conditions in any month for the CBR. With the exception of a slight increase in summer monsoon rains toward the south and east, there were no significant forecasted trends in precipitation for any other time of year in either the near term (2020s) or mid-century (2050s) projections (Comer et al. 2012).

Results for temperature showed increases in daily maximum temperature, particularly from July to September for 2025 and in July and August for 2060.

Table 3-60 summarizes areal extent of climate change for individual variables that have at least two standard deviations of projected change from the baseline (1900 to 1979; Comer et al. 2012a). The greatest changes were typically seen at the southern end of the study area, near the Great Basin/Mojave transitional area. Model forecasts for minimum temperatures show a considerable change in both rate and magnitude over most of the study area. July through September showed the greatest degree of change over most of the area (see **Figure 3-18** and **Figure 3-19**). Potential effects of these forecasts on the landscape could include increased fuel loads in higher elevations, increased frequency and duration of droughts, expansion of invasive species in higher elevations, increased wind erosion, and changes in wildland fire regimes (Comer et al. 2012a).

In addition to the forecast modeling for temperature and precipitation, climate envelope models were also developed in the REA analysis to indicate magnitudes and directions of shifts in climate regimes based on current distribution of conservation elements. One of the specific conservation elements analyzed in the REA was for GRSG-occupied habitat for 2060. This analysis shows that most of the analysis area will see a loss in habitat, with only a relatively small proportion of current distribution forecasted to retain the climate regime close to that currently supporting this species (Comer et al. 2012a).

Table 3-60
Temperature Variations in the Planning Area

Variable (Month, 2060 Forecast)	Percent of Area with Value > 2 Standard Deviation Departure	Mean Departure from Baseline (°F)	Grid Cells > 2 Standard Deviation (StDev) Departure Forecast 2060		
			Min (°F)	Max (°F)	StDev
January minimum temperature	0.2	7.67	6.24	8.77	0.57
March minimum temperature	0.6	5.62	4.67	6.97	0.50
April minimum temperature	8.9	4.94	3.68	6.71	0.39
May maximum temperature	0.005	5.57	5.57	5.57	NA
May minimum temperature	4.4	4.52	3.79	6.26	0.31
June maximum temperature	6.6	6.52	5.43	9.06	0.39
June minimum temperature	54.6	5.42	4.24	8.22	0.47
July maximum temperature	90.5	5.51	4.25	8.70	0.45
July minimum temperature	90.6	6.03	4.17	9.47	0.59
August maximum temperature	85.1	6.14	4.46	8.59	0.39
August minimum temperature	93.9	6.76	4.71	9.76	0.55
September maximum temperature	9.5	6.09	5.07	7.46	0.42
September minimum temperature	90.6	6.77	4.98	10.12	0.56
October maximum temperature	0.6	7.16	5.68	8.33	0.46
October minimum temperature	61.2	5.76	4.33	8.27	0.58
November minimum temperature	0.1	5.39	4.57	5.87	0.36
December minimum temperature	0.1	6.05	5.43	7.57	0.62

Source: Comer et al. 2012a

Figure 3-18
Forecasted Monthly Maximum Summer Temperature Change (degrees F) by the 2020s, for July, August, and September (Comer et al. 2012a)

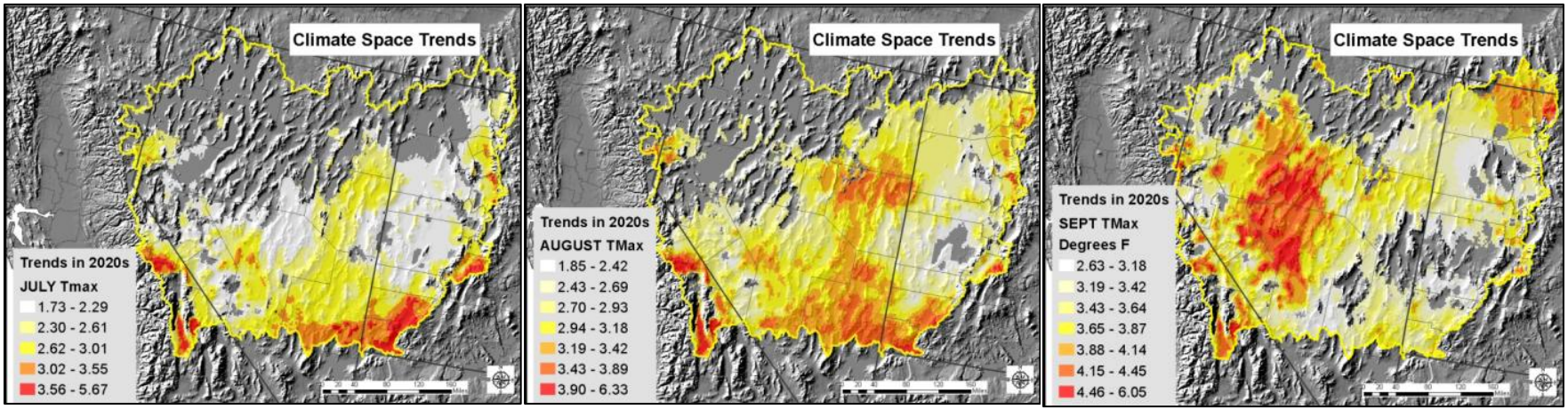
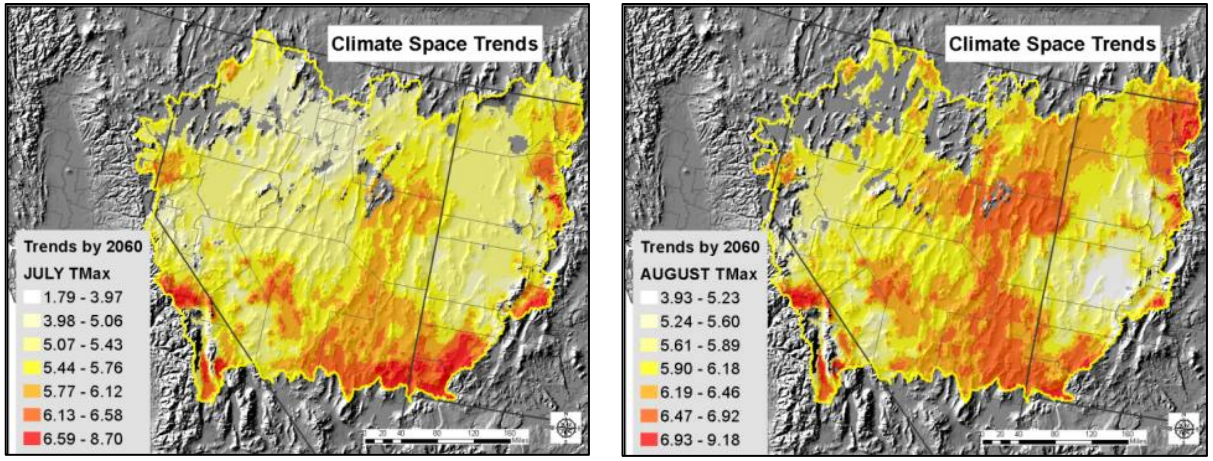


Figure 3-19
Forecasted Monthly Maximum Summer Temperature Increases (degrees F) for 2060, for July and August (Comer et al. 2012a)



Other climate change-related studies in the Nevada planning area are as follows:

- NDOW recently completed a habitat assessment and species vulnerability assessment to climate change as part of its updated Nevada Wildlife Action Plan (NDOW 2013). NDOW contracted with The Nature Conservancy (TNC) to complete predictive modeling of climate change effects on Nevada's vegetative communities.
- The Nevada Natural Heritage Program conducted a wildlife species vulnerability analysis using the NatureServe Climate Change Vulnerability Index evaluation program (Young et al. 2011) to determine which wildlife species exhibited characteristics that might uniquely hinder their adaptation to climate change, including general mobility, physiological challenges, and dependence on certain vegetation types or plant species.
- The GBBO developed data-supported climate change predictions for Nevada's breeding birds using point-count data from the Nevada Bird Count, a 10-year database with georeferencing and coarse-scale habitat association capability. Avian Species of Conservation Priority occurrences in the Nevada Bird Count were geospatially attached to the LANDFIRE map used by TNC to generate the habitats analysis. Results from the TNC analysis were then evaluated for the potential consequences for Nevada's breeding birds, and avian species responses were predicted (NDOW 2013).
- The Connectivity Assessment Group provided an avian climate change analysis to the Nevada Wildlife Action Plan (NWAP) revision process that evaluated possible patterns of movement on the landscape of priority birds, based on the availability and connectivity of suitable habitats as currently understood versus climate change projections in habitat shifts (NDOW 2013).

The results that follow are taken verbatim from the NWAP (NDOW 2013).

Predicted Climate Change Effects

Big Sagebrush Steppe

The Big Sagebrush Steppe currently occurs predominantly in the northern regions: Black Rock, Owyhee, and Elko. In those regions, Big Sagebrush Steppe is relatively intact (more than 75 percent in characteristic classes), but in the Black Rock Plateau and Owyhee Desert regions, sagebrush steppe is heavily weighted in percentage toward the mid-closed class with shrub cover ranging between 31 and 50 percent. In the Elko region, Big Sagebrush Steppe occurs predominantly in the mid-open class under 30 percent shrub cover. The percentage that would roughly represent its mid-closed class in reference condition (18 percent) is currently classified as rabbitbrush (early shrub, 22

percent). The open bunchgrass-dominated stage is largely deficient under current conditions. The 50-year climate change projections predict increases in transition to uncharacteristic classes for these regions: 26 percent in Elko, 45 percent in Black Rock, and 54 percent in Owyhee. Increases in the annual grass class are predicted to stay below 20 percent for each of these regions and tree encroachment (above 20 percent cover) is predicted to occur in about 14 percent of the Black Rock and Owyhee regions, but only 1 percent in the Elko region.

TNC climate change modeling predicts the appearance of Big Sagebrush Steppe in several regions south of the Columbia Plateau in 50 years, including the Calcareous Ranges, Eastern Sierra, Eureka, Humboldt Ranges, Lahontan Basin, Toiyabe, Tonopah, and Walker Corridor. Predicted acreages gained in each region are presented in Appendix G of the NWAP. Big Sagebrush Steppe will be converted primarily from the Montane Big Sagebrush Mountain above what is now the 14-inch precipitation elevation. These converted acreages will be significantly invaded with annual grasses, ranging anywhere from 36 to 84 percent in uncharacteristic classes, mostly occurring in the shrub-annual-perennial class. All but Eastern Sierra (36 percent) will be over 50 percent invaded.

Big Sagebrush Upland

Big Sagebrush Upland occurred in all 13 regions evaluated by TNC. In reference condition, Big Sagebrush Upland should exhibit 84 to 86 percent of its total acreage in the early, mid-open, and mid-closed classes. The early class (10 to 80 percent grass, 0 to 10 percent shrub) is almost non-existent throughout its range, deficient anywhere from 75 to 100 percent in all regions. Most regions also exhibit a significant transition from the mid-open class to the mid-closed and late open/closed classes, indicating that sagebrush age in this biophysical setting is weighted toward the high end with little natural rejuvenation. This is because throughout most of this biophysical setting, stand-clearing events (e.g., fire) are almost always significantly followed by the invasion of annual grasses.

Significant transitioning into uncharacteristic classes (U-classes) has already occurred in most of those regions (Appendix G of the NWAP), particularly the northern half of the state, where percentage in U-classes currently range from 41 to 81 percent, with the exception of the Owyhee (23 percent) and Eastern Sierra (20 percent) regions. In the three southern regions and the Walker Corridor, U-class percentages currently range from 8 to 34 percent.

Climate change modeling indicated that the greatest increases in U-class percentages would occur in those southern regions not currently so advanced in transition, ranging from 13 to 57 percent. The remaining 8 northerly regions increased in U-class percentage less than 10 percent in 50 years with climate change.

Low-Black Sagebrush

The Low-Black Sagebrush biophysical setting occurs in all 13 regions evaluated by TNC. In reference condition, Low-Black Sagebrush should exhibit 15 to 20 percent in the early class, 40 to 50 percent in the mid-open class, and 30 to 40 percent in the late-open/closed classes. Typically, low-black sagebrush in current condition exhibit a healthy 40 to 75 percent in the mid-open class, but early and late classes are invaded by annual grasses with some tree encroachment occurring on the eastern and western borders of the state.

Climate change modeling indicated that 4 of the 13 regions would increase in uncharacteristic class percentages over 10 percent in 50 years (Appendix C of the NWAP), four would increase over 20 percent, and 4 would increase over 30 percent, with the Mojave region transitioning to a 47 percent into U-classes. The eastern side of the state (Elko, Calcareous, and Clover regions) would experience relatively small increases but are largely transitioned to U-classes already (60 to 75 percent). The Black Rock and Owyhee regions would remain relatively intact, starting below 25 percent currently and experiencing 12 to 13 percent increases in U-classes in 50 years.

Low Sagebrush Steppe

The Low Sagebrush Steppe biophysical setting occurs at high elevations in 9 of the 13 regions, absent in the Lahontan Basin, Walker Corridor, Tonopah, and Mojave regions. Low Sagebrush Steppe currently exists in relatively good condition in its northern range (Black Rock, Owyhee, Elko regions) with less than five percent in uncharacteristic classes. Throughout the rest of its Nevada range, the type is already heavily invaded by annual grasses and/or tree-encroached.

Climate change modeling indicated that the northern regions with good condition Low Sagebrush Steppe listed above would transition 12 percent or less to U-classes in 50 years (Appendix C of the NWAP). Across the rest of its range, the type would not transition much further into U-classes, but in the Eureka and Toiyabe regions where current U-class percentage already tops 80 percent, the remaining amount would transition to U-class, while the Humboldt Ranges are predicted to lose their Low Sagebrush Steppe acreages completely in 50 years.

Montane Sagebrush Steppe Mountain

The Montane Sagebrush Steppe Mountain biophysical setting occurs in all 13 regions above the 14-inch precipitation zone and constitutes the upper-elevation element of what is commonly referred to in Nevada as mountain big sagebrush. The type is currently significantly departed from reference conditions in most regions throughout the state without a strong pattern of departure comparable between regions or regional trends (e.g., north, south, east, or west) that can be generally represented. U-class percentages range from 17 (Owyhee Desert) to 81 (Appendix C of the NWAP) percent. Characteristic

classes which should be ranging around 45 percent in the mid-open class are weighted more in the mid-closed and late classes in 10 of 13 regions. Acreage in the early class is almost non-existent, reflecting the continued lack of enough fire activity. The biophysical setting is very productive and should easily recover from fire.

Climate change projections predicted all but two regions (Owyhee and Eastern Sierra) would be over 40 percent transitioned to uncharacteristic classes in 50 years. The largest transitions tended to occur in the southerly regions (Mojave, Clover, Calcareous, Tonopah, and Walker Corridor).

Climate change modeling predicted significant conversion of this to either Big Sagebrush Upland or Big Sagebrush Steppe. Predicted losses by region are reported in Appendix G of the NWAP. Predicted losses in the Montane Sagebrush Steppe mostly run between 18 and 22 percent of its current totals in all regions, with the exceptions of the Elko and Mojave regions (12 and 14 percent, respectively).

Wyoming Big Sagebrush

Wyoming Big Sagebrush occurs in all the evaluated regions except the Mojave. Currently the type is significantly departed from reference conditions in all regions except the Owyhee Desert, where only one percent was classified in any uncharacteristic class (Appendix C of the NWAP). With respect to the distribution of the type between characteristic classes in the Owyhee, there is no early class, and significant invasion by annual grass or juniper encroachment is not yet occurring. All other regions are currently exhibiting greater than 50 percent of their acreage of Wyoming Big Sagebrush in uncharacteristic classes, some as high as 90 percent. For most regions, the bulk of the U-class acreage occurs in the tree-annual grass class. In the Elko region, most of the U-class acreage occurs in rabbitbrush. Both are rather unfriendly habitats to sagebrush-associated wildlife species. Eastern Sierra, Eureka, Humboldt, and Owyhee Desert regions were predicted to increase in U-class percentage over 10 percent in 50 years with climate change. Only Owyhee, Elko, and Eastern Sierra will remain under 60 percent transitioned to U-classes in 50 years.

Possible Wildlife Responses to Climate Change

Sagebrush communities in their characteristic forms provide essential habitat elements for wildlife in several critical ways. The shrub component provides essential nesting structure, protection from the elements (thermal cover), and protection from predators (escape cover). The native grass/forb understory provides food for plant- and seed-eating species, including the important upland forbs for early GRSG brood-rearing immediately after hatch. Rodents such as sagebrush vole, pale and dark kangaroo mouse, and Wyoming ground squirrel depend on the succulent parts, fruits, and seeds of native grasses and forbs. The native understory is also important to the sustenance of abundant, diverse

arthropod[7] communities, which are important food for reptiles, such as the greater and pygmy short-horned lizards, insect-eating mammals, such as Merriam's, Preble's, and Inyo shrew, and all the brood-rearing songbirds, including sage thrashers, Brewer's sparrows, sage sparrows, and loggerhead shrikes. In turn, several of these species are preyed on by predators, including burrowing owls, ferruginous hawks, bald eagles, and prairie falcons.

Predicted high ecological departure in sagebrush communities suggests disruption of many ecological processes required by wildlife species. Primary threats to ecological integrity are the invasion of annual grasses and exotic forbs via wildland fire, land disturbance, and the encroachment of pinyon/juniper trees from their characteristic sites, primarily through natural seed dispersal and fire suppression.

Invasive grasses and forbs change the community by eventually replacing the native understory with species whose seeds and succulent parts are of less nutritional value and are available in nutritious form for a shorter period, compared with the native understory. Eventually, through the change in fire conditions facilitated by annual grass/exotic forb buildup and their better recovery advantage after fire, the shrub component can be lost and the site converted to annual grass/exotic forbs with little natural recovery potential.

Tree encroachment will start a disruptive process that several sagebrush breeding birds, including sage thrashers, Brewer's sparrows, and sage sparrows, avoid in surprisingly early stages of advancement: as low as 6 percent tree cover for sage thrashers (Reinkensmeyer 2000) and around 15 percent for Brewer's sparrows (CalPIF 2005). GBBO bird response analysis predicted that among the three species, sage sparrows demonstrated the greatest negative sensitivity to the presence of trees, with reductions in densities ranging between 87 and 89 percent from absence of trees to presence of trees (NDOW 2013).

Similarly, the Connectivity Study Group Report predicted a 29 percent reduction in area occupied by sage thrashers, 18 percent reduction in area occupied by sage sparrows, and an 11 percent reduction in area occupied by Brewer's sparrows as pinyon/juniper woodland expanded (Fleishman et al. 2012).

Small mammal and reptile response to tree encroachment into sagebrush has been less studied, but intuition would suggest that these species would continue to inhabit sagebrush as long as a native understory and some of the shrub component persist. Tree encroachment can reach a point to where the understory is deprived of sufficient water by the tree root systems and disappears, as reflected in the uncharacteristic tree-encroached class description for several sagebrush communities in this analysis.

[7]Insects, spiders, and crustaceans

Evaluating the relative values of the different classes of sagebrush identifies uncharacteristic classes that will have definite impacts on wildlife's ability to stay on the landscape. For this analysis, the following classes have been identified as unsatisfactory to sagebrush-associated wildlife: annual grassland, early shrub (rabbitbrush), tree-annual grass, and tree-encroached.

The characteristic early classes (usually resultant from a stand-changing event, such as wildland fire or applied management) can be expected to be abandoned by shrub-associated wildlife species for the first 12 or so years. However, since this is a natural rejuvenation process and the sagebrush community is on track for natural succession, it is a stage that results in long-term benefits for the sagebrush wildlife community.

The depleted and shrub-annual grass-perennial grass classes will likely continue to hold shrub-nesting birds, such as sage thrashers, Brewer's sparrows, and sage sparrows. These species seem not to respond to changes in understory condition as long as the shrubs persist, particularly in their mature stages. GRSGs should conceivably find the depleted and shrub-annual/grass-perennial grass classes acceptable as wintering habitat because the understory would be under the snow; however, GRSGs would find the depleted class less suitable during nesting and summer foraging.

The lack of understory impacts nesting success through increased nest predation (Coates and Delehanty 2010) and lack of herbaceous material, and associated plant-eating insects would impact brood nutrition in the first few weeks after hatch (Klebenow and Gray 1968; Gregg et al. 2008). Ground-dwelling small mammals and reptiles may be negatively impacted by the loss of understory in the depleted classes, but necessary research is lacking.

Cumulative increases in the annual grass, early shrub, and tree-encroached classes of sagebrush types after 50 years of climate change consistently averaged between 10 and 25 percent when determined for each region, with some notable exceptions. In the Mojave region, sagebrush types are typically found or associated with mountainous dry washes and are largely restricted to the Spring Mountains and Sheep Range. Here, the cumulative increase in wildlife-unfriendly sagebrush classes reached 58 percent for Big Sagebrush Upland (affecting 9,200 acres), 64 percent for Low/Black Sagebrush (affecting 90,000 acres), and 65 percent for Montane Sagebrush Steppe Mountain (affecting 8,300 acres). The bulk of these increases were predicted to occur in the early shrub class (rabbitbrush), presumably following wildland fire.

The Lahontan region was predicted to transition an average of 46 percent of all its sagebrush communities to unsuitable classes in 50 years, while the Humboldt Ranges were predicted to transition 34 percent and the Clover region 30 percent to unsuitable classes. Large transitions in the Lahontan and Humboldt Ranges might particularly affect the sage sparrow, a species with more prevalent Wyoming big sage biophysical setting than other types of sagebrush. Pygmy

rabbits might particularly suffer range retractions in the two regions, where nearly all types of big sagebrush were predicted to transition over 40 percent to unsuitable classes.

Generally, sagebrush-associated species in Nevada could experience a 10 to 30 percent decrease in acres of suitable habitat over the next 50 years with climate change. GBBO bird population modeling predicted a 14 percent reduction in statewide population for Brewer's sparrows, 20 percent for sage sparrows, and 21 percent for sage thrashers, based on the TNC climate change analysis.

Whether populations will be able to adjust to greater densities in reduced suitable habitat, thus maintaining their current levels, remains to be seen and should be monitored. Evidence suggests that nesting sagebrush songbirds do have demographic capabilities to nest at densities higher than they typically do when unstressed for space (GBBO 2010). How mammals and reptiles might respond to such reductions is largely unknown and should be monitored.

3.23 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

Due to the nature of social, economic, and environmental justice conditions, the social and economic analysis is based on a somewhat different area of analysis than is used for other resources. Specifically, the socioeconomic study area is made up of counties in the Nevada and Northeastern California Sub-region that contain GRSG habitat and in which social and economic conditions might reasonably be expected to change, based on alternative management actions[8].

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 those where businesses regularly provide critical economic services, such as recreational outfitting or support services for the livestock grazing sector (METI Corp/Economic Insights of Colorado 2012). Including service area counties could be important because a change in economic activity in a county containing habitat may change economic activity in service area counties as well.

[8] As discussed in **Chapter 1**, minor changes to the habitat boundaries used in the draft LUPA/EIS resulted in three additional counties containing GHMA including Lyon and Storey in Nevada and Sierra in California. The GHMA in these counties amounts to about 1,200 acres and represents less than 0.02% of the GHMA in the decision area (none of the habitat falls within PHMA). Given the amount of habitat as well as the analysis of commuting patterns, the BLM does not expect this planning effort to have any measureable socioeconomic impacts in these counties. Therefore, the BLM did not add these counties to the socioeconomic study area. However, for informational purposes, population, employment and earnings data for these counties have been included in **Appendix T**, Detailed Employment and Earnings Data. Additional information related to potential impacts in these counties is provided in the **Chapter 4**.

The socioeconomic study area contains 12 counties, all containing GRSG habitat: two in California (Lassen and Modoc) and 10 in Nevada (Churchill, Elko, Eureka, Humboldt, Lander, Lincoln, Nye, Pershing, Washoe, and White Pine).

The BLM considered whether there would be a secondary study area, made up of counties providing services to the primary study area or linked through commuter patterns. **Table 3-61** shows the share of workers employed in a given county of the socioeconomic study area who reside in the same county. It also shows other counties that provide labor to the county. The table shows that no labor market in the socioeconomic study area relies on a county outside the socioeconomic study area for a considerable share of the workers employed. Some counties (not shown in **Table 3-61** but for example Storey County) do depend considerably on Washoe County as a source of employment; however, because this link is mostly to Reno, which is expected to be less impacted by management alternatives than rural areas of Washoe County, counties economically connected to Reno were not included in a secondary study area. Because the BLM also found no evidence of important service areas outside the counties already included in the study area, it did not identify a secondary study area.

Table 3-61
Commuter Patterns in the Socioeconomic Study Area, 2010

Geographic Area of Employment	Percent Who Live in Same Area of Employment	Other Counties (Percentages) Where A Considerable Share of Workers Live
Primary Socioeconomic Study Area		
Lassen County, California	75.7	Shasta (3.4), Plumas (3.1), and Washoe, Nevada (2.6)
Modoc County, California	63.3	Siskiyou (10.0), Klamath, Oregon (7.5), Shasta (4.7), and Lassen (2.5)
Churchill County, Nevada	70.6	Washoe (9.2), Lyon (6.6), and Clark (2.1)
Elko County, Nevada	75.3	Washoe (2.9), Humboldt (2.5), Clark (2.4), Tooele, Utah (2.4), and Twin Falls, Idaho (2.2)
Eureka County, Nevada	25.3	Elko (56.0) and Lander (10.6)
Humboldt County, Nevada	64.2	Elko (11.7), Washoe (5.8), Pershing (3.9), and Lander (3.8)
Lander County, Nevada	56.8	Elko (18.3), Humboldt (11.8), and Washoe (2.4)
Lincoln County, Nevada	73.2	Clark (15.1) and White Pine (2.2)
Nye County, Nevada	70.1	Clark (19.8)
Pershing County, Nevada	59.0	Washoe (9.6), Humboldt (9.2), Clark (5.1), Lyon (4.7), Churchill (3.4), and Carson City (2.7)
Washoe County, Nevada	80.6	Clark (4.0), Lyon (3.1), Carson City (2.8), and Douglas (2.0)
White Pine County, Nevada	75.7	Elko (9.3), Clark (4.3)

Source: US Census Bureau 2012a

Table 3-62 shows the planning documents that may be altered by the Nevada and Northeastern California Sub-region GRSG planning process and the counties containing GRSG habitat in the area encompassed by those plans. Although this table shows counties other than the 12 listed above, the BLM's analysis of habitat and cross-county labor flows indicates that any economic or social effects in these additional counties resulting from actions analyzed in this Proposed LUPA/Final EIS are likely to be small, relative to the 12 study area counties.

Table 3-62
BLM and Forest Service Plans in the Socioeconomic Study Area, Management Units, and Counties

Agency	Plan or Document	Management Unit	Counties
BLM	Battle Mountain RMP	Battle Mountain District Office (Mountain Lewis and Tonopah Field Offices)	Lander, Eureka, Nye, and Esmeralda (Nevada)
	Black Rock Desert National Conservation Area RMP (2004)	Surprise Field Office, Winnemucca District Office (Black Rock, Humboldt River Field Offices)	Humboldt, Pershing, and Washoe (Nevada)
	Carson City RMP	Carson City District Office (Sierra Front and Stillwater Field Offices)	Washoe, Storey, Carson City, Douglas, Lyon, Churchill, Mineral, and Nye (Nevada); Alpine, Plumas, and Lassen (California)
	Elko RMP (1987)	Elko District Office (Tuscarora Field Office)	Elko, Eureka, and Lander (Nevada)
	Ely RMP (2008)	Ely District Office (Egan, Schell, and Caliente Field Offices)	White Pine, Lincoln, and Nye (Nevada)
	Wells RMP (1985)	Elko District Office (Tuscarora Field Office)	Elko (Nevada)
	Winnemucca RMP	Winnemucca District Office (Black Rock and Humboldt River Field Offices)	Humboldt, Pershing, Washoe, Lyon, and Churchill (Nevada)
	Alturas RMP (2008)	Alturas Field Office	Lassen, Modoc, Shasta, and Siskiyou (California)
	Eagle Lake RMP (2008)	Eagle Lake Field Office	Lassen, Plumas, Sierra (California); Washoe (Nevada)
	Surprise RMP (2008)	Surprise Field Office	Modoc, Lassen (California); Washoe, Humboldt (Nevada)
Forest Service	Humboldt National Forest LRMP (1986)	Ely, Jarbidge, Mountain City, and Santa Rosa Ranger Districts	Nye, Elko, White Pine, and Humboldt
	Toiyabe National Forest LRMP (1986)	Austin, Bridgeport, Carson, Tonopah, and Spring Mountains National Recreation Area Ranger Districts	Nye, Lander, Mineral, Lyon, Eureka, Washoe, Douglas, Clark, Lincoln, and Carson City (Nevada); Mono, Alpine, Sierra, Nevada, Lassen, and El Dorado (California)

Source: BLM and Forest Service 2015

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 and current social values.

Population and Demographics

Table 3-63 shows current and historic populations in the socioeconomic study area. While the population of California grew at nearly the same rate as that of the United States between 1990 and 2010 (24.1 percent and 25.0 percent, respectively), the population in Nevada increased by 124.7 percent over the same period. Both states experienced a higher percentage of population growth from 1990 to 2000 than from 2000 to 2010. From 2000 to 2009, natural increase (births minus deaths) has accounted for 26 percent of Nevada's population growth, and net migration has accounted for about 74 percent.

Table 3-63
Population Growth in the Socioeconomic Study Area, 1990-2010

Geographic Area	1990	2000	2010	Percent Change (1990-2010)
Lassen County, California	27,598	33,828	34,895	26.4
Modoc County, California	9,678	9,449	9,686	0.1
Churchill County, Nevada	17,938	23,982	24,877	38.7
Elko County, Nevada	33,463	45,291	48,818	45.9
Eureka County, Nevada	1,547	1,651	1,987	28.4
Humboldt County, Nevada	12,844	16,106	16,528	28.7
Lander County, Nevada	6,266	5,794	5,775	-7.8
Lincoln County, Nevada	3,775	4,165	5,345	41.6
Nye County, Nevada	17,781	32,485	43,946	147.2
Pershing County, Nevada	4,336	6,693	6,753	55.7
Washoe County, Nevada	254,667	339,486	421,407	65.5
White Pine County, Nevada	9,264	9,181	10,030	8.3
Socioeconomic Study Area	399,157	528,111	630,047	57.8
California	29,811,427	33,871,648	37,253,956	25.0
Nevada	1,201,675	1,998,257	2,700,551	124.7
United States	248,790,925	281,421,906	308,745,538	24.1

Sources: US Census Bureau 1990, 2000, 2010a

In contrast, about 90 percent of California's population growth is due to natural increase, while only 10 percent is due to net migration (US Census Bureau 2009). Population growth between 1990 and 2010 in the separate counties of the socioeconomic study area ranges from a low of negative 7.8 percent growth in Lander County, Nevada, to a high of 147.2 percent growth in Nye County, Nevada. Washoe County, Nevada, which is by far the most populated county in the socioeconomic study area, grew 65.5 percent over the 1990 to 2010 period.

With a population of 225,221, Reno, Nevada, is the largest city in the socioeconomic study area (US Census Bureau 2010a). Reno is the county seat of Washoe County (NACO 2012) and the third largest city in Nevada, after Las Vegas and Henderson. Reno is serviced by three major highways, the Union Pacific railroad, and a number of trucking and airline carriers. Reno's economy is based predominantly in the trade and service sector, with approximately 65 percent of the workforce employed in these occupations. In 2005, *Inc.* magazine named Reno number one on its list of the Best Places to Do Business in America, based on job growth figures from 274 metropolitan areas (City of Reno 2012).

With a population of 90,264, Sparks, Nevada, is part of the Reno-Sparks metropolitan area. Sparks was reported as the fastest growing city in Nevada between 1999 and 2008.

Two large suburbs, Sun Valley (population: 19,299) and Spanish Springs (population: 15,604), are north of Reno and part of the Reno-Sparks metropolitan area. The GRSG habitat in Washoe County is predominantly found to the north of the Reno-Sparks metropolitan area.

With a population of 17,947, the largest California city in the socioeconomic study area is Susanville. The county seat of Lassen County, California (NACO 2012), Susanville is a former mining town and home to two California Department of Corrections and Rehabilitation facilities: High Desert State Prison and California Correctional Center.

Interest Groups and Communities of Place, 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 3-64** shows age and gender characteristics of the population in each county of the socioeconomic study area.

California, Nevada, and the socioeconomic study area generally follow the same trends as the country as a whole, with women comprising approximately 50 percent of the population and an age demographic of 20 to 64, for approximately 60 percent of the population.

Of the counties in the socioeconomic study area, Lassen County, California, and Pershing County, Nevada, have the populations with the highest percentage of males, both at least 14 percentage points higher than the national average. Of the counties in the socioeconomic study area, these two counties also have the highest percentages of working age individuals, both at least 5 percentage points higher than the national average. On the other end of the spectrum, Lincoln County, Nevada, and Nye County, Nevada, have the lowest percentages of working age individuals, both at least 6 percentage points lower than the national average.

Table 3-64
Demographic Characteristics of the Socioeconomic Study Area, Share in Total Population (Percent) 2010

Geographic Area	Women	20 to 64 Years of Age	Under 20 Years of Age	65 Years of Age or Older
Lassen County, California	35.8	69.4	20.6	10.0
Modoc County, California	49.6	56.5	23.8	19.7
Churchill County, Nevada	49.7	57.3	27.5	15.2
Elko County, Nevada	48.1	59.3	32.2	8.5
Eureka County, Nevada	47.3	61.1	26.0	12.9
Humboldt County, Nevada	47.6	60.0	29.8	10.2
Lander County, Nevada	49.3	57.9	30.3	11.8
Lincoln County, Nevada	46.2	52.4	29.5	18.1
Nye County, Nevada	49.5	53.9	22.7	23.4
Pershing County, Nevada	36.8	65.3	21.7	13.0
Washoe County, Nevada	49.5	61.3	26.6	12.1
White Pine County, Nevada	43.4	61.7	23.4	14.9
Socioeconomic Study Area	48.3	60.8	26.5	12.8
California	50.3	60.5	28.1	11.4
Nevada	49.5	60.7	27.3	12.0
United States	50.8	60.1	26.9	13.0

Source: US Census Bureau 2010b

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 both overlapping and divergent interests. These groups sometimes define or measure sustainable use or resource conservation differently; these 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. Identification of these groups is intended to inform on the different interests in the study area and not to suggest that different interests necessarily conflict. Furthermore, groups and individuals often value various interests. A list of interest groups that requested a copy of the Draft Proposed LUPA/EIS is provided in **Chapter 6**, Consultation and Coordination.

Interest groups in the socioeconomic study area include the following: federal, state, county, and local agencies, congressional representatives, local representatives, academic institutions, civic organizations, local chambers of commerce, environmental groups, land conservation groups, outdoors and sporting groups, local school boards, farm associations, Native American groups and tribal governments, and various business groups.

Specific types of business interest groups include real estate, tourism, mineral extraction, textile manufacturing, crop and livestock farming, and news media.

Residents of Nevada's cities and towns view federal lands as an invaluable open space resource for urban dwellers. For example, the Washoe Comprehensive Plan recognizes the numerous scenic, natural, and cultural values that make Washoe County an attractive and exciting place to visit (Washoe County 2005a). Convenient access to public lands for recreation is one of the area's most attractive features and forms an important element in the personal lifestyle of numerous county residents. The Policies and Action Programs section of the Washoe County Comprehensive Plan includes a policy statement that expresses the intention to maintain the rural character of the planning area and protect its scenic resources, wilderness areas, and natural habitats generally (Washoe County 2005a).

Churchill County's economy is primarily based on agriculture, while also having a strong military presence (BLM 2013c). Churchill County is home to the Naval Air Station Fallon, which hosts over 3,000 military, civilian employees, and Department of Defense contractors (CNIC, undated). Churchill County is also an important producer of renewable energy, generating almost three quarters of the geothermal energy produced in the study area (see **Table 3-72)**.

Churchill County's Master Plan states that its natural areas, historical and archaeological sites, and developed recreation facilities are valued and used by the residents, and they provide significant potential for increasing the tourism economy (Churchill County 2010). A community needs survey was completed in 2004. Of the respondents, 52 percent indicated that parks and recreation were very important, while 38 percent ranked parks and recreation as important. Economic strategy workshops conducted for the BLM's Carson City District LUP and EIS revealed the importance placed by participants on agriculture, military defense, and geothermal energy. They were also interested in maintaining the rural character of the area, although more health care and recreation infrastructure were identified as needed (BLM 2013c).

According to the December 2010 Elko County Public Land Use and Natural Resource Management Plan (Elko County 2010), open space and recreational opportunities are critical to Elko County's economic, historical, and cultural identity. Elko County has a diversified economy built on mining, ranching, recreation, and tourism. Recreation opportunities include camping, hiking, fishing, and hunting.

Elko County also hosts many annual recreational, historical, cultural, and ethnic special events and attractions. The county embraces the multiple use concept of public land management and expects federal land management agencies to maximize public access and use of lands, while addressing environmental concerns.

Mining and cattle ranching are two particularly important economic activities for the county (Elko County 2010). Nearly 73 percent of Elko County is under federal management (Elko County 2010). In 2010, Elko County prepared a study titled The Impact of Federal Land Policies on the Economy of Elko County,

Nevada, presented as Appendix E of the Elko County Public Land Use and Natural Resource Management Plan. This study shows that because a large share of personal income in the county is derived from activities on federal lands or directly from the federal government, changes in federal policies can have considerable impact on the economy (Leaming 2010).

Humboldt County, west of Elko County, is sparsely populated, with most of its population living in the only incorporated city, Winnemucca (BLM 2010d). Public ownership accounts for 80 percent of Humboldt County land use. Less than 1 percent of the land is urban or developed. According to the Humboldt County Regional Master Plan, it typifies a rural intermountain western county.

Its economy is derived substantially from natural resource extraction, primarily mining and agriculture, with mining being the single greatest concentration of resources. Mining-related boom-and-bust cycles have dominated Humboldt's history, and the county's Regional Master Plan aims at a more diversified economy (Humboldt County 2002).

The Pershing County economy is dominated by mining. The long-term goals of Pershing County, as indicated in its 2002 Master Plan, focus on maintaining a rural character, while supporting the existing agricultural and mining industries. The plan advocates concentrating growth in existing developed areas and balancing growth with the desire to protect agricultural and open space land uses. Overall, Pershing County is in a similar position as surrounding rural Nevada and California Counties in its desire to preserve a rural quality of life while promoting reasonable increases in population and economic diversity. Counties like Pershing are highly susceptible to industry-specific fluctuations, due to their less diverse economies. Local mines and the state prison account for nearly half of the county's total employment base. A change in mining regulations could impact the county financially (TMRPA 2010).

In Eureka, Lander, and Nye Counties, specific groups to whom management of public lands is of particular interest include local governments and school districts, ranchers (including those with livestock grazing permits), local sportsmen, mineral claims holders and mineral estate owners, and oil and gas and renewable energy leaseholders. Eureka and Lander are among the least populated counties in the study area.

Mining is a particularly important part of Eureka and Lander's economies; however, with mining jobs often filled by residents of neighboring counties and with the boom-and-bust cycles common to mining-related economies, agriculture has been vital as a steady economic force for the local labor force through the decades (BLM 2011i).

In Nye County, various service sectors, such as retail trade and professional and technical services, are also of particular importance for employment (see **Appendix T**, Detailed Employment and Earnings Data). According to information

provided by the county, local communities and private landowners next to public lands are concerned about the lack of private land available for commercial and residential development or other economic or social uses. In addition, local private landowners are concerned about how the development of public lands may impact the quality or quantity of local natural resources, particularly water.

Additional issues of importance to landowners include rural lifestyle preservation, OHV, and other recreation opportunities (Nye County 2012). Furthermore, special interest groups and individuals who represent resource conservation or resource use perspectives constitute another community with a specific interest in public land management. Various individuals and groups at the local, regional, and national levels are interested in how the BLM administers public lands. Many of their concerns regard wildlife, water quality, and visual quality. They value public lands for open space, wildlife, recreation, and scenic qualities among other aspects (BLM 2011i).

Local residents and organizational interests in Lincoln and White Pine Counties have a strong and often direct relationship with BLM administration of public lands. Many residents of these counties depend at least partially on public lands for their economic livelihood (e.g., ranchers who maintain and operate livestock grazing permits, commercial big game hunting guides and outfitters, individuals employed in mining, and the staff of the agencies themselves).

Some long-time residents see these uses of the land as part of their local customs and culture, which they believe ensures them to at least some preferential consideration. In turn, the revenues generated by those activities help support their local businesses and the function of local government. Maintaining and expanding economic uses of the public lands are important for these stakeholders (BLM 2007e).

Another major stakeholder group in Lincoln and White Pine Counties is local residents who express strong attachments to the public lands for various recreation pursuits and the contributions of such pursuits to their quality of life. These pursuits include rock-hounding, hunting, wildlife viewing, backcountry touring, four-wheeling, OHV touring, and camping. Proximity and ready access to these opportunities, which are ancillary attributes of the rural character and lifestyle of the area, are also key factors influencing their choice to live in the area. Along with factors such as affordable housing and Nevada's favorable personal income tax structure, local economic development interests are promoting outdoor opportunities to recruit retirees and others, to move to the area since their residency choices are largely independent of a specific work site or location (BLM 2007e).

In some areas of the socioeconomic study area, historic, economic, and cultural connections with activities taking place on public lands (e.g., the timber and the livestock industries) may be in a state of transition. For example, the Lassen County General Plan notes that Lassen County has a strong and favorable

historic, economic, and cultural connection with timber production, agriculture, and the livestock industry (Lassen County 1999; BLM 2007f). The plan notes that attitudes and values are subject to compromise because of economic changes and shifting demographics. As people from suburban and urban areas seek out rural communities and accept government, service, or other non-agricultural jobs, they often have different values and expectations regarding resource use and open space (BLM 2007f).

The issue of livestock grazing on federal lands is often cited in rural western communities as epitomizing the relationship of public land use with the lifestyle and economics of these communities (BLM 2007f). A number of ranching operations in Lassen County rely heavily on public grazing allotments.

The agricultural element of the Lassen County General Plan states that the economic viability of these operations depends substantially on the continued and productive use of public rangeland and that there is a direct relationship between federal grazing privilege and the economic viability and real estate value of dependent ranches. The plan maintains that if grazing allotments were no longer available or rendered uneconomical due to unreasonable grazing fees, extensive management requirements, or excessively reduced capacity, the home ranches that depend on public land grazing allotments would lose their economic viability (Lassen County 1999). This could cause or contribute to the failure of small ranching operations that, in addition to the tragic consequences for the families involved, could contribute to the trend to convert valuable agricultural land to other unproductive—but more lucrative—non-agricultural uses. The Lassen County Board of Supervisors firmly believes that such losses to the agricultural base erode basic values and lifestyles cherished by most county residents (Lassen County 1999; BLM 2007f).

Modoc County is mostly rural, with a population of less than 10,000. It developed based on livestock farming, logging, mining, wildlife, and the railroad industries. Modoc County's Comprehensive LUP states that federal and state lands occupy over three-quarters of the county and that its economy depends on commercial and business activities operated on those lands, including cutting, mining, livestock grazing, and commercial and recreational activities. Land use policies include an expectation that private economic activity will be fostered both on private and public lands, including agriculture, sustainable forestry, recreation, mining, and transportation (Modoc County 1995).

Comments received during scoping and included in the scoping reports as well as comments received during the June 2012 Economic Strategies Workshop for planning, reflected many of the themes discussed above (BLM and Forest Service 2012; BLM 2012o). Residents expressed strong support for multiuse management strategies that would maintain or expand access to public lands for grazing, mining, and renewable energy development. Many expressed concern that placing constraints on these existing activities, as well as activities that may

occur in the reasonably foreseeable future, might create economic hardship in their communities and alter traditional cultural values and lifestyles. Some voiced broader concerns about the effects of restricted access to public lands on domestic energy production and the prices of minerals and materials.

Participants in the Economic Strategies Workshop also requested that the BLM address a variety of specific concerns in its analysis of the Nevada and Northeastern California Sub-region, including potential impacts on GRSG habitat not related to humans, major development projects likely to occur in the socioeconomic study area in the reasonably foreseeable future, and potential economic impacts on the hunting and fishing industries.

County Land Use Plans

Federal land administered by the BLM, Forest Service, and other agencies in the socioeconomic study area is intermingled with state and private lands. County governments have land use planning responsibility for the private lands in their jurisdictions. County-level LUPs were identified for nine of the twelve counties in the socioeconomic study area (Lassen County 1999; Churchill County 2010; Elko County 2010; Eureka County 2010; Humboldt County 2002; Lander County 2010; Lincoln County 2007; Nye County 2011; Pershing County 2002). Six of these nine plans (Churchill, Elko, Eureka, Humboldt, Lander, and Nye) include some economic development component, such as promotion of specific industrial sectors and natural resource uses.

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. It also describes major economic sectors in the socioeconomic study area that can be affected by management actions. Economic activities that rely or could rely on public lands, such as recreation and livestock grazing, are the economic activities that are most likely to be affected.

Economic Sectors, Employment, and Personal Income

The distribution of employment and income by industry sector in the socioeconomic study area is summarized in **Table 3-65** and **Table 3-66**. See **Appendix T** for equivalent data by county.

Employment results for the socioeconomic study area as a whole are driven in large part by Washoe County, which accounted for about 70 percent of the study area jobs in 2010. The largest industry sector in the socioeconomic study area is the services-related sector, which comprised 71.5 percent of total employment in the socioeconomic study area in 2010. This reflects a growth rate of 12.8 percent since 2001 (compared to an overall employment growth rate of 9.4 percent since 2001). Compared with the services-related sector, the government sector and the non-services-related sector represented much lower levels of employment, 14.4 percent and 13.8 percent, respectively.

Table 3-65
Employment by Sector in the Socioeconomic Study Area[1]

Socioeconomic Study Area	Absolute			Percentage of Total		Percent Change 2001-2010
	2001	2010	Change 2001-2010	2001	2010	
Total Employment (number of jobs)	**330,259**	**361,315**	**31,056**	**100.0**	**100.0**	**9.4**
Non-services related	**55,921**	**49,848**	**-6,073**	**16.9**	**13.8**	**-10.9**
Farm	5,070	4,785	-285	1.5	1.3	-5.6
Forestry, fishing, and related activities	1,142	1,087	-56	0.3	0.3	-4.9
Mining (including oil and gas)	9,893	13,224	3,331	3.0	3.7	33.7
Construction	23,414	17,542	-5,871	7.1	4.9	-25.1
Manufacturing	16,402	13,210	-3,192	5.0	3.7	-19.5
Services related	**228,845**	**258,194**	**29,349**	**69.3**	**71.5**	**12.8**
Utilities	1,459	1,057	-402	0.4	0.3	-27.6
Wholesale trade	13,717	11,769	-1,948	4.2	3.3	-14.2
Retail trade	34,985	36,558	1,573	10.6	10.1	4.5
Transportation and warehousing	12,271	14,615	2,345	3.7	4.0	19.1
Information	5,146	4,136	-1,010	1.6	1.1	-19.6
Finance and insurance	13,455	19,855	6,400	4.1	5.5	47.6
Real estate and rental and leasing	12,579	21,710	9,131	3.8	6.0	72.6
Professional and technical services	17,486	21,581	4,094	5.3	6.0	23.4
Management of companies and enterprises	2,311	4,712	2,401	0.7	1.3	103.9
Administrative and waste services	17,304	19,658	2,354	5.2	5.4	13.6
Educational services	1,986	3,790	1,804	0.6	1.0	90.8
Health care and social assistance	22,746	29,561	6,814	6.9	8.2	30.0
Arts, entertainment, and recreation	11,050	11,387	337	3.3	3.2	3.0
Accommodation and food services	48,134	40,376	-7,758	14.6	11.2	-16.1
Other services, except public administration	14,216	17,430	3,214	4.3	4.8	22.6
Government	**44,539**	**51,877**	**7,338**	**13.5**	**14.4**	**16.5**
Federal[2]	8,101	10,065	1,964	2.5	2.8	24.2
State[2]	10,406	14,498	4,092	3.2	4.0	39.3
Local[2]	20,700	26,386	5,686	6.3	7.3	27.5

Sources: Headwaters Economics 2012; BEA 2012a.

Note: Because government employment includes estimates of data not disclosed for state and local employment in two counties in the study area, the sum of local, state, and federal employment is less than the total government employment shown and slightly underestimates state and local government employment.

[1]US Department of Commerce, Bureau of Economic Analysis, data for employment and earnings are used in this chapter and in **Appendix T**. Bureau of Economic Analysis data reflect place of work (not necessarily residence). Proprietor's employment and earnings are counted, although not employment and earnings of unpaid family members and volunteers. For further method details, see http://www.bea.gov/regional/methods.cfm.

[2]The values in the table for Government differ from the sum of the values for Federal, State, and Local because the Government line provided by Headwaters Economics includes estimates for undisclosed data, whereas the three following lines do not.

Table 3-66
Labor Income by Sector in 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	**$15,908.7**	**$16,676.0**	**$767.3**	**100.0**	**100.0**	**4.8**
Non-services related	**$3,466.5**	**$3,279.3**	**-$187.3**	**21.8**	**19.7**	**-5.4**
Farm	$119.9	$177.0	$57.2	0.8	1.1	47.7
Forestry, fishing, and related activities	$40.6	$29.3	-$11.3	0.3	0.2	-27.8
Mining (including oil and gas)	$820.7	$1,200.6	$379.8	5.2	7.2	46.3
Construction	$1,390.1	$1,008.2	-$381.8	8.7	6.0	-27.5
Manufacturing	$1,095.3	$864.2	-$231.2	6.9	5.2	-21.1
Services related	**$9,871.3**	**$10,204.5**	**$333.2**	**62.0**	**61.2**	**3.4**
Utilities	$157.7	$119.8	-$37.9	1.0	0.7	-24.0
Wholesale trade	$842.8	$774.5	-$68.3	5.3	4.6	-8.1
Retail trade	$1,182.1	$1,116.3	-$65.8	7.4	6.7	-5.6
Transportation and warehousing	$648.1	$765.7	$117.6	4.1	4.6	18.1
Information	$293.8	$199.6	-$94.1	1.8	1.2	-32.0
Finance and insurance	$902.3	$763.3	-$139.0	5.7	4.6	-15.4
Real estate and rental and leasing	$283.3	$328.7	$45.4	1.8	2.0	16.0
Professional and technical services	$1,052.4	$1,169.1	$116.7	6.6	7.0	11.1
Management of companies and enterprises	$291.0	$452.2	$161.2	1.8	2.7	55.4
Administrative and waste services	$557.6	$638.7	$81.1	3.5	3.8	14.6
Educational services	$157.4	$212.4	$55.0	1.0	1.3	35.0
Health care and social assistance	$1,251.3	$1,627.1	$375.8	7.9	9.8	30.0
Arts, entertainment, and recreation	$322.4	$281.7	-$40.7	2.0	1.7	-12.6
Accommodation and food services	$1,497.8	$1,161.2	-$336.7	9.4	7.0	-22.5
Other services, except public administration	$431.3	$594.1	$162.8	2.7	3.6	37.8
Government[2]	**$2,766.3**	**$3,482.1**	**$715.7**	**17.4**	**20.9**	**25.9**
Federal	$608.7	$887.0	$278.3	3.8	5.3	45.7
State	$718.9	$884.7	$165.8	4.5	5.3	23.1
Local	$1,162.7	$1,657.4	$494.7	7.3	9.9	42.5
Non-labor Income	**$7,447.5**	**$10,030.7**	**$2,583.2**	**29.8**	**35.3**	**34.7**
Dividends, interest, and rent	$5,279.8	$6,013.1	$733.3	24.4	24.1	13.9
Personal current transfer receipts[3]	$2,167.7	$4,017.6	$1,849.9	10.0	16.1	85.3
Contributions to government social insurance[4]	**$1,626.1**	**$1,718.2**	**$92.1**	**7.5**	**6.9**	**5.7**
Total Personal Income[5]	$24,982.3	$28, 424.9	$3,442.6	100	100	13.8

Sources: Headwaters Economics 2012; BEA 2012a.

Note: 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. Adjustment for residence; dividends, interest, and rent; personal current transfer receipts; and contributions to government social insurance are reported as a share of personal income.
[2]The values in the table for Government differ from the sum of the values for Federal, State, and Local because the Government line provided by Headwaters Economics includes estimates for undisclosed data, whereas the three following lines do not.
[3]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.
[4]Contributions for government social insurance consist 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 (BEA 2012b).
[5]Total personal income is reported by place of residence.

In the services-related sector, the accommodation and food services industry (11.2 percent) and retail trade industry (10.1 percent) accounted for the largest share of employment in 2010, followed by the health care and social assistance industry (8.2 percent). The industries that demonstrated the largest growth between 2001 and 2010 were the management of companies and enterprises industry, with an increase of 103.9 percent, the educational services industry, with an increase of 90.8 percent, and the real estate and rental and leasing industry, with an increase of 72.6 percent.

Eight industries declined in employment levels from 2001 to 2010, including the accommodation and food services industry (16.1 percent decline) and farm industry (5.6 percent decline).

Appendix T provides county-level employment figures for 2010. The greatest difference in industry proportion between counties in 2010 was in the mining industry, which contributed just 0.6 percent of total employment in Washoe County, but contributed a much higher share in Eureka County (79.6 percent), Lander County (44.1 percent), Humboldt County (18.9 percent), and Pershing County (16.2 percent). The employment data is reported by place of work and does not necessarily reflect the sources of income of the population of a given county. Mining in Eureka County is a good example, since mining employs not only Eureka residents but also those of neighboring counties, notably Elko. Note that the data source does not release employment data in three of the counties to protect business confidentiality.

The percentage of employment generated by the accommodation and food services industry also varied across the counties in the socioeconomic study area, from 1.3 percent in Eureka County to 21.6 percent in Elko County. The retail trade industry, which is another recreation-related industry like accommodation and food services, also varied in importance across counties, contributing a low 1.1 percent of employment in Eureka County and higher shares in Lincoln County (11.2 percent), Humboldt County (11.5 percent), and Nye County (11.8 percent).

The arts, entertainment, and recreation industry contributed a consistently low share of employment in all counties (no more than 5.5 percent in any county). Farming also contributed a relatively low share of employment in most counties (with a low of 0.2 percent in Washoe County), although the industry did support a high of 12.7 percent of employment in Modoc County, California. See **Appendix T** for individual county detail.

With respect to personal earnings, the services-related sector accounted for the largest share (61.2 percent) of labor income in the socioeconomic study area in 2010, followed by the government sector (20.9 percent) and the non-services-related sector (19.7 percent).

In 2010, the individual industries that generated the largest shares of personal earnings were local government (9.9 percent), healthcare and social services (9.8 percent), and mining trade (7.2 percent). The management of companies and enterprises, farming , and mining showed strong growth since 2001 (a percent change of 55.4 percent, 47.7 percent, and 46.3 percent, respectively); these were the three highest growth rates between 2001 and 2010. During the same period, information and forestry, fishing, and related activities experienced declines of 32.0 percent and 27.8 percent, respectively, the greatest declines of all the industry sectors.

Appendix T provides county-level labor earnings figures for 2010 by place of work. The county-by-county patterns are similar to those for employment, with relatively more variation in mining-related income; mining contributed the most to earnings in Eureka County, at 92.1 percent, followed by Lander County, at 66.8 percent. Mining labor earnings in Eureka and Lander Counties reflect, in part, labor earnings of residents in neighboring counties. This is reflected in the adjustment for residence. For example, the adjustment for residence for Eureka County was about -$357 million, indicating that almost 80 percent of labor earnings are made by workers who do not live in the county. Alternatively, the adjustment for residence for Elko County was $284 million indicating that a substantial amount of earnings by residents of Elko County are made outside the County.

Mining contributed less than $50,000 to earnings in Modoc County, California. Earnings from the mining sector were left undisclosed in 3 of the 12 counties, due to confidentiality. The share of earnings from the farm industry varied across the 12 counties in the study area. In Washoe County, the farm industry accounted for zero percent of earnings, while farming in Modoc County, California provide 22.1 percent of earnings. The proportion of the county-level labor earnings from the accommodation and food services industry and the retail trade industry, which are both influenced by recreation and travel, differed by county. Accommodation and food services generated 13.2 percent of earnings in Elko County, Nevada, but only 0.2 percent in Eureka County, Nevada. Retail trade provided a maximum of 7.3 percent of earnings in Churchill and Nye Counties, but only 0.2 percent in Eureka County, Nevada. The arts, entertainment, and recreation industry was not a major contributor to earnings in any of the counties.

Table 3-67 presents the unemployment rates for each county in the socioeconomic study area, as well as the rates for the 12 counties aggregated and for California and Nevada.

The data show that the socioeconomic study area has experienced rates of unemployment that are about equal to or lower than those of California and Nevada for each of the years listed. At the county level, in 2011, the

Table 3-67
Annual Unemployment Percentages in the Socioeconomic Study Area, 2007 to 2011

Geographic Area	2007	2008	2009	2010	2011	2012
Churchill County, Nevada	4.5	6.3	8.9	10.6	10.6	9.5
Elko County, Nevada	3.4	4.5	6.5	7.4	7.0	6.1
Eureka County, Nevada	4.3	5.5	6.8	7.6	6.0	6.2
Humboldt County, Nevada	3.7	5.2	7.5	8.1	7.3	6.3
Lander County, Nevada	3.4	4.6	6.0	7.1	6.4	5.3
Lassen County, California	8.2	9.5	12.6	14.0	13.5	12.5
Lincoln County, Nevada	4.4	5.8	9.2	12.6	13.4	13.0
Modoc County, California	8.0	9.6	12.3	14.4	15.0	13.5
Nye County, Nevada	6.8	10.2	14.3	16.5	16.0	13.9
Pershing County, Nevada	5.1	7.3	10.0	10.9	11.2	10.3
Washoe County, Nevada	4.5	7.1	11.4	13.1	12.7	11.3
White Pine County, Nevada	3.8	4.9	7.2	8.8	8.3	7.5
Socioeconomic Study Area	4.7	7.0	10.8	12.4	12.0	10.6
California	5.4	7.2	11.3	12.4	11.8	10.4
Nevada	4.7	7.0	11.6	13.7	13.2	11.5

Source: BLS 2014

unemployment rate ranged from a low of 6.1 percent in Elko County, Nevada, to a high of 13.9 percent in Nye County, Nevada.

Recreation

Approximately 52,600 jobs (24.6 percent of total employment 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, the local economy, and the local population. It includes both full- and part-time jobs. Most of these jobs are concentrated in the accommodation and food services sector.

In 2010, the socioeconomic study area's proportion of travel and tourism-related jobs was 9.5 percentage points higher than the national average of 15.1 percent. 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 other sectors. The average annual wage per travel- or tourism-related job was $20,823 (2010 dollars) in the socioeconomic study area in 2011, compared to $48,787 for jobs unrelated to travel and tourism (Headwaters Economics 2012).[9]

Although much of the recreation on BLM-administered lands is dispersed and far from counting devices (e.g., trail registers, fee stations, or vehicle traffic

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

counters), approximations of the number of visitors to BLM-administered land can be obtained from the BLM Recreation Management Information System (RMIS) database. The BLM recreation specialists provide estimated total visits and visitor days to various sites.[10]

Table 3-68 summarizes BLM visitation data in the study area for fiscal year ending September 30, 2011, and Forest Service visitation data from Round 2 of the National Visitor Use Monitoring program (NVUM).

Table 3-68
Estimated Annual Visits by Planning Unit

Planning Unit	Number of Visits
Carson City District Office	1,007,842
Caliente Field Office	30,073
Egan Field Office	1,034,655
Schell Field Office	160,867
Black Rock Field Office	110,772
Humboldt River Field Office	240,248
Mount Lewis Field Office	97,814
Tonopah Field Office	160,358
Tuscarora Field Office	951,100
Wells Field Office	280,945
Alturas Field Office	33,401
Eagle Lake Field Office	174,433
Surprise Field Office	75,400
Humboldt-Toiyabe National Forest	1,796,132
Total	**6,154,040**

Source: Data for BLM field offices are for fiscal year 2011 (BLM 2012p); data for the Humboldt-Toiyabe National Forest are for fiscal year 2007 (Forest Service 2012f). Fiscal year 2011 is the year ending September 30, 2011.

Note: For the Carson City District Office, recreation data were not available for the two field offices, Stillwater and Sierra Front.

Visitor expenditures can be approximated 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 Forest Service NVUM. Although the data are collected from National Forest visitors, the analysis that follows is based on the NVUM profiles because the BLM has no analogous database.

[10]In RMIS, a visit is defined as the entry of any person onto lands or related waters administered by the BLM for any 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.

The profiles break down recreation spending by type of activity, day use versus overnight use, local versus visitors, and non-primary visits (i.e., incidental visits where the primary purpose of the trip was other than visiting public lands).

Table 3-69 summarizes individual and party visits and expenditures by trip type and estimated direct expenditure.

Table 3-69
Visitor Spending from Recreation on BLM and National Forest System Land in Socioeconomic Study Area, Fiscal Year 2011

Trip Type	Percent of Visits[1]	Estimated Number of Individual Visits	Average Party Size[1]	Estimated Number of Party Visits	Estimated Party Spending per Visit (2010 $)[1]	Estimated Direct Expenditure ($Millions)
Visitor day trips	10	489,675	2.5	195,870	$63.68	$12.5
Visitor overnight on public lands	9	464,057	2.6	178,483	$237.27	$42.3
Visitor overnight off public lands	14	753,798	2.6	289,922	$522.63	$151.5
Local resident day trips	49	3,302,861	2.1	1,572,791	$33.56	$52.8
Local resident overnight on public lands	4	228,200	2.6	87,769	$165.14	$14.5
Local resident overnight off public lands	1	97,463	2.4	40,610	$216.48	$8.8
Non-primary visits	13	817,986	2.5	327,194	$376.62	$23.2
Total		**6,154,040**		**2,692,639**		**$405.6**

[1]Visits on BLM-administered land estimated using the national average distribution of trip types for all National Forests (White and Gooding 2012). Visits on National Forest System lands by trip type are provided in NVUM (Forest Service 2012f). Estimated party spending per visit is converted from 2009 to 2010 dollars using the Consumer Price Index (BLS 2012a).

As **Table 3-69** shows, the estimated total visitor spending on BLM-administered and National Forest System lands in the socioeconomic study area was about $405.6 million in FY 2011. It is important to note that this includes expenditures from local residents and from visitors whose use of public lands was incidental to some other primary purpose.

Grazing

Farming, including ranching (livestock grazing), employed approximately 4,785 people in the socioeconomic study area in 2010, accounting for 1.3 percent of total employment. This includes labor of farm proprietors, although not of unpaid family labor. The average annual wage for a farm job (including ranching) in the socioeconomic study area was $27,965 in 2010. This was lower than the average annual wage for a non-farm job of $41,963 (Headwaters Economics 2012).

Data from the 2012 agricultural census show higher numbers with hired farm labor reaching 6,992 people in the study area (USDA NASS 2014).

Table 3-70 presents the proportion of personal income originating from farm earnings and the farm cash receipts from livestock received in 2010 throughout the socioeconomic study area and Nevada and California as a whole.[11]

Table 3-70 shows that the relative contribution of farm earnings varies substantially across the counties in the socioeconomic study area and that the share of farm earnings is greatest in Modoc County (22.1 percent), Pershing County (7.7 percent), and Lassen County (5.0 percent). Farm earnings in all other counties in the socioeconomic study area made up less than four percent of total earnings.

Table 3-70 also shows that the relative contribution of farm earnings from livestock varies substantially across the counties in the socioeconomic study area and that the share of farm earnings from livestock is greatest in Elko County (96.6 percent), Nye County (95.0 percent), Churchill County (82.8 percent), and White Pine County (77.0). Farm earnings from livestock in all other counties in the socioeconomic study area made up less than 54.3 percent of the total farm earnings.

The right-most column of **Table 3-70** combines the information on relative contribution from livestock with the information on farm earnings as a share of all earnings. This should be interpreted as an approximate measure; even so, it is useful to identify counties in which livestock grazing contributes the greatest portion of overall earnings: Modoc in California and Pershing and Nye in Nevada.

Table 3-71 provides information on active and billed AUMs on BLM-administered and National Forest System land for each of the BLM field offices and National Forest areas. The estimated gross receipts data in the table are calculated from data from the USDA Economic Research Service (ERS), which publishes annual gross receipts for cow-calf operations for different production regions across the country (USDA ERS 2012). Gross receipts reflect the sales value for output from cow-calf operations.

The BLM calculated a ten-year inflation-adjusted average value 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).

[11]All dollar values were converted to 2010 dollars using the Consumer Price Index (BLS 2012a). Note that farm cash receipts vary considerably from year to year and that the primary purpose of the table is to highlight relative representative shares of earnings and the relative importance of crops and livestock.

Table 3-70
Farm Earnings Detail in the Socioeconomic Study Area, 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	Estimated Share of Earnings from Livestock[3]
Lassen County, California	5.0	(D)[2]	$81.9	32.9	67.1	1.6
Modoc County, California	22.1	3.3	$112.1	33.3	66.7	7.4
Churchill County, Nevada	2.3	(D)	$69.4	82.8	17.2	1.9
Elko County, Nevada	1.4	(D)	$63.6	96.6	3.4	1.4
Eureka County, Nevada	1.2	(D)	$24.1	37.3	62.7	0.4
Humboldt County, Nevada	3.8	(D)	$80.8	41.6	58.4	1.6
Lander County, Nevada	2.3	(D)	$19.2	52.6	47.4	1.2
Lincoln County, Nevada	0.9	(D)	$16.6	54.3	45.7	0.5
Nye County, Nevada	3.1	(D)	$64.2	95.0	5.0	2.9
Pershing County, Nevada	7.7	(D)	$42.6	53.4	46.6	4.1
Washoe County, Nevada	0.0	(D)	$20.9	47.2	52.8	0.0
White Pine County, Nevada	1.6	(D)	$17.2	77.0	23.0	1.2
Socioeconomic Study Area	1.1	3.3	$612.6	57.4	42.6	0.6
California	1.2	0.5	$38,176.9	27.7	72.3	0.3
Nevada	0.2	0.0	$556.5	60.7	39.3	0.1

Sources: Headwaters Economics 2012; BEA 2012a. Values reported in 2001 dollars were converted to 2010 dollars using the Consumer Price Index (BLS 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]Indicates that the value is not released to the public by the Bureau of Economic Analysis to avoid disclosure of confidential information.
[3]Calculated by multiplying the share of farm earnings by the share of cash receipts from livestock.

Table 3-71
Active and Billed AUMs

Planning Unit	Active (2011)	Billed	Billed (Average 2000-2011)	Cattle (Percent)	Sheep (Percent)	Other (Percent)	Allotments	Acres per AUM	Gross Receipts ($Millions)
Alturas Field Office	51,918	58	30,185	100	0	0	138	8.8	$1.52
Black Rock Field Office	55,619	93	51,580	94	6	0	11	33.5	$2.59
Caliente Field Office	170,614	32	53,776	96	3	1	97	29.5	$2.70
Eagle Lake Field Office	51,958	63	32,531	90	10	0	53	19.2	$1.63
Egan Field Office	147,479	39	58,076	75	24	0	64	24.5	$2.92
Humboldt River Field Office	279,331	70	195,806	96	4	0	95	26.5	$9.84
Mount Lewis Field Office	250,371	73	182,630	89	11	0	60	17.3	$9.18
Schell Field Office	199,641	42	83,623	57	43	0	71	12.4	$4.20
Sierra Front Field Office	57,560	53	30,409	88	12	0	42	19.9	$1.53
Stillwater Field Office	101,117	60	60,925	99	0	0	36	38.6	$3.06
Surprise Field Office	87,857	74	64,828	95	5	0	49	16.5	$3.26
Tonopah Field Office	134,092	64	85,800	100	0	0	31	45.4	$4.31
Tuscarora Field Office	372,320	64	239,593	97	2	0	142	8.0	$12.04
Wells Field Office	320,578	67	216,229	92	8	1	97	13.1	$10.86
Humboldt-Toiyabe National Forest	276,191	85	234,786	79	21	0	N/A	N/A	$11.80
Total	**2,556,646**								**$81.43**

Sources: BLM 2012l; Forest Service 2012g, 2013d; Workman 1986; USDA ERS 2012

N/A—Not available
Gross receipts are calculated based on billed AUMs and ten-year average expenditures, as described in the text.

Note: For the Humboldt-Toiyabe National Forest, active AUMs are for 2013. Active and billed AUMs are estimates for the portion of the National Forest in the planning area and were estimated based on the share of total Humboldt-Toiyabe National Forest area that is in the planning area and were estimated based on the share of total Humboldt-Toiyabe National Forest area that is in the planning area.

Based on these calculations, the BLM estimates that ten-year average gross receipts in the socioeconomic study area come to $50.24 per AUM (2010 dollars), which is reflected in the table below. Because sheep are a small share of the livestock, any difference in gross receipts between cow and sheep operations have little impact on the overall receipt estimates.

The data in the table help to demonstrate the importance of livestock grazing throughout the socioeconomic study area, although there is more grazing on

federal lands in some counties than in others. For example, the importance of grazing on federal lands in Elko County (Tuscarora and Wells Field Offices) is supported by **Table 3-71** and existing studies (e.g., Alevy et al. 2007).

Between 2000 and 2011, billed AUMs decreased by approximately 20.4 percent on BLM-administered lands in the planning area and by approximately 3.6 percent on the portion of Humboldt-Toiyabe National Forest in the planning area. Billed AUMs fluctuate considerably, and grazing has actually increased in some areas during this period (e.g., Wells Field Office). It is also important to remember that the data are only for forage values on BLM-administered and National Forest System land; forage on other public lands and private lands contribute additional values to the socioeconomic study area, as well as fiscal revenues. The economic analysis of the alternatives, presented in **Chapter 4**, addresses additional indirect contributions of livestock grazing (as well as other resource uses) to the regional economy and compares impacts of the alternatives with one another.

In addition to contributing additional forage for raising livestock, making public lands available for grazing provides additional benefits to the holders of federal permits. Research has demonstrated that in most cases, grazing permits increase the property value of the ranch holding the permit.

Various factors have been explored to explain this effect. Significantly, the research has found that the added forage and relatively low permit fees for grazing on BLM-administered and National Forest System lands do not entirely explain the increase in property value associated with the permit itself. Research has found that the added acreage associated with a public land permit is perceived as adding semiprivate open space to the property and thus increases the value of the ranch. Examples of this research include Rimbey et al. (2007) and Torell et al. (2005). However, since the federal government administers the lands, note that any premium to property values is a result of amenity perception rather than ownership, since any public land grazing permit is associated with publicly, not privately, owned land.

Forestry and Wood Products

Timber-related industries in the socioeconomic study area employed over 655 people in 2010, approximately 0.3 percent of total employment, according to the US Census Bureau County Business Patterns. No county had more than 50 timber jobs, except for Washoe County, with 597, making up 90 percent of the socioeconomic study area's timber labor force. 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 (0.3 percent) was 0.5 percentage points lower than 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. However, the average annual wage per timber-related job in the socioeconomic study area in 2010 was $39,532 (2010 dollars), compared to $41,840 for non-timber jobs.

Collecting wildlings (live transplants) and woody biomass, cutting Christmas trees, and using wood for posts are all allowed on BLM-administered lands with a permit or through purchase. Permits are also available on BLM-administered and National Forest System lands for collecting firewood. Collecting pinyon pine nuts and campfire wood are also allowed (BLM 2012o).

Renewable Energy Resources

There is one active solar energy project in the Battle Mountain portion of the planning area, in Nye County, with production of approximately 110 megawatts anticipated for 2014 (BLM 2011j). There is also a solar power plant in Churchill County, Nevada, which is forecasted to produce 43 million kilowatt-hours of energy per year (ENEL Green Power 2013).

There are four wind projects in the monitoring stage in the Battle Mountain portion of the planning area. Meteorological towers are in Nye County, Esmeralda County, and Lander County (BLM 2011j). At least eight project areas have been proposed for wind energy development in the Ely planning area, but these are still in the wind energy monitoring phase (BLM 2007d, 2013c).

There has been some interest in developing wind energy in the Winnemucca planning area. Current activity includes placing meteorological towers (BLM 2010d). The BLM deferred the final decision on a proposed commercial-scale wind energy project, located in part in Elko County, until the completion of the GRSG Proposed LUPA/Final EIS process (BLM 2012q).

As of April 2013, there were two wind testing projects authorized by the BLM in the Eagle Lake Field Office and a development project waiting for authorization. In the Surprise Field Office there were three wind testing projects authorized and one additional testing project waiting for authorization (BLM 2013c).

Geothermal resources in Nevada provide an important economic contributor to the state; by some estimates, the geothermal industry in Nevada could be worth up to $22.5 billion over the next 30 years; 86 planned or developing geothermal power plants in Nevada have the potential to add nearly 3,700 megawatts of power, enough to power 2.6 million homes (Geothermal Energy Association 2010). According to the Geothermal Energy Association (a trade association), 20 recipients in Nevada were awarded a combined $73.6 million in Department of Energy funding via the American Recovery and Reinvestment Act and other appropriations.

The Geothermal Energy Association reports that as of 2010, Nevada had generated over $44 million from BLM geothermal leasing activities and that the state and counties with geothermal resources should receive an additional $12.9 million from 2010 BLM leases. According to the trade association, this could create significant economic activity for rural counties with geothermal resources, as well as environmental benefits from corresponding reductions in carbon dioxide emissions (Geothermal Energy Association 2010).

Table 3-72 provides sales volume and sales value for geothermal resources managed by the BLM, using data from the DOI Office of Natural Resources Revenue (ONRR). The data underscore the importance of geothermal resources on BLM-administered resources in Churchill County, in particular.

Table 3-72
Geothermal Electrical Generation: Sales Volume and Sales Value from BLM-Administered Resources, FY2011

County	Sales Volume (kilowatt-hour)	Sales Value (Millions)
Churchill	734,107,309	$33.9
Eureka	3,131,249	$0.1
Humboldt	110,920,485	$8.7
Lander	54,289,404	$2.2
Pershing	27,597,213	$0
Washoe	89,784,995	$1.3
Total	**1,019,830,655**	**$46.2**

Source: ONRR 2012

There are six geothermal projects in Churchill County (NV Energy 2014):

- The 24-megawatt Brady Geothermal Power Plant started producing energy in 1992
- The 25-megawatt Desert Peak geothermal power station started producing energy in 2007
- The 51-megawatt Dixie Meadows geothermal power station is expected to start producing electricity in 2015
- The 23.6-megawatt Salt Wells Geothermal Plant started producing energy in 2009
- The 23.1-megawatt Soda Lake 1 and 2 Geothermal Plants starting producing energy in 1987 and 1991
- The 47.2-megawatt Stillwater 2 Geothermal Plant started producing energy in 2009
- A 22-megawatt solar field was added to the plant in 2012 (NV Energy 2014)

As of 2007, the Battle Mountain planning area had 86 authorized geothermal leases covering 97,005 acres, two pending geothermal applications covering 12,137 acres, one recently permitted plan of development for geothermal leasing, and one existing geothermal plant. About 20 percent of the lands in the Battle Mountain District are potentially valuable geothermal resource areas, mainly in Esmeralda and Lander Counties. Pending lease application sites cover less than one percent of the potentially valuable lands and are located in Nye and Lander Counties (BLM 2011j).

There are no known geothermal resource areas in the Ely planning area and only one active geothermal lease (BLM 2007d). In the Elko planning area, the Beowawe geothermal power station (Eureka County) started producing energy in 2006 (NV Energy 2013), and the 32-megawatt Tuscarora project (Elko County) was completed in 2012 (Ormat 2012).

Geothermal energy resource exploration and development has increased in the Winnemucca planning area. As of 2006, there were 109 geothermal leases, 5 pending geothermal applications, and 6 known geothermal resource areas in the planning area. Two large and one small geothermal exploration projects were permitted in 2006 and 2007. In addition, there were three power plants and two vegetable dehydration plants in operation in the planning area, ranging in generation capacity from 5.8 to 30 megawatts (BLM 2010d).

In the Eagle Lake planning area, the Honey Lake Power Plant in Lassen County, is using a combination of biomass resources and geothermal sources in the Wendel-Amadee Known Geothermal Resource Area to generate up to 30 megawatts of electrical power per year (Greenleaf Power 2013; BLM 2007e). In the near future, at least one other geothermal facility will likely be developed in the known geothermal resource area (BLM 2007e). Although geothermal leasing is encouraged, activity is sporadic to nonexistent in the Surprise planning area (BLM 2007f).

In many areas there are warm springs used for pools, spas, and space heating (Nevada Bureau of Mines and Geology 2000). Biomass technology is being used in the Ely planning area for heating one of the White Pine County schools (BLM 2007d). As previously noted, the Honey Lake Power Plant, in Lassen County, is a cogeneration biomass and geothermal plant (Greenleaf Power 2013; BLM 2007f). The BLM is cooperating with Modoc County on a biomass study area using juniper for biomass fuel (BLM 2012r), and other individual biomass projects are under development in Modoc County.

As previously mentioned, firewood collection is allowed on BLM-administered and National Forest System lands with a permit. Although wood for heating is relatively low among households (1.8 percent in California and 1.3 percent in Nevada; US Census Bureau 2011), its use can be much more important in rural areas. In Modoc County, 37.5 percent of households use wood as heating fuel, and in Lassen County, 30.1 percent do so (US Census Bureau 2011). Census

data show that wood for heating grew faster between 2000 and 2010 than other heating fuels, and low- and middle-income families are more likely to rely on it for heat (Alliance for Green Heat 2011).

Mining and Minerals

The overall value of mineral and energy production in Nevada reached an all-time high of $7.72 billion in 2010. Nevada led the nation in the production of gold, barite, and gypsum and was the only state that produced magnetite, lithium, and two types of specialty clays, sepiolite and saponite (Nevada Bureau of Mines and Geology 2010). Locatable minerals (such as gold and gypsum) may occur on private or public lands. Those under federal lands (and those owned by the federal government under private or state lands) require the establishment and maintenance of a mining claim and payment of maintenance fees.

In 2010, Nevada's production of gold, valued at $6.5 billion, was 73 percent of the total gold production in the United States, helping to make the United States the third largest gold producer in the world. Nevada alone accounted for 7 percent of world production of gold. Gold mining is heavily located in the northern and central part of the state, particularly Elko, Eureka, and Lander Counties. In 2010, Nevada's largest gold operations included Barrick Gold Corporation's mines (1.2 million ounces) and Newmont Mining Corporation's mines (0.9 million ounces) on the Carlin trend in Eureka and Elko Counties; Barrick Gold Corporation's Pipeline and Cortez Hills mines (1.1 million ounces) in Lander County; Newmont's Twin Creeks mine (0.45 million ounces) in Humboldt County; and the Kinross-Barrick Smoky Valley joint venture Round Mountain mine (0.4 million ounces) in Nye County. Combined, Barrick and Newmont accounted for 81 percent of Nevada gold production in 2010 (Nevada Bureau of Mines and Geology 2010).

In counties with relatively small populations (e.g., Eureka), smaller mines can be of particular importance due to the share of the labor force employed.

Nevada's silver production in 2010, which totaled 7.36 million ounces, was generally a co-product or byproduct of gold mining and was produced at a value of $149 million. Nevada's silver production in 2010 accounted for 18 percent of the US total and 1 percent of the world total. With a ratio of value (i.e., average price of gold to average price of silver) of 61:1 in 2010, only those deposits with more than 61 times as much silver as gold can be considered primary silver deposits. Only one such deposit, the Coeur Rochester Mine in Pershing County, was being mined in Nevada in 2010, with a silver-to-gold production ratio of 210:1 and total silver production of 2.0 million ounces. The Coeur Rochester Mine produced 27 percent of Nevada's silver in 2010 (Nevada Bureau of Mines and Geology 2010).

Other mineral production values in Nevada in 2010 were the following: copper, $438 million; barite, $49 million; gypsum, $12 million; and petroleum, $27

million (Natural Resource Industry Institute 2011; Nevada Bureau of Mines and Geology 2010).

In 2010, Nevada's copper production was dominated by the Robinson copper-gold-silver-molybdenum mine, operated by Quadra Mining Ltd. near Ely in White Pine County. Byproduct copper was also produced at Newmont's Phoenix project near Battle Mountain in Lander County. One major contributor to the production of molybdenum in Nevada in 2010 was the Golden Phoenix's Ashdown Mine in northwestern Humboldt County, producing approximately 350 thousand pounds valued at $5.6 million (Nevada Bureau of Mines and Geology 2010).

Table 3-73 provides sales volume and sales value for oil resources managed by the BLM, underscoring the importance of oil resources in Nye County in particular.

Table 3-74 provides data on the number of jobs in the mining sector by county in the socioeconomic study area.

Table 3-73
Oil Sales Volume and Sales Value from BLM-Administered Resources, Fiscal Year 2011

County	Sales Volume (Barrels)	Sales Value ($Millions)
Eureka	41,362	$3.6
Nye	369,908	$29.8
Total	**411,270**	**$33.4**

Source: ONRR 2012

Table 3-74
Mining Sector Employment by County

Geographic Area	Number of Jobs	Percentage of Total Employment
Lassen County, California	2	0.1
Modoc County, California	72	5.3
Churchill County, Nevada	75	1.4
Elko County, Nevada	4,203	22.2
Eureka County, Nevada	769	76.9
Humboldt County, Nevada	1,949	31.7
Lander County, Nevada	309	24.3
Lincoln County, Nevada	26	4.2
Nye County, Nevada	755	10.8
Pershing County, Nevada	226	24.5
Washoe County, Nevada	354	0.2
White Pine County, Nevada	880	35.1

Table 3-74
Mining Sector Employment by County

Geographic Area	Number of Jobs	Percentage of Total Employment
Socioeconomic Study Area	9,620	4.5
California	21,425	0.2
Nevada	10,922	1.1
United States	581,582	0.5

Source: Headwaters Economics 2012

Mineral production in the socioeconomic study area employed approximately 9,620 people in 2010, making up 4.5 percent of total employment, which is 4 percentage points higher than the national average of 0.5 percent (Headwaters Economics 2012). This estimate is based on data from the US Census Bureau County Business Patterns and a selection of industrial sectors that includes oil and gas extraction, coal mining, metals mining, nonmetallic minerals mining, and other mining-related industries. The estimate includes both full- and part-time jobs. It is shown here because it has fewer data gaps (data not disclosed for confidentiality reasons, estimated here by Headwaters Economics 2012) than the data provided in **Appendix U,** Non-Market Valuation Methods.

Appendix U, **Table U-1**, shows Bureau of Economic Analysis data for comparison. Though the proportion of employment associated with mining industries varied by county, every county had some percentage of employment coming from a mining industry. The lowest percentages of mining employment were found in Lassen County (0.1 percent) and Washoe County (0.2 percent), and the highest percentages of mining employment were found in Eureka County (76.9 percent), White Pine County (35.1 percent), and Humboldt County (31.7 percent).

The percentage of mining employment on total employment in Eureka and Elko Counties does not appropriately capture the fact that many of those employed in the mining sector in Eureka County actually reside in Elko County, which is also an important service area for mining in nearby counties (Elko County 2003; Leaming 2010).

In 2010 in Nevada, the average annual earnings per mining-related job were substantially higher than the average annual earnings per non-mining job: $83,377 (2010 dollars) compared to $39,369 (Headwaters Economics 2012).

Other Values

Public lands provide a range of goods and services that benefit society in a variety of ways. Some of these goods and services, such as timber and minerals, are bought and sold in markets and hence have a readily observed economic value (as documented in the sections above); others have a less clear connection to market activity, even though society derives benefits from them. In some

cases, goods and services have both a market and a non-market component value to society. This section provides an overview of several non-market values described through a qualitative and quantitative economic valuation analysis.

The non-market values associated with public lands can be classified as values that derive from direct or indirect use (e.g., recreation) and those that do not derive from use, such as existence values held by the general public from self-sustaining populations of GRSGs.

This section and the related appendix describe the use and non-use economic values associated with recreation, populations of GRSGs, and land that is used for livestock grazing and ranch operations. The sections that follow discuss each of these values in turn. **Appendix U** provides more discussion of the concepts and measurement of use and non-use non-market values. Note that these non-market values are not directly comparable to previous sections that describe output (sales or expenditures) and jobs associated with various resource uses on BLM-administered and National Forest System lands (see **Appendix U** for more information).

Values Associated with Recreation

Actions that promote the conservation of GRSG habitat may result in changes in recreation activity, by changing opportunities or access for different recreational activities. Opportunities for some activities such as wildlife viewing may increase as the amount of habitat may increase for species that depend on public lands, including GRSGs.

Analysis in **Chapter 4**, Environmental Consequences, 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 U** provides an explanation of consumer surplus. Fees to use public lands for recreation are typically very low or nonexistent, so the value people place on public land recreation opportunities is not fully measured simply by the entrance fees people pay.

Economists estimate the consumer surplus from recreation by measuring how the variation in visitors' travel costs corresponds to the number of visits taken. This "travel cost method" has been developed extensively in academic literature and is used by federal agencies in economic analyses; the method is explained more fully in **Appendix U**.

Conducting original travel cost method studies can be time consuming and expensive; for this project, the BLM and Forest Service 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 U**, visitors to natural areas, such as

National Forest System lands and lands managed by the BLM, gain values (in excess of their direct trip cost), ranging from approximately $32 per day for camping to about $175 per day for mountain biking.

To calculate the aggregate "consumer surplus" value of recreation in the study area, 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 RMIS database and the Forest Service NVUM for the study area.

Accounting for the value per day and the number of days, the total non-market value of recreation on BLM-administered and National Forest System lands in the study area was estimated to be about $285 million per year (see **Appendix U** for details). Based on the quantity of recreational trips and the economic value of each type of activity, the largest annual non-market values are associated with hunting, camping, OHV touring, hiking, and pleasure driving. These categories omit downhill skiing, because there is little or no overlap between GRSG habitat and lands used for downhill skiing. Analysis in **Chapter 4**, Environmental Consequences, addresses how recreational visits and total non-market value for recreation may change under the alternatives being considered.

Established in 2012, the Nevada Sagebrush Ecosystem Program aims at protecting and enhancing the sagebrush landscape recognizing its economic and cultural value and the value of the plants, animals, and people that depend on it, including the GRSGs. As part of this program, the Nevada Conservation Credit System establishes a market-based mechanism for buying and selling conservation outcomes to compensate for harm done by human activities to the sagebrush ecosystem. Its near-term goal is to achieve no net unmitigated loss of GRSG habitat, meaning that at adverse impact on the GRSG habitat would be fully compensated for the benefit of the species (State of Nevada 2013)

Values Associated with Populations of GRSG

The existence and perseverance of the ESA and similar acts reflects the values held by the American public associated with preventing species from going extinct. Economists have long recognized that rare, threatened, and endangered species have economic values beyond those associated with active use through viewing. This is supported by legal decisions and technical analysis (see **Appendix U** 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 U** 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 and Forest Service reviewed existing literature to determine if there were existing non-use value studies for GRSGs. No existing studies on valuation specific to GRSGs were found. However, there are several studies, published in peer-reviewed scientific journals, for bird species that the BLM judged to have similar characteristics with GRSGs, 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 U** for details). These values represent a mix of use and non-use values, but the non-use components of value are likely to be the majority share, since the studies primarily address species that are not hunted. Since GRSG protection is a public good available to all households throughout the intermountain west, if similar per-household values apply to the species, the aggregate regional existence value could be substantial.

Established in 2012, the Nevada Sagebrush Ecosystem Program aims at protecting and enhancing the sagebrush landscape recognizing its economic and cultural value and the value of the plants, animals and people that depend on it, including GRSGs. As part of this program, the Nevada Conservation Credit System (CCS) establishes a market-based mechanism for buying and selling conservation outcomes to compensate for harm done by human activities to the sagebrush ecosystem. Its near-term goal is to achieve no net unmitigated loss of GRSG habitat, meaning that an adverse impact to the habitat would be fully compensated for the benefit of the species (State of Nevada 2013).

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 policymakers 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 and Forest Service 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 next 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 U** provides more information about this method, as well as additional information to address potential non-market values associated with grazing.

Fiscal

Nevada has no corporate or personal income taxes and is a right-to-work state.[12] Sales and use taxes, imposed at a rate of two percent, make up 70 percent of Nevada's tax revenues (US Census Bureau 2010c). The next biggest source of revenue is the modified business tax, followed by the net proceeds of minerals tax. The tax proceeds of each mining operation is taxed at a maximum rate of five percent, and gold and silver accounted for almost 90 percent of total gross tax proceeds in fiscal year 2011 (Nevada Department of Taxation 2012).

California receives approximately 85 percent of its own-source revenue from four sources: personal income tax, sales and use tax, corporate tax, and major motor vehicle-related levies (California Legislative Analyst's Office 2007). Though California does not impose a statewide severance tax, there is a small statewide assessment on oil and gas produced in California. The assessment rate is established each year and is imposed on each barrel of oil and each 10,000 cubic feet of natural gas produced. The assessment rate for fiscal year 2010 was $0.0880312 (California Department of Conservation 2010).

Nevada's counties receive roughly a third of their revenues from local taxes, a third from intergovernmental transfers from the state government, and a third from charges for services and utility revenues. Transfers from the federal government contribute approximately 5 percent of county revenues. Property taxes account for roughly three-quarters of local tax receipts, with much of the rest collected through sales taxes (US Census Bureau 2010d).

Public elementary and secondary schools received, in 2008-2009, approximately 60 percent of their funding from local property and other taxes, 30 percent from the state, and 10 percent from federal funds (National Center for Education Statistics 2012).

In California, counties receive a little over 40 percent of their revenues from intergovernmental transfers (mostly from the state), 30 percent from local taxes, and the rest from charges for services and utility revenues. Transfers from federal governments contribute approximately 5 percent of county revenues. California

[12]States where employment may not require membership in labor unions or payment of fees to labor unions.

charges a property tax on possessory interests (private interests on public lands), such as grazing on public lands (California State Board of Equalization 2012).

In Nevada, property taxes account for roughly three-quarters of local tax receipts, with much of the rest being collected through sales taxes (US Census Bureau 2010d). Public elementary and secondary schools received funding for 2008-2009 from 57 percent state sources, 30 percent local sources (mostly property taxes), and 13 percent federal funds (National Center for Education Statistics 2012).

Federal payments to states, counties, and public schools associated with the presence of federal lands in Nevada and California include payments in lieu of taxes (PILT), Forest Service revenue transfers, federal mineral royalties and fees for grazing, recreation, and rents on ROWs. PILT are federal government payments based on the presence of all federal lands (not just BLM-administered lands) in each county. **Table 3-75** shows the PILT payments each county received in 2010. The nontaxable status of federal lands is of interest to local governments, which must provide public safety and other services to county residents. BLM revenue-sharing programs provide resources to local governments in lieu of property taxes because local governments cannot tax federally owned lands the way they would if the land were privately owned. PILT payments have been reauthorized by Congress since 1976, and values vary between authorization cycles (DOI 2012). Full funding of PILT depends on legislation (e.g., between fiscal years 2008 and 2013), without which it is an appropriated program that may be less than fully funded (NACO 2013).

Table 3-75
Payments in Lieu of Taxes Received in the Socioeconomic Study Area by County, 2010

Geographic Area	PILT ($Thousands)[1]
Lassen County, California	$1,092
Modoc County, California	$572
Churchill County, Nevada	$2,089
Elko County, Nevada	$2,649
Eureka County, Nevada	$275
Humboldt County, Nevada	$1,641
Lander County, Nevada	$806
Lincoln County, Nevada	$773
Nye County, Nevada	$2,810
Pershing County, Nevada	$906
Washoe County, Nevada	$3,198
White Pine County, Nevada	$1,108
Socioeconomic Study Area	$17,918

Source: DOI 2012
[1]Includes payments received from the BLM, Forest Service, Bureau of Reclamation, National Park Service, and USFWS.

Since 1908, the Forest Service pays 25 percent of its receipts to states for use on roads and schools in the counties where national forests are located. The decline in the sale of timber from federal lands over time has led to the decline in these payments. Although the Secure Rural Schools and Community Self-Determination Act of 2000 attempted to limit this decline (Congressional Research Service 2012), it expired in 2014. In fiscal year 2012, Nevada received approximately $3.6 million in Forest Service payments (Forest Service 2013e).

Federal mineral royalties are typically paid on leasable minerals, with a portion redistributed to states and counties. Locatable minerals do not require federal royalty payments. Extraction of locatable minerals from federal lands does pay state sales and use taxes. Nevada also charges a 5 percent net proceeds of mines tax on locatable minerals, which is distributed between the Nevada General Funds and the counties where the minerals were extracted (Nevada Mining Association 2010).

BLM and Forest Service Expenditures and Employment

BLM and Forest Service offices provide a direct contribution to the economy of the local and surrounding area. BLM and Forest Service operations and management make direct contributions to area economic activity by employing people who reside in 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. **Table 3-76** provides available information on the BLM and Forest Service expenditures, including both labor and non-labor expenditures.

Table 3-76
BLM Employment and Related Expenditures in the Socioeconomic Study Area

Agency	Office	Employment, 2011 (FTEs)	Non-labor Expenditures, 2011 (2010 dollars)
BLM	Alturas Field Office	27.9	$951,520
	Eagle Lake Field Office	47.1	$2,317,077
	Surprise Field Office	30.8	$764,032
	Battle Mountain District Office	39.7	$4,871,061
	Mountain Lewis Field Office	23.5	$6,116
	Tonopah Field Office	21.7	$2,887
	Carson City District Office	68.8	$6,499,975
	Sierra Front Field Office	21.6	$633,825
	Stillwater Field Office	20.3	$345,758
	Elko District Office	81.7	$5,079,293
	Tuscarora Field Office	21.8	$208,103
	Wells Field Office	18.7	$198,417
	Ely District Office	75.6	$8,681,938
	Caliente Field Office	13.8	$425,115

Table 3-76
BLM Employment and Related Expenditures in the Socioeconomic Study Area

Agency	Office	Employment, 2011 (FTEs)	Non-labor Expenditures, 2011 (2010 dollars)
	Egan Field Office	16.7	$666,103
	Schell Field Office	20.6	$326,489
	Winnemucca District Office	58.0	$5,743,305
	Black Rock Field Office	7.3	$1,163,939
	Humboldt River Field Office	34.8	$746,276
Forest Service	Humboldt -Toiyabe National Forest	238	$19,421,940

Sources: BLM 2012s; Forest Service 2013f, 2013g

Values reported in 2001 dollars (BLM) or 2011 dollars (Forest Service) were converted to 2010 dollars using the Consumer Price Index (BLS 2012a).

FTE = Full-time equivalent employees (hours worked in relation to hours in a full-time schedule)

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 2005a).

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 2005a) reiterates BLM's commitment to environmental justice, both in providing meaningful opportunities for low-income, minority, and tribal populations to participate in decision-making and to identify and minimize any disproportionately high or adverse impacts on these populations.

According to the CEQ 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 onto 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 3-77 summarizes the percentage of the population made up of ethnic minority groups in each county of the socioeconomic study area, as well as Nevada, California, and the United States as a whole.

Each county in the socioeconomic study area has a lower minority population than California, Nevada, and the United States. All counties in the socioeconomic area have a higher Alaska Native or American Indian population than the United States as a whole. The minority population ranges from a low of 12.1 percent in Lincoln County, Nevada, to a high of 33.9 percent in Washoe County, Nevada.

Low-Income Populations

Table 3-78 summarizes the percentage of the population below poverty level in each county of the socioeconomic study area, as well as California, Nevada, and the United States as a whole. Following the Office of Management and Budget's Directive 14, the Census Bureau uses a set of money income thresholds that vary by family size and composition to detect what part of the population is considered to be in poverty (US Census Bureau 2012b).

In the economic study area, the percentage of the population below the poverty line ranges from a low of 7.1 percent in Elko County, Nevada, to a high of 18.9 in Nye County. Of the 10 Nevada counties in the socioeconomic study area, 7 have higher percentages of residents below the poverty line than Nevada overall (11.9 percent). Both California counties have a higher percentage of residents below the poverty line than California as a whole (13.7 percent). Both California and Nevada have a lower percentage of residents below the poverty line than the United States as a whole (13.8 percent).

Table 3-77
Population Race and Ethnicity, 2010

Geographic Unit Analyzed	Total Population	Percent of Total Population								
		White	Black or African American	Alaska Native or American Indian	Asian	Native Hawaiian and Other Pacific Islander	Other Race	Two or More Races	Hispanic or Latino[1]	Total Minorities[2]
Lassen County, California	34,895	73.2	8.1	3.5	1.0	0.5	10.2	3.5	17.5	32.4
Modoc County, California	9,686	83.5	0.8	3.8	0.8	0.2	7.0	3.8	13.9	20.9
Churchill County, Nevada	24,877	82.0	1.6	4.5	2.7	0.2	4.8	4.2	12.1	23.4
Elko County, Nevada	48,818	79.4	0.8	5.3	0.9	0.1	10.3	3.2	22.9	30.9
Eureka County, Nevada	1,987	89.3	0.1	2.4	0.9	0.0	5.1	2.2	12.0	16.3
Humboldt County, Nevada	16,528	79.0	0.5	4.2	0.7	0.1	12.7	2.8	24.4	31.0
Lander County, Nevada	5,775	84.0	0.3	4.2	0.4	0.0	8.6	2.5	21.1	26.2
Lincoln County, Nevada	5,345	91.1	2.3	1.1	0.7	0.3	2.2	2.3	6.2	12.1
Nye County, Nevada	43,946	85.9	2.0	1.6	1.3	0.5	5.2	3.5	13.6	20.9
Pershing County, Nevada	6,753	81.9	3.7	3.2	1.3	0.1	6.7	3.1	22.3	31.7
Washoe County, Nevada	421,407	76.9	2.3	1.7	5.2	0.6	9.5	3.8	22.2	33.9
White Pine County, Nevada	10,030	85.5	3.9	4.2	1.0	0.1	2.8	2.5	13.2	23.7
Socioeconomic Study Area	630,047	78.3	2.4	2.4	3.9	0.5	8.9	3.6	20.6	31.4
California	37,253,956	57.6	6.2	1.0	13.0	0.4	17.0	4.9	37.6	59.5
Nevada	2,700,551	66.2	8.1	1.2	7.2	0.6	12.0	4.7	26.5	45.7
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 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.

Table 3-78
Low-Income Populations, 2006-2010 Average

Geographic Unit Analyzed	Percent Population Below Poverty Level
Lassen County, California	14.2
Modoc County, California	18.4
Churchill County, Nevada	8.8
Elko County, Nevada	7.1
Eureka County, Nevada	16.2
Humboldt County, Nevada	12.0
Lander County, Nevada	12.2
Lincoln County, Nevada	10.6
Nye County, Nevada	18.9
Pershing County, Nevada	13.7
Washoe County, Nevada	12.6
White Pine County, Nevada	15.5
Socioeconomic Study Area	12.7
California	13.7
Nevada	11.9
United States	13.8

Source: US Census Bureau 2010d

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

Tribal Populations

In 2010, Nevada's Native American population was approximately 32,000, and Washoe County had the largest Native American population of all the counties in the socioeconomic study area (approximately 7,000 people; US Census Bureau 2010b). There are 32 reservations and colonies in Nevada belonging to the tribes listed in **Table 3-79**.

In California, Lassen County is home to the Susanville Indian Rancheria, and Modoc County is home to the Alturas Rancheria, Cedarville Rancheria, Fort Bidwell Reservation, and Pit River Tribe of California (BIA 2012). Several Native American tribes and groups in Nevada and California have historically used GRSGs as a food source, including at least the Achumawi, Western Shoshone, Northern Paiute, and Washoe (Heizer 1978; D'Azevedo 1986). See **Section 3.17**, Tribal Interests (including Native American Religious Concerns), for further details.

Table 3-79
Federally Recognized Tribes of Nevada[1]

Tribe	In Primary Study Area
Duck Valley Shoshone-Paiute Tribe	Yes
Duckwater Shoshone Tribe	Yes
Ely Shoshone Tribe	Yes
Fallon Paiute Shoshone Tribe	Yes
Ft. McDermitt Paiute-Shoshone Tribe	Yes
Ft. Mojave Tribe	No
Confederated Tribes of Goshute	Yes
Las Vegas Paiute Tribe	No
Lovelock Indian Colony	Yes
Moapa Band of Paiutes	No
Pyramid Lake Paiute Tribe	Yes
Reno Sparks Indian Colony	Yes
Hungry Valley Community	Yes
Summit Lake Paiute Tribe	Yes
Te-Moak Tribe of Western Shoshone	Yes
Battle Mountain Band	Yes
Elko Band	Yes
South Fork Band	Yes
Wells Band	Yes
Timbisha Shoshone Tribe	No
Walker River Paiute Tribe	No
Washoe Tribe of Nevada and California	No
Carson Indian Colony	No
Dresslerville Indian Colony	No
Stewart Indian Colony	No
Woodfords Indian Colony	No
Winnemucca Colony Council	Yes
Yerington Paiute Tribe	Yes
Yomba Shoshone Tribe	Yes

Source: Nevada Indian Territory 2012
[1]There are no additional state-recognized tribes in Nevada (NCSL 2013).

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