Chapter 3. Affected Environment

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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 LUPA/EIS, the planning area is the entire Nevada and Northeastern California Sub-region (49,868,700 acres), which contains BLM- and Forest Service-administered lands. Within the Nevada and Northeastern California Sub-region planning area, there are 45,360,300 of BLM-administered lands and 9,721,600 acres of Forest Service-administered lands

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

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*:*

- GRSG and GRSG Habitat
- Vegetation (Including Invasive and Exotic Species/Noxious Weeds)
- Riparian Areas and Wetlands
- Fish and Wildlife and Special Status Species
- Wild Horse and Burros
- Wildland Fire 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 in this chapter contains a discussion of background information, including guidance and regulations, and current conditions. Current conditions describe the location, extent, and current conditions of the resource in the planning area on BLM-administered and Forest Service-administered lands. Conditions for a resource can vary, depending on the resource. Those resources (e.g., vegetation, fire management, livestock grazing, mineral resources, and lands and realty) that have a greater influence on GRSG populations and habitat and that are more likely to be affected by GRSG management actions are described in greater detail than those resources (e.g., water, air quality, and soil resources) that have little to no influence. The Nevada and Northeastern California Sub-region planning area comprises 49,868,700 acres. Within the Nevada and Northeastern California Sub-region planning area, there are 45,360,300 acres of BLM-administered lands and 9,721,600 acres of Forest Service-administered lands that are managed according to the BLM and Forest Service plans being amended by this LUPA/EIS.

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 Forest Service-administered lands managed according to the BLM and Forest Service plans being amended by this LUPA/EIS. This is done to provide an area-specific description of the existing conditions for the resource. When possible, greater emphasis is placed on describing the existing conditions of the resource as it pertains to GRSG and its habitat.

The BLM and Forest Service reviewed the LUPs being amended under this LUPA/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 GRSG and its 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, GRSG were considered to be one species with a range that included 14 US states and 3 Canadian provinces prior to Euro American contact (**Figure 3-1**, Historic Greater Sage-Grouse Range; Aldrich 1963; Johnsgard 1983; Connelly et al. 2004; Schroeder et al. 2004). After considering the splitting of GRSG into separate species and sub-species 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 and its status is widely debated, but the species remains taxonomically within GRSG. The Bi-State population, however, is not within the purview of this Nevada and Northeastern California Sub-regional LUPA/EIS.

The current range of GRSG includes 11 US states and 2 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 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). As 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 exotic weeds, fire, and conifer encroachment (Connelly et al. 2004), populations have declined substantially, raising conservation concern for the species.

(PDF Map 3–1)

Figure 3.1. Historic Sage Grouse Range

3.2.2. Biology and Life History

GRSG depend on a variety of shrub-steppe habitats throughout their life cycle and are considered obligate users of 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; Connelly et al. 2004; Miller et al. 2011). GRSG 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). GRSG exhibit strong loyalty, also known as site fidelity, to seasonal habitats (including breeding, nesting, brood rearing, and wintering areas) even when the area is no longer of value (Connelly et al. 2004). Adult GRSG rarely switch between these habitats once they have been selected, limiting their ability to adapt to changes.

During the spring breeding season, male GRSG gather together 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, thermal, and feeding cover. The proximity, configuration, and abundance of nesting habitat are key factors influencing lek location (Connelly 1982; Connelly et al. 2000b; Connelly et al. 2011). Leks can be formed opportunistically at any appropriate site within or adjacent to nesting habitat (Connelly et al. 2000a), and, therefore, lek habitat availability is not considered to be a limiting factor for GRSG (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 (0.04 hectare) to over 90 acres (36 hectares; Connelly et al. 2004) and can host from several to hundreds of males (Johnsgard 2002). Males defend individual territories within leks and perform elaborate displays with their specialized plumage and vocalizations to attract females for mating. Males do not participate in incubation of eggs or rearing chicks.

Females have been documented to travel more than 12.5 miles (20 kilometers) to their nest site after mating (Connelly et al. 2000a), but distances between a nest site and the lek on which breeding occurred is variable (Connelly et al. 2004). Average distance between a female's nest and the lek on which she was first observed ranged from 2.1 miles (3.4 kilometers) to 4.8 miles (7.8 kilometers) in 5 studies examining 301 nest locations (Schroeder et al. 1999).

Productive nesting areas are typically characterized by sagebrush with an understory of native grasses and forbs (broad-leaved flowering plants), with horizontal and vertical structural diversity that 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; Connelly et al. 2004; Connelly et al. 2011). GRSG also may use other shrub or bunchgrass species for nest sites (Klebenow 1969; Connelly et al. 2000a; Connelly et al. 2004). Shrub canopy and grass cover provide concealment for GRSG nests and young and are critical for reproductive success (Barnett and Crawford 1994; Gregg et al. 1994; DeLong et al. 1995; Connelly et al. 2004). Vegetation characteristics of successful nest sites include a sagebrush canopy cover of 15 to 25 percent, sagebrush heights of 11.8 to 31.5 inches (30 to 80 centimeters), and grass/forb cover of 7.1 inches (18 centimeters; Connelly et al. 2000a).

Hens rear their broods within 0.1 to 3.1 miles (0.2 to 5 kilometers) of the nest site for the first 2 to 3 weeks following hatching, based on 2 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) adjacent to areas rich in forbs and insects to ensure chick survival during this period (Connelly et al. 2004).

All GRSG 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). GRSG 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, GRSG shift their diet entirely to sagebrush (Schroeder et al. 1999). GRSG depend entirely on sagebrush throughout the winter for both food and cover. Sagebrush stand selection is influenced by snow depth (Patterson 1952; Hupp and Braun 1989), availability of sagebrush above the snow to provide cover (Connelly et al. 2004 and references therein) and, in some areas, topography (e.g., elevation, slope, and aspect; Beck 1977; Crawford et al. 2004).

Many populations of GRSG 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 (161 kilometers) have been recorded (Patterson 1952); however, distances vary depending on the locations of seasonal habitats (Schroeder et al. 1999). Migration distances for female GRSG generally are less than for males (Connelly et al. 2004), but, 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 GRSG (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 this species 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 it is used by this species have been considered causes of the decline in GRSG distribution and abundance. These factors include habitat loss, alteration, and degradation (Braun 1995). Historically, sagebrush-dominated vegetation was one of the most widespread habitats in the country and still covers much of the Great Basin and Wyoming Basin, reaching into the Snake River Plain, Columbia Basin, the Colorado Plateau, Montana, southwestern Colorado, northern Arizona, and New Mexico. Across this area, big sagebrush predominates and has five known subspecies (West 1988; Kartesz 1994). The sagebrush mosaic was historically subject to impacts from natural components of the environment, such as small and patchy fires, and periodic population explosions of jackrabbits, grasshoppers, and crickets. Big sagebrush does not resprout after a fire, but is replenished by wind-dispersed seed from adjacent unburned stands or seeds in the soil. Depending on the species and the size of a burn, sagebrush can reestablish itself within 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 year 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 GRSG that depend on them have declined as a result of activities such as large-scale conversions to cultivated croplands or pastures, altered fire frequencies resulting in conifer encroachment at higher elevations and annual grass invasion at lower elevations, livestock grazing, herbicide use, mineral and energy development, and recreational activities related to urban growth and increased human populations. As a result, the

156 million acres of sagebrush that existed historically were reduced to 119 million acres by 2004 (Connelly et al. 2004). Currently, sagebrush communities and GRSG are at risk from multiple sources across multiple scales (BLM 2004d). About 56 percent of the potential distribution of habitat prior to Euro American contact is currently occupied by GRSG (Connelly et al. 2004).

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

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

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

Habitat Selection

GRSG are currently estimated to occupy 165 million acres (668,000 square kilometers) across the western US and Canada (Knick and Connelly 2011), and his range encompasses tremendous variability in habitat conditions, anthropogenic activities, and GRSG populations. The development of comprehensive monitoring approaches led to formal recognition that habitat selection assessments need to utilize approaches that address multiple spatial scales to represent selection processes of the animals (Connelly et al. 2003b; Connelly et al. 2011). First-order selection is the geographic range and defines the GRSG population of interest. Within 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. Assessment can be made of the fourth-order of behavioral classification by quantifying food and cover attributes and foraging behavior at particular sites (Stiver et al. 2010). In practice, selection of food items is nested within selection of feeding site 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) and this may include very large areas on an annual basis; it has been suggested that migratory

populations may range across a habitat the size of the state of Rhode Island (approximately 1,200 square miles [311,000 hectares]; 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, Characteristics of Sagebrush Rangeland Needed for Productive GRSG Habitat, describes GRSG habitat characteristics and provides the standard for seasonal habitat definitions.

Based on current research conducted within 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 within the sub-region or within the floristic province represented by the WAFWA Management Zone III. These guidelines, outlined in **Table 3-2**, Habitat Health Indicators and Objectives, emphasize the role of sagebrush canopy cover for nesting in the Great Basin sagebrush type, the importance of riparian condition and species diversity in brood-rearing habitat, and the nesting of site-specific habitat attributes within broader scales of habitat selection by GRSG.

Table 3.1. Characteristics of Sagebrush Rangeland Needed for Productive GRSG Habitat

	Breeding		Brood-rearing		Winter[e]	
	Height (centimeters)	Canopy (%)	Height (centimeters)	Canopy (%)	Height (centimeters)	Canopy (%)
Mesic sites[a]						
Sagebrush	40 to 80	15 to 25	40 to 80	10 to 25	25 to 35	10 to 30
Grass-forb	>18[c]	>25[d]	variable	>15	N/A	N/A
Arid sites[a]						
Sagebrush	30-80	15 to 25	40 to 80	10 to 25	25 to 35	10 to 30
Grass-forb	18[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 on a local basis; 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% for perennial grasses and 10% 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.

Table 3.2. Habitat Health Indicators and Objectives

Life Requisite	Habitat Indicator	Objective
General		
All life stages	Rangeland Health Standards	Meeting all standards [1]
LEK		
Cover	Availability of sagebrush cover	Has adjacent sagebrush cover
Security	Proximity of tall trees	Within 3 kilometers (1.86 miles): ● none within line of sight of the lek ● <3.5% conifer land cover
	Proximity of tall structures	None within 5 kilometers
NESTING		
Cover	Sagebrush canopy cover (%)	≥20
	Sagebrush species present	Includes *Artemesia tridentata* subspecies
	Perennial grass cover (%)	>10 if shrub cover <25[2]
	Annual grass (%)	<5
	Total shrub cover (%)	>40
	Conifer encroachment (%)	<5
BROOD-REARING/SUMMER		
Cover	Sagebrush canopy cover (%)	≥10
Cover and Food	Perennial forb canopy cover (%)	≥5 arid >15 mesic
Food	Riparian Areas/Meadows	Manage for PFC
	Perennial forb availability (riparian areas/meadows)	≥ 5 plant species present[3]
Security	Conifer encroachment (%)	<3 phase I (0 – 25% cover) No phase II (25 – 50% cover) No phase III (>50% cover) within 850-meter (2,788-foot) buffer of microhabitat plot
	Riparian Area/Meadow Interspersion with adjacent sagebrush	Perimeter to area ratio of 0.15 within 159-meter (522-foot) buffer of the microhabitat plot
WINTER		
Cover and Food	Sagebrush canopy cover (%)	≥10
	Sagebrush height (centimeters)	≥25
	Conifer encroachment (%)	<5 phase I (0 – 25% cover) no phase II (25 – 50% cover) no phase III (>50% cover) within 850-meter (2,788-foot) buffer of microhabitat plot
	Sagebrush extent (%)	>85 sagebrush land cover within 850-meter (2,788-foot) buffer centered on microhabitat plot
	Sagebrush species comp (%)	>50 *A. tridentate* sites 25 *A. arbuscula* sites

Life Requisite	Habitat Indicator	Objective
		25 *A. vaseyana* sites

Sources: Blomberg et al. 2012; Casazza 2011; Coates et al. 2011; Coates and Delehanty 2010; Coates and Casazza (in prep. A); Coates and Casazza (in prep. B); Connelly et al. 2000; Kolada 2009a, 2009b; Lockyer et al. (in review); Nevada Governor's Sage-Grouse Conservation Team 2010

[1] Upland standards are based on indicators for canopy and ground cover, including litter, live vegetation, and rock, appropriate to the ecological potential of the site.

[2] Assumes upland rangeland health standards are being met.

[3] Standard considered in addition to PFC. Measured Ecological Site Deterioration (ESD)/Daubenmire (20-centimeter by 50-centimeter frame). Includes all mesic plant species, not perennial forbs only.

3.2.3. Management Zones

Due to the differences in the ecology of sagebrush across the range of the GRSG, WAFWA further parses sagebrush habitats into seven management zones (Management Zones I-VII) based primarily on floristic provinces (**Figure 3-2**, Preliminary Priority and General Greater Sage-Grouse Habitat and WAFWA Management Zones). The boundaries of these management zones were delineated based on their ecological and biological attributes rather than on arbitrary political boundaries (Stiver et al. 2006). Vegetation found within each management zone is similar, and GRSG and its habitat within these areas are likely to respond similarly to environmental factors and management actions.

(PDF Map 3–2)

Figure 3.2. Preliminary Priority and General Sage-Grouse Habitat and WAFWA Management Zones

The Nevada and Northeastern California Sub-regional planning area includes GRSG habitat and populations within three management zones as delineated by WAFWA. To facilitate local planning efforts and foster stakeholder involvement in state-led planning initiated by the Nevada 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). Management zones in the Nevada and Northeastern California Sub-region include the following:

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

These management zones, their aggregate populations and subpopulations, and the PMUs in the sub-region are described in **Table 3-3**, WAFWA Management Zones in the Planning Area and in **Figure 3-3**, Populations/Subpopulation Management Units and WAFWA Management Zones. Portions of PMUs may cross population/subpopulation boundaries (Connelly et al. 2004). For

planning purposes, management zone boundaries are adapted to the PMU boundaries described for the sub-region.

Management Zone Conditions

Nevada Habitat Mapping

NDOW, the BLM, and Forest Service completed detailed mapping of GRSG habitats within Nevada, with the exception of habitat for the northeast California/northwest Nevada population, which includes the California portion of the sub-region and the California-managed portion of northwestern Nevada. This mapping was developed using a mapping framework produced by the BLM that designates the restoration potential of sagebrush communities (R-values) within the known range of GRSG in Nevada. The R-values, based upon existing vegetation cover, ecological site potential, and burned areas, were developed in Geographic Information Systems (GIS) by the Nevada BLM State Office staff and district personnel with cooperation from NDOW wildlife biologists. R-value classifications were adapted from Sather-Blaire et al. (2000).

Restoration potentials are defined as follows:

- *R-0*: Areas with desired species composition that have sufficient, but not excessive, sagebrush canopy and sufficient grasses and forbs in the understory to provide adequate cover and forage to meet the seasonal needs of GRSG (nesting, early brooding, summer, fall/winter).

Table 3.3. WAFWA Management Zones in the Planning Area

WAFWA Management Zone	Populations/Subpopulations	Population Management Units
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, Black Rock, Pine Forest
	Klamath (California)	Devil's Garden
	Warm Springs Valley	Virginia/Pah Rah
Source: Stiver et al. 2006		

- *R-1*: Areas with potential to produce sagebrush plant communities that have good understory composition of desired grasses and forbs but lack sufficient sagebrush canopy. These areas

could be characterized by native perennial grasslands post-fire or seeded perennial grass rangelands.

- *R-2*: Existing sagebrush plant communities with insufficient desired grasses and forbs in the understory.
- *R-3*: Areas dominated by pinyon-juniper woodland that may have the potential to produce sagebrush plant communities. These areas include sagebrush sites that have been encroached by pinyon-juniper woodlands, as well as other pinyon-juniper dominated sites that may provide potential value to GRSG.
- *X-3*: Pinyon-juniper areas that have crossed the threshold from sagebrush ecological site to pinyon-juniper or juniper woodland or have only had a potential for woodland plant community.

(PDF Map 3–3)

Figure 3.3. Populations/Subpopulation Management Units and WAFWA Management Zones

- *R-4*: Areas with potential to produce sagebrush plant communities but are dominated by annual grasses, annual forbs, or weeds.
- *X-4*: Areas that have crossed the threshold from sagebrush ecological site to annual grasses, perennial weeds, bare ground, or a non-sagebrush ecological site.
- *Other*: Areas with some value to GRSG but typically not considered traditional GRSG habitat. These areas include riparian zones, salt desert scrub communities, aspen stands, mountain mahogany stands, and agricultural lands.

Using the R-mapping as a starting point, the NDOW habitat categorization mapping then incorporates the best available data (including lek observations, telemetry locations, survey and inventory reports, vegetation cover, soils information, and aerial photography) into a statewide prioritization of GRSG habitat. This mapping delineates GRSG habitat into the following five categories:

- *Category 1 – Essential/Irreplaceable Habitat*: The lek and associated nesting habitat is categorized as essential and irreplaceable habitat. The interrelationships between the vegetal characteristics of a given area, female nest site selection, and movement patterns of the population that drive males to establish a lek in areas of female use is spatially and temporally dynamic and has yet to be successfully recreated (USFWS 2013a). However, focusing solely on the lek location and a certain buffer around the lek does not always adequately represent those areas that are crucial to the long-term survival of particular populations, especially those that are migratory. Several telemetry monitoring efforts, particularly in eastern Nevada, have shown that females will move up in elevation from the lek sites to more mesic habitats to both nest and raise their broods. These habitats should also be considered as Category 1 habitats that are essential and irreplaceable. Category 1 habitat often corresponds to the R-0 habitat definition (see definitions above).
- *Category 2 – Important Habitat*: Suitable and diverse winter habitats and high quality brood-rearing habitats are critical to the long-term persistence of GRSG populations. Winter habitats are very important to GRSG due in large part to their complete dependence

on sagebrush during the late fall and winter months (Connelly et al. 2000a). Depending on the year and the snowpack in a given area, winter habitats elevate in importance as snow accumulations rise. Because of the loss of sagebrush in Nevada over the last decade (approximately 2.6 million acres or 12 percent of available GRSG habitat), winter habitat is at a premium and, depending on the particular PMU, could actually be considered essential and irreplaceable. In Nevada, winter habitats are essentially comprised of mountain big sagebrush, Wyoming big sagebrush, and low sagebrush communities. Plants within these communities are usually taller than at random sites (Connelly 1982; Schoenberg 1982). Also, sagebrush canopy cover is typically greater than 20 percent at wintering sites (Hanf et al. 1994; Eng and Schladweiler 1972; Homer et al. 1993). High quality winter habitat may correspond to the R-2 habitat definition, but there are situations where important winter habitats could be nested within R-0 habitats as well.

Brood-rearing habitats are also a very important component of GRSG habitats. A mosaic of upland sagebrush vegetation intermixed with mountain meadows and spring systems compose brood rearing habitat. These habitat types are fairly limited in Nevada because of the dry climate exhibited throughout the majority of the Great Basin. These habitats have been impacted by improper livestock grazing practices (whether prior or current), overutilization by wild horses, and pinyon and juniper encroachment. High quality brood-rearing habitat generally corresponds best to the R-0 habitat definition; however, there are instances where high quality brood-rearing habitat could be nested within R-1 and R-2 habitat definitions.

- *Category 3 – Habitat of Moderate Importance*: These habitats are not meeting their full potential due to any number of factors but still serve some benefit to GRSG populations. These habitats can serve as nesting, brood rearing, wintering, or transitional habitat but are marginal. For the short term, these habitats may only be of limited value on a seasonal basis but could serve additional long-term values if certain habitat components (most importantly sagebrush) return to the site.

Habitats within this category could correspond to R-1, R-2, or R-3 habitat definitions. R-1 habitats generally tend to be upper elevation sagebrush habitats, normally mountain big sagebrush communities that have recently burned. These areas are likely to return to a mountain big sagebrush community within 35 to 100 years (Baker 2006) and would then serve greater value to GRSG, but presently may only be of marginal value during the brood-rearing period, for example. R-2 habitats with ample sagebrush but little understory exist at various elevation and topography types. These areas can often be treated with passive management techniques, which are recommended in xeric sagebrush communities that receive less than or equal to 12 inches of precipitation. Pinyon and juniper-encroached sagebrush habitats, or R-3 habitats that have not crossed a threshold, may be of value to GRSG depending on the level of encroachment.

- *Category 4 – Low Value Habitat and Transition Range*: Habitats within this category currently contribute very little value to GRSG other than transitional range from one seasonal habitat to another or minimal foraging use. Habitats within this category that also correspond to R-3 habitat definitions have not completely crossed a threshold where restoration efforts would be ineffective but would be very expensive, with secondary work needed to recover the understory. The cost to benefit ratio is too high to apply recovery efforts at this time. Similarly, habitats that correspond to the R-4 habitat definition may not have necessarily crossed the restoration threshold, but restoration would be very expensive and would also require secondary or tertiary treatments to control invasive plant species post treatment.

- *Category 5 – Unsuitable Habitat*: This category represents non-habitat at this time unless greater strides are made with respect to restoration techniques. In general, this type of habitat is in such poor condition that restoration efforts would not be feasible or effective. Non-habitat can either be designated non-habitat areas delineated within seasonal distribution maps or areas that have undergone substantial change and are not likely to recover. These areas could be lower elevation sagebrush habitats that have burned and are now annual grasslands dominated by various invasive weeds. Areas such as these are not likely to recover without substantial effort and expense. Other examples of habitat alteration that could render an area to be considered non-habitat include agricultural conversion, or cultivation, and urban/suburban development. Category 5 habitat could correspond to the R-3 or R-4 (and X-3 or X-4) habitat definitions. These areas have little potential to produce sagebrush plant communities and are currently dominated by pinyon-juniper woodlands or annual grasses and forbs.

California Habitat Mapping

The California BLM administers lands within the Surprise, Eagle Lake, and Alturas Field Offices in the northwestern portion of the Nevada and Northeastern California Sub-region. BLM-administered lands in the Surprise and Eagle Lake Field Offices fall within California and Nevada. For the Northeast California/Northwest Nevada GRSG population, California BLM utilized a mapping methodology based on the Doherty modeling (Doherty et al. 2011), including the 100 percent breeding bird density core regions, or all known active leks with appropriate buffering (6.4 kilometers [4 miles] for 25 percent and 50 percent kernels, 8.5 kilometers [5.3 miles] for 75 percent and 100 percent kernels). Areas were modified by local knowledge of seasonal range use, known connectivity, and vegetative and natural barriers. In California, extensive radio telemetry information was available, providing a direct footprint of GRSG use areas.

For the purposes of quantifying GRSG habitat, the terms PPH and PGH are used. PPH includes NDOW mapping Categories 1 and 2, and PGH includes mapping Category 3. All mapped habitat within California and California-managed PMUs in northwestern Nevada are included as PPH and PGH per the methodology noted above.

Surface and Habitat Acres

Population/subpopulation surface acreage within the sub-region is dominated by BLM-administered lands at 70 percent. Forest Service-administered lands comprise 13 percent, and all other ownerships comprise the remaining 17 percent (**Table 3-4**, Surface Ownership within Nevada Population/ Subpopulation Areas).

Table 3.4. Surface Ownership within Nevada and Northeastern California Population/Subpopulation Areas

Population/Subpopulation	Total	BLM	Forest Service	Other
Management Zone III				
Central Nevada	13,796,074	9,561,331	2,461,316	1,773,427
Northwestern Interior	1,284,622	991,457	0	293,165
Quinn Range	1,986,395	1,719,176	222,502	44,717
Southeast Nevada	9,015,524	7,530,250	787,939	697,335
Management Zone IV				
North Central Nevada	2,063,293	1,341,319	312,456	409,518

Population/Subpopulation	Total	BLM	Forest Service	Other
Northeastern Nevada	5,981,841	3,403,738	679,337	1,898,766
Management Zone V				
Klamath (California)	69,539	0	59,446	10,093
Northeastern California/Northwestern Nevada	4,265,207	3,129,350	18,213	1,117,644
South Central Oregon/North Central Nevada	480,377	456,409	0	23,968
Warm Springs Valley	356,033	231,387	0	124,646
Total	**39,319,059**	**28,364,422**	**4,541,212**	**6,393,283**
Source: Manier et al. 2013				

Population/subpopulation PPH and PGH within the sub-region is slightly more skewed toward BLM-administered lands at 73 percent. Forest Service-administered lands comprise 11 percent, and all other ownerships comprise the remaining 15 percent (**Table 3-5**, GRSG Habitat within Nevada and Northeastern California Population/Subpopulation Areas). Of note is the percentage of PPH/PGH contained within each of the population/subpopulation areas and the contribution of each for the sub-region (**Table 3-6**, Suitable GRSG Habitat As Percentage of Population/Subpopulation Surface Acreage and as Percentage of Sub-region Occupied Habitat).

Occupied GRSG habitat is depicted on **Figure 3-4**, Occupied Habitat.

Table 3.5. GRSG Habitat[1] within Nevada and Northeastern California Population/Subpopulation Areas

Population/Subpopulation	Total		BLM		Forest Service		Other	
	PPH	PGH	PPH	PGH	PPH	PGH	PPH	PGH
Management Zone III								
Central Nevada	4,123,513	2,643,355	3,041,134	1,887,370	502,472	303,839	579,907	452,146
Northwestern Interior	29,155	111,458	25,070	93,837	0	0	4,086	17,622
Quinn Range	1,669	259,543	1,204	230,084	0	22,549	465	6,910
Southeast Nevada	2,282,856	1,357,973	2,003,203	1,201,344	106,425	53,770	173,228	102,859
Management Zone IV								
North Central Nevada	1,380,282	369,967	969,511	282,418	203,319	35,934	207,452	51,614
Northeastern Nevada	4,256,002	847,865	2,621,895	457,111	372,976	147,879	1,261,131	242,874
Management Zone V								
Klamath (California)	0	69,526	0	0	0	59,435	0	10,091
Northeastern California/ Northwestern Nevada	3,072,306	415,918	2,559,361	376,424	4,169	7,754	508,776	31,740
South Central Oregon/North Central Nevada	314,813	84,396	300,319	78,119	0	0	14,494	6,278
Warm Springs Valley	83,635	72,654	60,253	51,490	0	0	23,382	21,164
Total	**15,544,232**	**6,232,655**	**11,581,950**	**4,658,196**	**1,189,361**	**631,161**	**2,772,921**	**943,299**

Source: Manier et al. 2013

[1]Occupied Habitat defined as Categories 1 and 2 for PPH and Category 3 for PGH mapped by NDOW as described above.

Table 3.6. Suitable GRSG Habitat As Percentage of Population/Subpopulation Surface Acreage and as Percentage of Sub-region Occupied Habitat

Population/Subpopulation	As % of Surface within Population/Subpopulation	As % of Sub-region Occupied Habitat
Central Nevada	49	31
Northwestern Interior	31	2
Quinn Range	13	1
Southeast Nevada	40	17
North Central Nevada	72	7
Northeastern Nevada	84	23
Klamath (California)	100	<1
Northeastern California/Northwestern Nevada	81	16
South Central Oregon/North Central Nevada	83	2
Warm Springs Valley	44	1
Source: NDOW and CDFW 2012		

Sage-Grouse Populations

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

- *Active:* 2 or more males observed at least twice in the last 5 years
- *Pending Active:* 2 or more males observed only once in the last 5 years with no other visits conducted
- *Inactive*: 0 or 1 male observed during every visit (minimum 2 visits) in the last 5 years
- *Historic:* 0 or 1 male observed during every visit (minimum 5 visits) in the last 30 years
- *Unknown:* no other conditions met

Currently, there are 573 leks classified as active, 272 leks classified as inactive, and approximately 200 leks classified as pending (having been active within the last 5 years with no other visits). Active leks are distributed among the population/subpopulation areas, as shown in **Table 3-7**, Leks in Population/Subpopulation Areas.

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

(PDF Map 3–4)

Figure 3.4. Occupied Habitat

Table 3.7. Leks in Population/Subpopulation Areas

Population/Subpopulation	Active	Inactive	Total
Central Nevada	134	51	185
Northwestern Interior	0	9	9

Population/Subpopulation	Active	Inactive	Total
Quinn Range	0	0	0
Southeast Nevada	105	42	147
North Central Nevada	44	29	73
Northeastern Nevada	157	93	250
Northeastern California/Northwestern Nevada	95	30	125
South Central Oregon/North Central Nevada	36	18	54
Warm Springs Valley	2	0	2
Source: NDOW and CDFW 2012			

Numbers of males per active lek in each population/subpopulation are characterized in **Table 3-8**, Percentage Distribution of Active Leks by Size Category within Population/Subpopulation Areas.

Table 3.8. Percentage Distribution of Active Leks by Size Category within Population/Subpopulation Areas

	1-10 males	11-20 males	21-30 males	31-40 males	41-50 males	50+ males
Central Nevada	35%	23%	16%	11%	6%	8%
Northwestern Interior	N/A	N/A	N/A	N/A	N/A	N/A
Quinn Range	N/A	N/A	N/A	N/A	N/A	N/A
Southeast Nevada	56%	28%	10%	3%	0%	3%
North Central Nevada	43%	18%	16%	7%	2%	14%
Northeastern Nevada	44%	27%	17%	3%	5%	3%
Lake Area: Northeastern California/Northwestern Nevada	24%	19%	18%	17%	7%	15%
South Central Oregon/North Central Nevada	53%	19%	17%	5%	3%	3%
Warm Springs Valley	50%	0%	0%	0%	0%	50%
Source: NDOW and CDFW 2012						

The distribution of lek categories among the population/subpopulations depicts their relative strength. Of note is the northeast California/northwest 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 lek size across the categories. The smaller but viable populations in North Central and South Central Oregon/North Central Nevada have fewer leks overall but lek size distributions similar to those of the most robust northeast California/northwest Nevada and Central Nevada populations. These distributions generally correlate to wildfire/annual grass/conifer influences among subpopulations.

Fire Occurrence

Fire has played a major role in the decline of GRSG habitat within the sub-region. Fire starts and total burned acres by both year and decade have increased substantially since 1980. Causal factors 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, Areas with a High Probability of Cheatgrass Occurrence, 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 wildfire (Connelly et al. 2004). Of note is the low risk for the Nevada portion of the Northeast California/Northwest Nevada, North Central, and Northeastern subpopulations and the low to moderate risk in the Central and Southeastern subpopulations, demonstrating some level of resilience to the effects of wildfire and ultimately loss of habitat in these areas.

More recent fire history in the sub-region is shown on **Figure 3-6**, Fire History 2000-2012, while the trends in fire starts and burned acres are depicted in **Table 3-9**, Fire Starts and Acres Burned by Decade by Population/Subpopulation Area.

Chart 3-1, Acres Burned by Decade, 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 tripled from the 1980s to the 1990s and nearly quadrupled to current.

(PDF Map 3–5)

Figure 3.5. Areas with a High Probability of Cheatgrass Occurance

(PDF Map 3–6)

Figure 3.6. Fire History 2000-2012

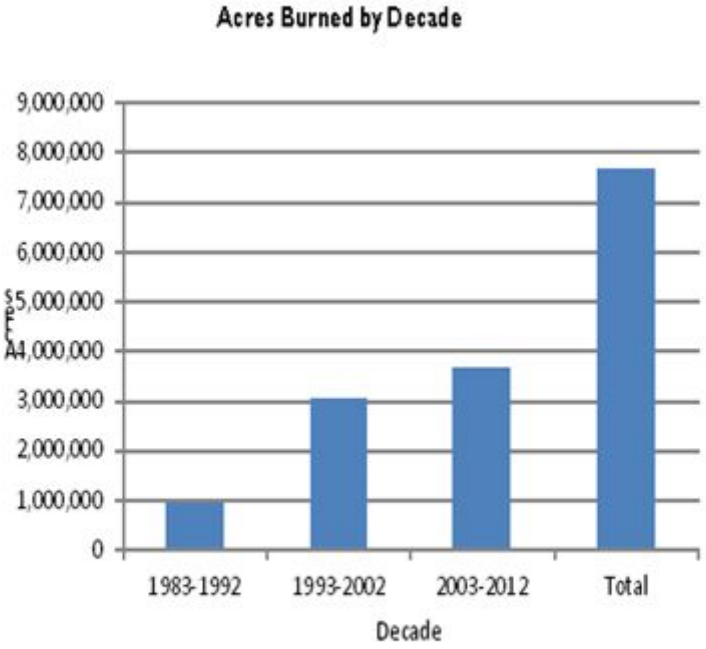
Table 3.9. Fire Starts and Acres Burned by Decade[1] by Population/Subpopulation Area

Population/ Subpopulation	1983-1992		1993-2002		2003-2012		Total
	Starts	Acres	Starts	Acres	Starts	Acres	Acres
Central Nevada	215	189,475	517	1,123,789	503	631,250	1,944,514
Northwestern Interior	71	75,305	214	394,503	110	91,217	561,025
Quinn Range	5	1,928	4	1,362	9	10,735	14,025
Southeast Nevada	120	54,085	182	100,672	69	59,361	214,118
North Central Nevada	45	44,284	84	187,976	114	328,232	560,492
Northeastern Nevada	310	279,340	519	809,090	590	1,841,607	2,930,037
Northeast California/ Northwest Nevada	223	132,446	426	211,190	142	419,248	762,884
South Central Oregon/North Central Nevada	29	99,309	41	91,569	34	239,713	430,591
Warm Springs Valley	81	55,772	65	73,304	119	24,145	153,221
Total	**1099**	**931,944**	**2052**	**2,993,455**	**1690**	**3,645,508**	**7,570,907**

Source: BLM and Forest Service GIS 2013

[1]Nevada fire data 1984 to present.

Chart 3-1



Source: BLM/NDOW data not published

This chart and these tables reflect a relatively lower frequency and fire size in the 1980s. Burned acreage increased dramatically in Central Nevada from 1993 to 2002 and remains high into the present. Fires are concentrated in the northern one-third of this subpopulation adjacent to the Northeastern subpopulation where fire activity more than doubled per decade, burning nearly 2 million acres between 2003 and 2012. This general area of fire activity is within an apparent storm track that bisects the state from west to east and runs generally from the Warm Springs Valley population on the west, through the Northwest Interior, and into the Northeast. 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 Northeast California/Northwest Nevada, North Central, and South Central Oregon/North Central Nevada population/subpopulations where the 2003 to 2012 decade demonstrates decadal highs. Populations of comparatively low fire activity are Southeast 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 GRSG

To depict the direct effects of fires and fire history on GRSG populations, **Table 3-10**, Active and Inactive Lek Sites and Adjacent Nesting Habitat Burned Since 1980, utilizes the composite footprint of all wildfires in the sub-region and overlays active and inactive leks (NDOW and CDFW 2012), and any leks that had wildfire occurrence within 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. In areas of high wildfire frequency and extent, an extremely high percentage of active and inactive lek sites have been impacted. It is assumed that

many of these leks may have become inactive in the years following wildfires. The Northeastern subpopulation shows the highest percentage of impact on active/inactive leks and associated nesting habitat. Approximately 25 percent of active leks and over 50 percent of inactive leks have been burned. Virtually all leks have had varying amounts of associated nesting habitat burned. The effects of the 2012 wildfires are shown in the South Central Oregon/North Central Nevada subpopulation, where nearly one-third of active and inactive leks are burned and virtually all nesting habitat associated with active and inactive leks is impacted. In the Northeast California/Northwest Nevada area, while just over 10 percent of active leks have burned, nesting habitat associated with virtually all leks has been impacted.

Table 3.10. Active and Inactive Lek Sites and Adjacent Nesting Habitat Burned Since 1980

Population/Subpopulation	Total Leks		Burned Leks			
			Lek Site Burned		Within 4-mile buffer	
	Active	Inactive	Active	Inactive	Active	Inactive
Central Nevada	134	51	2	1	71	22
Northwestern Interior	0	9	0	0	0	6
Quinn Range	0	0	0	0	0	0
Southeast Nevada	105	42	2	0	37	15
North Central Nevada	44	29	1	1	21	20
Northeastern Nevada	157	93	36	50	145	91
Northeastern California/ Northwestern Nevada	95	30	10	1	66	20
South Central Oregon/North Central Nevada	36	18	8	7	33	16
Warm Springs Valley	2	0	0	0	2	0
Source: BLM and Forest Service GIS 2013						

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 land ownership 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 therefore facilitated a 40-mile wide corridor (20 miles to 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 dramatically into GRSG habitats, development will continue to intensify within 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 their habitats are well demonstrated, with consensus among the land and wildlife management agencies that very little seasonal range connectivity currently exists across this corridor. It is unknown whether enough episodic crossing occurs to facilitate genetic exchange.

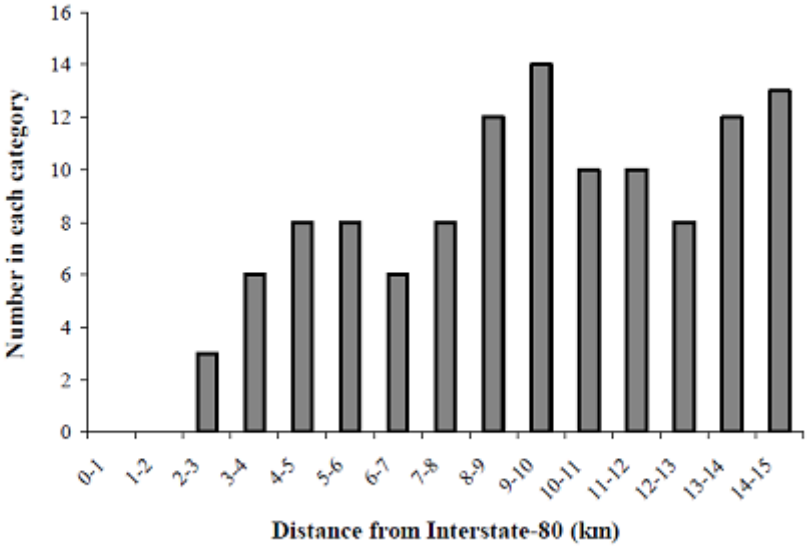
The detrimental effects of interstate highways on GRSG nesting has been documented in Wyoming and northeastern Utah (Connelly et al. 2004) (Chart 2-5), with an analysis of active leks within distance buffers from the interstate and exhibiting similar land ownership and concentration of infrastructure as in Nevada. The analysis found no leks within 2 kilometers of

the interstate (4-kilometer-wide [2.5-mile-wide] band) and only 9 leks between 2 and 4 kilometers [1.2 and 2.5 miles] of the interstate. Only 1 equivalent-sized band 62 to 64 kilometers [38.5 to 40 miles] from the interstate had 8 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 5-kilometer [3.1-mile] bands out to 60 kilometers [37.3 miles] on either side of the interstate from Winnemucca to the Utah border. No leks occur within the 5-kilometer [3.1-mile] band (10 kilometers [6.2 miles] wide), 9 occur within the 10-kilometer [6.2-mile] band (20 kilometers [12.4 miles] wide), and 10 occur within the 15-kilometer [9.3-mile] band (30 kilometers [18.6 miles] wide). An equivalent band 21 to 25 kilometers [13 to 15.5 miles] away contains 9 leks. Of the highest 5 band counts, 4 occur beyond 40 kilometers [24.8 miles], indicating that the corridor may be affecting GRSG to that distance.

The distance and distribution of GRSG leks in relation to Interstate 80 are displayed in **Chart 3-2**, Leks by Distance from Interstate 80 and **Chart 3-3**, Nevada Lek Distribution – Interstate 80, below.

Chart 3-2

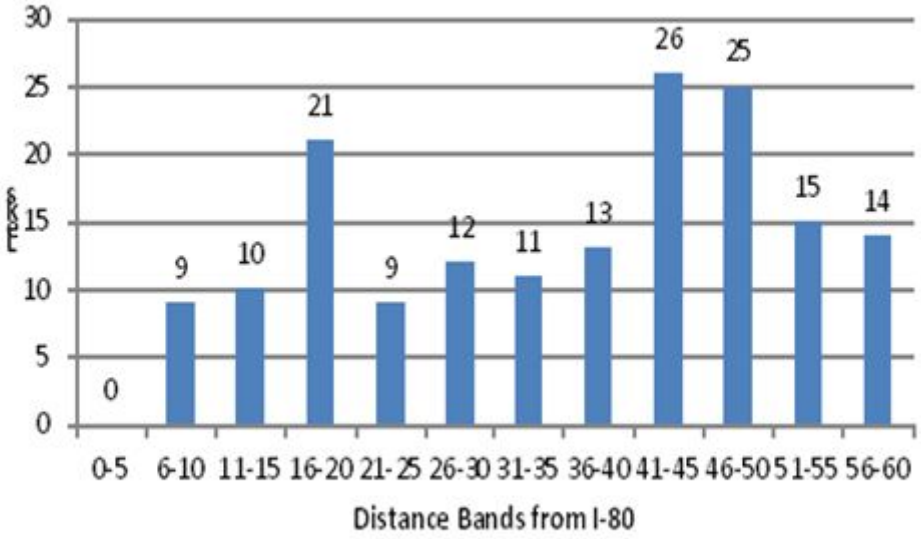
Leks by Distance from Interstate 80



Source: Connelly 2004

Chart 3-3

Nevada Lek Distribution – Interstate 80



Source: BLM/NDOW data not published

Management Zone III

Management Zone 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 4 populations/subpopulations (Connelly et al. 2004) and all or portions of 39 PMUs in central and southeastern Nevada. Of the four populations/subpopulations, two of these 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 West Nye, East Churchill, Eureka, South Elko, Lander, and West White Pine counties, including 13.8 million surface acres and 6.7 million acres of GRSG habitat. The subpopulation contains 16 PMUs and is considered 1 of the 4 stronghold GRSG habitats within Nevada. Vegetation modeling across GRSG population areas was completed June 2013 by Forest Service and the BLM using the Vegetation Dynamics Development Tool (VDDT). This tool incorporated 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, this subpopulation is considered in long-range population decline (Connelly et al. 2004; Garton et al. 2011). The

subpopulation area supports 134 active and 51 currently inactive leks. Fifty-six active leks (42 percent) have greater than 20 males in attendance, with 11 active leks having greater than 50 males (NDOW 2013). The COT Report (USFWS 2013a) characterizes the population status as being "potentially at risk" because of limited or declining numbers, range, or habitat even though GRSG may be locally abundant in some portions of the area. The report highlights conifers, weeds/annual grasses, fire, infrastructure, grazing, free-roaming horses and burros, and recreation as threats. Wildfire activity has been concentrated in the northern end of the subpopulation adjacent to the Northeast subpopulation area where wildfire has exerted the highest impacts within the state. The southern two-thirds of the Central subpopulation remains relatively insulated from the occurrence and effects of wildfire.

Generally, wildfire 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 which has already occurred. Overall, compared with 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 woodland 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 with increased temperature regimes shifting lower elevation sagebrush habitats into mixed salt desert scrub on a significant scale and sagebrush habitat expansion occurring at higher elevations, retaining significant habitat as potential projected climate change focal areas for GRSG and other species (Comer et al. 2012). 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 acres (18 percent).

The Southeastern Nevada subpopulation includes portions of far Southeast Elko, East White Pine, and North Lincoln counties, including 9 million surface acres and 3.6 million acres of GRSG habitat. It contains all or portions of 6 PMUs. GRSG habitats here are considered important as a stronghold within the state, but are recognized as having generally smaller population size (lek size) on average compared with other stronghold areas. The subpopulation area supports 105 active and 42 currently inactive leks. Only 17 active leks (17 percent) have greater than 20 males in attendance, with 3 active leks having greater than 50 males (NDOW 2013). 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. GRSG 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 "potential at risk" because of limited or declining numbers, range, and habitat even though GRSG may be locally abundant in some portions of the area. The report highlights conifers, weeds/annual grasses, fire, infrastructure, grazing, free-roaming horses and burros, and recreation as threats. 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 shrinkage of sagebrush habitats from the southern end of the subpopulation due to an increase in salt desert scrub and northerly encroachment of Mojave Desert species with only minor expansion of pinyon-juniper habitats. Intact habitats will persist at higher elevations (Comer et al. 2012).

While the Northwest Interior population of Pershing and South Humboldt counties is relatively small in area (1.9 million acres), the population contains all or portions of 16 small and isolated PMUs. The population area 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 561,000 acres have burned since 1984. Sagebrush canopy is absent over vast areas, marginalizing habitat value to GRSG. NDOW mapped habitat on only small portions of seven of these PMUs based on the lack of leks and the suspected inability of these areas to recover from wildfire. Total GRSG habitat is 311,000 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, making GRSG in this area highly vulnerable to extirpation. The NDOW lek database indicates no active and nine currently inactive leks. The report highlights isolated and small size, fire, weeds, annual grasses, mining, infrastructure, grazing, free-roaming horses and burros, and recreation as threats. The invasive grass potential is above 45 percent, with fire regime departures the highest in Nevada (Comer et al. 2012).

The Quinn Canyon 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; 222,000 Forest Service). NDOW maps total habitat at 258,557 acres with no habitat in Categories 1 and 2 (Essential/Irreplaceable and Important). VDDT modeling was not completed on this population. The COT Report (USFWS 2013a) characterizes the population status as "high risk" because of extremely limited and/or rapidly declining numbers, range, and/or habitat, making GRSG in this area highly vulnerable to extirpation. The report states the population as containing less 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 myriad, including weeds/annual 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 management zone is extensive, including five states with the subpopulations in Nevada shared into southern Idaho, northwestern Utah, and southeastern Oregon. The zone consists of two subpopulations (Northeastern and North Central) 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 habitat for the Northeastern subpopulation are 6 million acres and 5.1 million acres, respectively. Surface acreage and habitat for the North Central subpopulation are 2.1 million acres and 1.5 million acres, respectively. Of seven management zones, Management Zone IV is characterized as one of those supporting the highest densities of GRSG but also considered in long-range population decline (Connelly et al. 2004; Garton et al. 2011). The Northeastern subpopulation supports 157 active and 93 currently inactive leks. Active lek size distribution is skewed toward leks with less than twenty males (112 leks, 71 percent). Four leks have more than 50 males. The North Central subpopulation supports 44 active and 29 currently inactive leks.

Seventeen leks (39 percent) have more than 20 males (NDOW 2013). The critical factor affecting GRSG and their habitats in Management Zone IV is the effect of wildfires. Combined, these subpopulations have had 555 fire starts burning 3.5 million acres since 1984. The combined areal footprint of wildfire in these subpopulations is 2.3 million acres. Thirty-seven (18 percent) of 201 active and 51 (42 percent) of 122 inactive leks have burned. Eighty-two percent of active and 91 percent of inactive leks have suffered nesting habitat losses within a four-mile buffer of leks. Wildfires 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 efforts are moderately successful in some areas. VDDT modeling in the Northeastern 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 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 weeds/annual grasses, conifer encroachment, and infrastructure development as threats. The potential abundance of invasive annual grasses is consistently above 45 percent over the majority of the management zone, 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 expansion of habitat types supportive of GRSG through time with an accompanying increase in invasive juniper. 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 this management zone supporting the potential for management as a stronghold in this zone (Comer et al. 2012).

Management Zone V

This zone 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 in extent over the last three decades, while some populations within the zone 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 seven management zones, Management Zone V is characterized as one of those supporting the highest densities of GRSG.

The Klamath population in northern Modoc County, California, is shared with Oregon and contains the Devil's Garden PMU. It was once connected to PMUs to the south in northeastern California and northwestern Nevada, but is now virtually extirpated. Of 46 active leks known to have been extant as late as the 1970s, only 1 active lek remains. The lek is located on USFWS lands at Clear Lake and has been supported for the last seven years through population augmentation efforts consisting of annual trans-location of various numbers of males and females from other lek sites, mostly from the Sheldon 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 is

dependent upon the implementation of large-scale juniper removal by the Modoc National Forest. Planning for this PMU/population is not considered further in this LUPA/EIS.

The Northeast California/Northwest 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 3.5 million acres of mapped habitat. The subpopulation includes a mix of extirpated, highly threatened, and relatively stable PMUs. In the COT Report (USFWS 2013a), USFWS generalizes threats to this subpopulation as isolation and small size, conifers, fire, weeds, annual grasses, livestock, and wild horses.

The California portion includes the Likely Tablelands PMU in eastern Modoc County, which is likely to become extirpated within the next decade. The population consists of only one lek that contained three strutting males in 2012. Up to eight leks were present on the tablelands in the 1980s and were connected to other populations on the Devil's Garden and further west onto Rocky Prairie and into the next valleys to the west, including Round Valley 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 non-native grasses, including cheatgrass, but specifically medusahead grass. 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 1.4 million acres in the PMU, 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 (invasive 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 2006). 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 of this habitat (23 percent of the PMU). The Rush Fire burned nearly the entire length of the PMU and severed the remnant western half of the PMU 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 sage sites, and low precipitation. Similar results are expected from the Rush fire. Long-term population declines leading to extirpation of GRSG in this PMU are likely over the next several decades due to isolation and habitat loss, thus greatly shrinking GRSG range on the western edge and potentially eliminating GRSG from northeastern California. No modeling has been completed to support this hypothesis. As of 2012, 21 leks were active in the PMU. Of these leks, 11 were burned in the Rush Fire of 2012. Livestock grazing, both historic and present, and wild horse overpopulation are additional threats affecting the PMU, including both nesting cover and availability of late-summer brood-rearing habitats.

The remaining PMUs within the Northeast California/Northwest Nevada subpopulation include stronghold populations within northwestern Nevada and the far northeastern corner of California. The Massacre PMU has experienced much less wildfire than is the norm for the remainder of northern Nevada. Invasive grasses, though present, are a threat which have not manifested extensively in the PMU. GRSG populations remain high and stable and are connected with stronghold PMUs at the Sheldon Antelope Refuge and into Oregon. As of 2012, 28 leks were active in the PMU, including 2 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 wildfire activity has affected up to 100,000 acres, including 60,000 acres lost to fire in 2012. This

potentially reflects a further heightening of wildfire 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 overpopulation affecting both nesting cover and availability of late-summer brood-rearing habitats.

Adjacent to the Massacre PMU, the Vya PMU is the northwestern-most Nevada PMU and includes a sliver of farthest northeastern California. Similar to the Massacre, wildfire and invasive grasses are less manifest than in north-central and northeastern Nevada, with overall habitat quality relatively high. However, GRSG habitat is affected by the encroachment of invasive juniper. The agencies continue to conduct large-scale juniper control in the PMU. Livestock grazing and wild horse overpopulation are additional threats. The PMU supports 16 active leks with population declines apparent as the conifer encroachment increases fragmentation.

Overall, VDDT modeling for the Northeast California/Northwest 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 implementation of habitat treatments under current management, are projected to bring sagebrush habitats supporting 10 to 30 percent cover down to 45 percent in 50 years. Trend is down due to increasing annual grasses and conifer encroachment.

The South Central Oregon/North Central Nevada subpopulation contains 480,390 surface acres and 400,000 acres of GRSG habitat 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 in size, the subpopulation includes 36 active leks, with 9 of these supporting 21 to 50 males and 1 population supporting more 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 total burned acreage of nearly 25 percent of the area by 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 resulting in an improving trend though greatly impacted by recent fire activity. The COT Report (USFWS 2013a) characterizes fire and annual grasses as substantial and imminent threats within this portion of the subpopulation along with mining and infrastructure as substantial and non-imminent.

The Warm Springs Population (Pah Rah and Virginia PMUs) encompass 402,748 surface acres and 156,111 acres of mapped habitat 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 the north by State Highway 446. Wildfires have burned approximately 35 percent of this PMU, converting sagebrush-dominated shrub lands to annual grasses and weeds. Wildfires 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. GRSG in these two mountain ranges occur in small isolated pockets of suitable habitat in the northern Virginia Mountains. It is estimated that GRSG currently utilize 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 currently used by GRSG in the Pah Rah and Virginia Mountain Ranges, 27,520 acres or 51 percent are under private ownership. Within the Pah Rah Range, an estimated 69 percent of existing GRSG habitat is under private ownership. VDDT modeling indicates that 60 percent of the modeled 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 6 of the Governor's GRSG plan. Analysis by Nevada Division of Wildlife of factors in these mountain ranges indicates a high probability of extirpation within 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 GRSG (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 a myriad of threats, including fire infrastructure, weeds/annual grasses, conifer, energy, free-roaming 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 wildfire regimes, and development.

Roads, other linear infrastructure, urban areas, mining, and other industry have a relatively small overall footprint in this ecoregion. Approximately 7 percent of the land surface is currently 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, which also tend to be favored for wildlife movement and so may impact some of the most productive and sensitive resources.

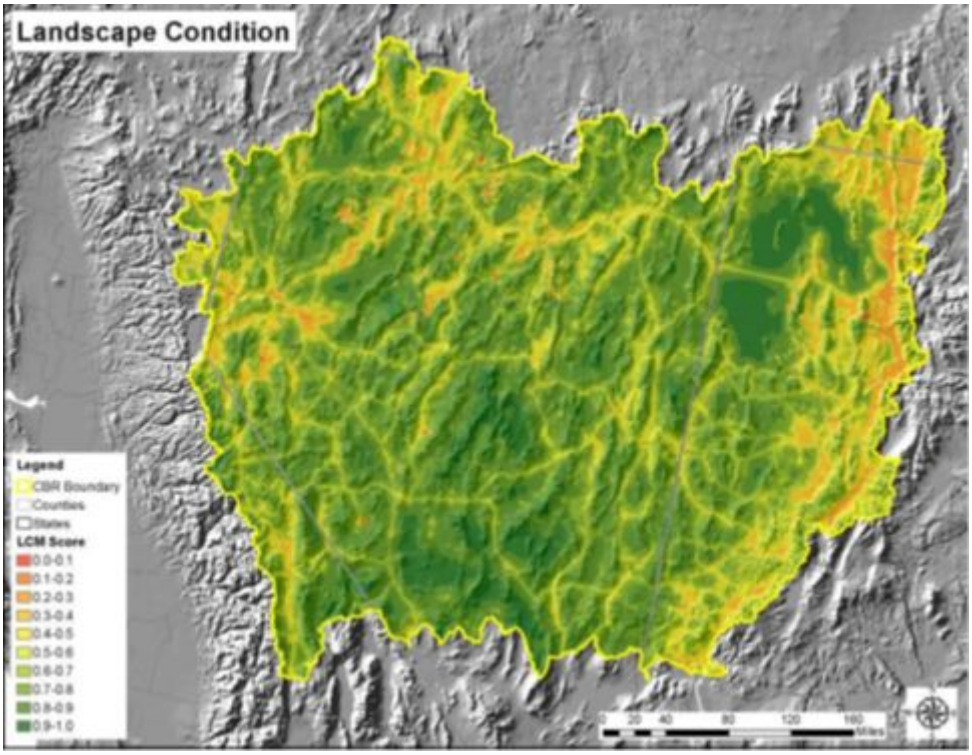
Much more pervasive are the effects of expanding invasive species and their interacting effects of wildfire regimes. Nearly every fifth field watershed is vulnerable to, if not already seriously infested with, invasive annual grasses, substantially altering effects on natural wildfire regimes. Effects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

Infrastructure

All development types currently occupy approximately 7 percent of the ecoregion and are only 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 as 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 the majority of the area.

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**, Landscape Condition, shows the current landscape condition indicator based on development change agents.



Source: Comer et al. 2012a

Figure 3.7. Landscape Condition

Invasive Species/Fire

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

An overwhelming proportion of the CBR is predicted by this model to support annual grasses at 45 percent cover. 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 inter-mountain basins (such as salt desert scrub and big sagebrush shrub land) is overall more severe, and reflects a similar spatial pattern 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. 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 coming 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 the vast majority 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 20th century baseline. In contrast, for this same near future time period, July, August, and September may see similarly significant maximum temperature increase 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.

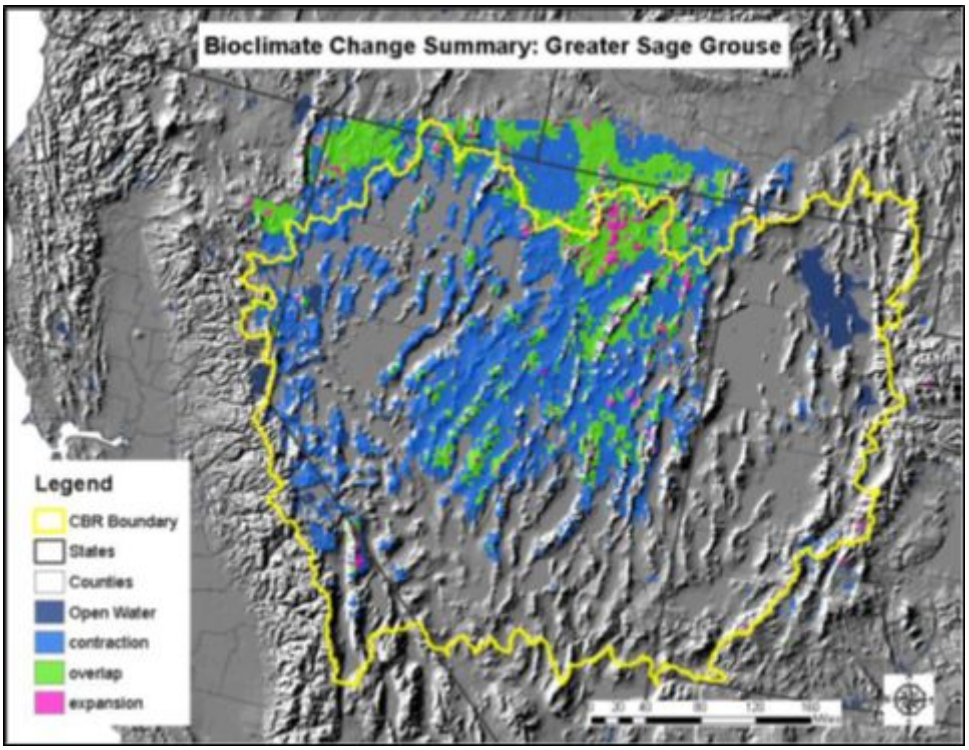
By 2060, the six global climate models ensemble forecasts substantial increases in maximum temperatures for all months, with the greatest increases concentrated during the summer. For July and August, by 2060, 90 percent and 85 percent of the CBR, respectively, is forecast to experience monthly maximum temperatures 2 standard deviations beyond the values of the 20th century baseline.

As early as the 2020s, July, August, and September minimum temperatures (i.e., night-time temperatures) are predicted to exceed 1 standard deviation beyond the 20th 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 1 standard deviation beyond the 20th century baseline, and for July through September, the models predict that 90 percent of the region will experience monthly minimum temperatures 2 standard deviations beyond baseline values, and 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 is 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 GRSG, 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**, Bioclimate Change Summary: Greater Sage-Grouse). Green areas indicate where current climate envelope distributions "overlap" with 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. More generally, species that rely on sagebrush habitat have higher loss in climate envelope compared with other species. In particular pygmy rabbit, sage sparrow, and Columbian sharp-tailed grouse are projected to experience severe climate-related loss by 2060.



Source: Comer et al. 2012a

Figure 3.8. Bioclimate Change Summary: Greater Sage-Grouse

Lowest elevation basins throughout the ecoregion could transition from cool semi-desert 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/Noxious Weeds)

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

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, and further divided into vegetation communities, which are named according to the types of plant species of which they are composed. 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 PGH and PPH on BLM-administered and Forest Service-administered lands in the planning area are shown in **Table 3-11**, Acres of Vegetation Communities within PPH and PGH.

Table 3.11. Acres of Vegetation Communities within PPH and PGH

Vegetation Community	PGH (acres)		PPH (acres)	
	BLM	Forest Service	BLM	Forest Service
Northern Basin and Range	793,800	179,600	5,201,500	551,00
Central Basin and Range	3,663,600	358,600	6,208,100	625,600
Sierra Nevada	400	0	400	0
Eastern Cascades Slopes and Foothills	50,500	0	106,00	0
Mojave Basin and Range	0	0	0	0
Cascades	0	0	0	0
Total	**4,508,300**	**538,200**	**11,516,926**	**1,198,431**
Source: BLM and Forest Service GIS 2013				

3.3.1. Weed Control Guidance and Programs

Integrated Weed Management is a systems approach for the management of 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. It 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, wildfire scars, and developed lands maintained as ROWs or recreational areas.

These threats can come in the form of unbalanced biodiversity, a weakened ecosystem, a higher propensity for soil erosion, increased frequency of wildfires, 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). Active management of noxious weeds occurs on a regular basis by federal, state, and county agencies; conservation groups; and private landowners. Repeated wildfires 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 Forest Service-Administered Lands

On the Humboldt-Toiyabe National Forest, invasive species account for less that 0.5 percent of the land base in Nevada. Approximately 29,000 acres of invasive species have been identified; of this approximately 16,000 acres are classified as noxious weeds. Of this, 16,000 acres, 40 percent of the infestation is less than one tenth of an acre in size, and 30 percent of the infestations are one half 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 sage accounts for 18 percent of the vegetative types, it contains 27 percent of the weed occurrences. Comparatively, pinyon-juniper accounts 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 1 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 management of riparian areas even more important. This is especially true in the arid state of 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 as well as other mountain browse species with an understory of bunchgrasses and forbs. These areas are largely treeless and included 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 occurring within 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's bluegrass, bottlebrush squirreltail, bluebunch wheatgrass, Great Basin wildrye, Indian ricegrass, needle and thread, and Idaho fescue. However the range of understory and diversity are based on successional stages that vary from early, mid, and late.

Central Basin and Range

The CBR ecoregion is internally drained (Great Basin) and is characterized by a mosaic of xeric 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 occurring 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 and slopes gently toward the Central California Valley to the west. The eastern portion has been strongly glaciated. Much of the central and southern parts of the region are underlain by granite. The vegetation is mixed conifer and in Nevada are 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).

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 dryer 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 wildfire. 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 GRSG in the Nevada and Northeastern California planning area.

Shrub Alliances

Shrubs are woody plants, relatively short in height, 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) and biotic (plant species and effects of wildlife and domestic stock) resources, 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); and (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 associated with human activities (e.g., cheatgrass and medusahead). The natural dominants, having evolved with an indigenous disturbance regime, are not well adapted to this role.

Management of fire, livestock and wild horse 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 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 dryer 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-foot to 6-foot evergreen shrubs. Canopy cover is 25 percent to 39 percent. The dominant shrubs are mountain big sagebrush and snowberry. Grasses include California brome, western needlegrass, Idaho fescue, bluebunch wheatgrass, and squirreltail. Understory forbs include 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 include Sandberg's bluegrass, squirreltail, bluebunch wheatgrass, basin wildrye, Thurber's needlegrass, and cheatgrass. Understory forbs include 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 pluvial times, mountain big sagebrush had a nearly continuous distribution. However, under hypsothermal 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 ecotypes 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; recovery following fire 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's 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 reestablishment occurs. 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 percent to 24 percent. Low-growing sagebrush is associated with perennial grasses and forbs. Other codominants in Wyoming big sagebrush steppe include 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 altitudes 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 dryer 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; when this happens, 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 percent to 24 percent. Associated plants are primarily perennial grasses and forbs, sometimes with scattered western juniper. Sandburg's bluegrass dominates the understory; other associated species include antelope bitterbrush, plateau gooseberry, gray horsebrush, squirreltail, bluebunch wheatgrass, Idaho fescue, ballhead sandwort, desert yellow daisy, low pussy-toes, rock eriogonium, Bolander's yampah, Hooker's balsamroot, and cushion eriogonium. 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 one half inch long. This species flowers in the fall, and the flower stalks often cast a slight orange appearance. These flower stalks often persist from year to year. The canopy is often loosely branched with a short trunk 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 (thick calcium carbonate that restricts rooting depth) 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. Black sagebrush provides important forage for pronghorn, mule deer, GRSG, 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, 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 (non-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, and when compared with habitats with more complex structural diversity, they are very important in terms of regional biodiversity. There are three main plant associations.

Non-Native 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 for purposes of improving 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 acres (State of Nevada 2001).

Native Perennial Grass Association

These areas also include areas of dominant native grasses and forbs that can occur following a wildfire. 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 GRSG. 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 wildfires 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. 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, photography, 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 adjacent 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 adjacent 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. Obligate species require the environmental conditions that prevail within this zone, whereas facultative species tolerate these conditions and 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 include 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. These plants alter basic ecosystem functions such as nutrient cycling, hydrology, and wildfire frequency; 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- and Forest Service-administered 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 ubiquitous 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 regimes 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 utilize 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 3-12**, the known acreage values of cheatgrass, by jurisdictional boundaries, are presented.

Table 3.12. Acres of Cheatgrass Potential in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres[1] within PGH	Acres[1] within PPH	Acres[1] within PGH	Acres[1] within PPH
BLM	III	2,521,800	5,157,100	2,521,800	3,612,900
	IV	6,234,900	13,995,500	674,300	3,044,200
	V	4,209,100	4,401,200	543,600	2,649,300
Forest Service	III	243,700	1,065,100	243,700	437,600
	IV	1,086,900	1,521,600	181,300	566,700
	V	113,600	82,500	11,800	44,100
Tribal and Other Federal	III	15,700	288,200	15,700	51,900
	IV	740,200	974,100	2,200	1,700
	V	96,300	374,100	16,400	193,900
Private	III	468,200	1,972,100	468,200	510,100
	IV	4,257,400	5,643,800	487,800	1,510,700
	V	1,429,500	759,300	72,900	148,000
State	III	200	427,900	200	5,600
	IV	945,500	1,022,900	400	1,000
	V	107,800	62,600	7,900	13,100
Other	III	0	100	0	100
	IV	54,900	93,800	0	100
	V	94,100	361,800	88,700	361,800
Source: Manier et al. 2013					
[1]Acreage composed of areas with a high potential for cheatgrass occurrence					

Conifer Encroachment

Pinyon-juniper woodlands are complex, not only in terms of species composition and physiognomy, but also because the management area contains woodlands that vary greatly in successional stage (from early to senescent). 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 within 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 utilization 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. A loss of understory 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 and 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 wildfire 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 the invasion by exotics. Once these communities become mature, tree-dominated woodlands, treatment becomes difficult and expensive (Miller and Tausch 2001).

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 GRSG, 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, adjacent to, or contiguous with perennially and intermittently flowing rivers, streams, and shores of lakes and reservoirs with stable water levels. Excluded are such sites as ephemeral streams or washes that do not exhibit vegetation dependent on free water in the soil. Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support and which, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include marshes, swamps, lakeshores, sloughs, bogs, wet meadows, estuaries, and 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 adjacent to surface waters are the most productive and important ecosystems in the planning area. Although these areas represent 2,509,000 acres (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). Healthy riparian and wetland areas have the potential for multi-canopy vegetation layers with trees, shrubs, grasses, forbs, sedges, and rushes and 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 wide 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 Elko, Battle Mountain, and Winnemucca BLM districts in Nevada, the Surprise, Eagle Lake, and Alturas BLM field offices in California, and the Humboldt-Toiyabe National Forest in both California and Nevada (**Table 3-13**, Lotic and Lentic Riparian Areas Meeting Riparian Goals; BLM and Forest Service GIS 2013). Collectively, these seven management areas cover 14,778,500 acres (83 percent) of total PPH and PGH within the planning area.

Much of the information presented in **Table 3-13**, Lotic and Lentic Riparian Areas Meeting Riparian Goals, is based on proper functioning condition (PFC) assessments, as this technique is used by the BLM to determine whether or not 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; Prichard et al. 1999, Revised 2003). Riparian areas that are functioning at risk lack one or more soil, water, or vegetation attribute, 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.

Table 3.13. 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: proper functioning condition (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.

Some of the data in **Table 3-13**, Lotic and Lentic Riparian Areas Meeting Riparian Goals, 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 within 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 majority of assessed lentic riparian habitats (or for both lentic and lotic areas for Forest Service-administered 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 within the last 15 to 20 years. In addition, lentic areas are characteristically small in size, widely scattered, and typically less resilient to grazing impacts than stream systems. Consequently, these areas tend to be disproportionally impacted by grazing animals, including both livestock and wild horses.

For remaining management units in the planning area, including the Ely and Carson City districts of BLM, 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 horses is often identified as the primary causal factors. 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, riparian areas and wetlands in the planning area are impacted by a wide range of land uses that have occurred and continue to occur throughout the western US. 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 including accelerated erosion, concentration of stream energy, loss of floodplain access, reduced water supplies, sediment loading, and degradation of water quality all affect functionality and condition of riparian ecosystems.

Although identified as the number one threat to the GSGR by the USFWS, impacts on riparian areas from wildfire are highly variable depending on a host of factors, including but not limited to elevation, precipitation, timeframes, habitat conditions, grazing impacts, and fuel moisture levels. Especially during periods of drought or in areas of low average annual precipitation, wildfires can result in complete destruction of 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 from fire due to the persistence of soil moisture.

However, habitat conditions (often tied to livestock grazing practices) can also be determinants of riparian response to fire. In an analysis of 81 streams on BLM-administered and Forest Service-administered lands in northern Nevada, Dalldorf et al. (2013) found that the occurrence of wildfires between 1999 and 2001 played a non-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 management of fish and wildlife species in the planning area. The BLM and Forest Service are responsible for land management. Therefore, on BLM-administered and Forest Service-administered lands in the decision area, the agencies are directly responsible for the management of habitat for fish and wildlife species and indirectly responsible for the health of fish and wildlife populations that are supported by these habitats.

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 utilize 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

Within 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 the valley, foothill, and mountain environments (NDOW 2012b). Annual precipitation ranges from 8 to 30 inches, mostly in the form of snow. Temperatures range from -30 to 110°F (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 include basin big sagebrush, mountain big sagebrush, Wyoming big sagebrush, low sagebrush, and black sagebrush (Cronquist et al. 1994). Co-dominant plant species include 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 (38 centimeters), 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 include 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 from wetland, spring, meadow, seep, vernal pool, stream/river, and riparian communities 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 avian species 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 such as pygmy rabbit, Great Basin pocket mouse, sagebrush vole, sagebrush lizard, Sage Thrasher, Brewer's Sparrow, Sage Sparrow, and GRSG. The varied aquatic habitats and natural barriers have resulted in the evolution of several unique communities of endemic fish and invertebrates.

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, 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 19th 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 GRSG, include increases in both the frequency and intensity of wildfire, 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 currently lacks understory of native bunchgrasses and forbs that were historically present. Shrub cover has increased from what are generally regarded as the conditions prior to 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 compensate. Low and black sagebrush are being similarly invaded by cheatgrass throughout the state and by medusahead in northern Nevada, which 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 and is threatening the low sagebrush landscape. Overall, a temporal conversion from shrubland with high species diversity to annual grassland with drastically reduced wildlife value is occurring (NDOW 2012b).

Pinyon and juniper expansion into shrubland has thrived due to range overgrazing in the 19th century and continuing in the first half of the 20th 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 19th century, but many woodlands have repopulated the soils that supported them and continue to aggressively contribute to the expansion of trees into sagebrush range. Pinyon and juniper expansion into sagebrush range drastically alters range structure and creates conditions difficult to restore to pre-encroachment expression. Pinyon and 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 GRSG and the habitat needs of pinyon and juniper obligates 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 cover, escape cover, and sources of food to herbivorous and granivorous 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 GRSG. 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. **Tables 3-14** through **3-16**, 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 species 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 either: 1) there is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend, such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range; or 2) the species depends on ecological refugia 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 upon 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.

3.5.2. Conditions on Forest Service-Administered Lands

The Forest Service-administered lands within the Humboldt-Toiyabe National Forest and within 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 within the individual LUPs during the planning process; and other wildlife species. Other wildlife species 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 taxa.

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. Leaders are 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, friable, 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 adjacent 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 12 to 117 centimeters [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 of food taken in the 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 leporid 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 the 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 further among 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 by 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 an upward elevational shift in pygmy rabbit occurrences. 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 heterogeneity (patchiness) and negatively correlated with spiny hopsage, budsage, and grass cover (Rotenberry and Wiens 1980; Wiens and Rotenberry 1981). The species usually nests within 1 meter (3.3 feet) of the ground in the fork of shrubs (almost always sagebrush) and sometimes nests on ground (Harrison 1978; Reynolds 1981; Rich

1980). In winter, the sage thrasher uses arid and semi-arid 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 sparrow is 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 1 to 2 meters (3.3 to 6.6 feet) tall (Martin and Carlson 1998). Sage sparrow nests on the ground or in shrubs, up to about 1 meter (3.3 feet) above 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 plant (Petersen and Best 1985). Placement may be related to density of vegetative cover over the nest, as sage sparrow will nest higher in a taller shrub (Rich 1980). In-migration and wintering for the species also occurs 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, but are expected to see population gains 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, or juniper) about 5 to 30 feet above 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 insects such 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 within 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 subflocks 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 senescent) 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 regimes, although grazing pressure and invasive plants may be contributing factors.

3.5.4. Federal Endangered, Threatened, Proposed, and Candidate Species

Current Conditions

Table 3-14, Federal Endangered, Threatened, Proposed, and Candidate Species, and **Table 3-15,** Federal Endangered, Threatened, Proposed, and Candidate Species Minimal Overlap with Planning Area, show 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 3-16**, BLM and Forest Service Sensitive Species, lists BLM and Forest Service sensitive species in the planning area.

Table 3.14. Federal Endangered, Threatened, Proposed, and Candidate Species

Species	Federal Status	Designated Critical Habitat in Planning Area
Birds		
Yellow-billed cuckoo Coccyzus americanus	Candidate	
Greater Sage-Grouse*Centrocercus urophasianus*	Candidate	
Reptiles and Amphibians		
Columbia spotted frog (*Rana luteiventris*)	Candidate	
Warner sucker Catostomus warnerensis	Threatened	
Cui-ui Chasmistes cujus	Endangered	
Desert dace Eremichthys acros	Threatened	Yes

Species	Federal Status	Designated Critical Habitat in Planning Area
Lahontan cutthroat trout Oncorhynchus clarki henshawi	Threatened	
Clover Valley speckled dace Rhinichthys osculus oligoporus	Endangered	
Bull trout Salvelinus confluentus	Threatened	
Plants		
Steamboat buckwheat Eriogonum ovalifolium var. williamsiae	Endangered	
Sources: BLM 2011d; Forest Service 2011c		

Table 3.15. Federal Endangered, Threatened, Proposed, and Candidate Species Minimal Overlap with Planning Area[1]

Species	Federal Status	Designated Critical Habitat in Planning Area
Birds		
Southwestern willow flycatcher1 Empidonax traillii extimus	Endangered	Yes
Yuma clapper rail1 Rallus longirostris yumanensis	Endangered	
Reptiles and Amphibians		
Oregon spotted frog Rana pretiosa	Candidate	
Columbia spotted frog (*Rana luteiventris*)	Candidate	Yes
Ash Meadows Amargosa pupfish Cyrpinodon nevadensis mionectes	Endangered	
Warm Springs pupfish *Cyrpinodon nevadensis pectoralis*	Endangered	
White River spinedace Lepidomeda albivalis	Endangered	Yes
Ash Meadows speckled dace Rhinichthys osculus nevadensis	Endangered	
Hiko White River springfish Crenichthys baileyi grandis	Endangered	Yes
Insects		

Species	Federal Status	Designated Critical Habitat in Planning Area
Carson wandering skipper Pseudocopaeodes eunus obscurus	Endangered	
Sources: BLM 2011d; Forest Service 2011c [1]Species range either hypothetically or marginally overlaps with planning area boundary and/or range of GRSG. Species will be excluded from further analysis.		

Table 3.16. BLM and Forest Service Sensitive Species

Common Name	Scientific Name	BLM	Forest Service
Mammals			
Silver-haired bat	Lasionycteris noctivagans	x	
Western red bat	Lasiurus blossevillii	x	
Hoary bat	Lasiurus cinereus	x	
Dark kangaroo mouse	Microdipodops megacephalus	x	
Pale kangaroo mouse	Microdipodops pallidus	x	
Western small-footed myotis	Myotis ciliolabrum	x	
Long-eared myotis	Myotis evotis	x	
Little brown myotis	Myotis lucifugus	x	
Fringed myotis	Myotis thysanodes	x	
Long-legged myotis	Myotis volans	x	
Yuma myotis	Myotis yumanensis	x	
Big free-tailed bat	Nyctinomops macrotis	x	
Pika	*Ochotona princeps*	x	
Western pipistrelle	Parastrellus hesperus	x	
Preble's shrew	Sorex preblei	x	
Spotted bat	Euderma maculatum	x	x
Fish Spring pocket gopher	Thomomys sp	x	
San Antonio pocket gopher	Thomomys sp	x	
Pallid bat	Antrozous pallidus	x	
Pygmy rabbit	*Brachylagus idahoensis*	x	x
Townsend's big-eared bat	*Corynorhinus townsendii*	x	
Townsend's western big-eared bat	*Corynorhinus townsendii townsendii*		x
Big brown bat	Eptesicus fuscus	x	
Spotted bat	*Euderma maculatum*	x	x
California bighorn sheep	Ovis canadensis californiana		x
Rocky Mountain bighorn sheep	Ovis canadensis canadensis		x
Birds			
Greater sandhill crane	Grus canadensis	x	
Northern goshawk	*Accipiter gentilis*	x	x
Greater Sage-Grouse	*Centrocercus urophasianus*	x	x
Peregrine falcon	*Falco peregrinus anatum*	x	x
Bald eagle	*Haliaeetus leucocephalus*	x	x
Mountain quail	*Oreortyx pictus*		x
Flammulated owl	*Otus flammeolus*		x
Golden eagle	Aquila chrysaetos	x	
Western burrowing owl	Athene cunicularia	x	
Ferruginous hawk	*Buteo regalis*	x	
Swainson's hawk	Buteo swainsoni	x	
Western snowy plover	Charadrius nivosus	x	

Common Name	Scientific Name	BLM	Forest Service
Pinyon jay	Gymnorhinus cyanocephalus	x	
Loggerhead shrike	Lanius ludovicianus	x	
Juniper titmouse	Baeolophus ridgwayi	x	
Bank swallow	Riparia riparia	x	
Sage thrasher	Oreoscoptes montanus	x	
Brewer's sparrow	Spizella breweri	x	
Reptiles and Amphibians			
Yosemite toad	*Bufo canorus*		x
Sierra Nevada yellow-legged frog	*Rana sierrae*		x
Northern sagebrush lizard	Sceloporus graciosus graciosus	x	
Fish			
Bonneville cutthroat trout	*Oncorhynchus clarki utah*	x	x
Meadow Valley wash desert sucker	Catostomus clarkii ssp. 2	x	
Wall Canyon sucker	Catostomus murivallis	x	
Cui-ui	Chasmistes cujus	x	
White River springfish	Crenichthys baileyi baileyi	x	
Desert dace	Eremichthys acros	x	
Independence Valley tui chub	Gila bicolor isolata	x	
Newark Valley tui chub	Gila bicolor ssp	x	
Hot Creek Valley tui chub	Gila bicolor ssp	x	
Railroad Valley tui chub	Gila bicolor ssp. 7	x	
Northern leatherside chub	Lepidomeda sp.+	x	
Inland Columbia Basin redband trout	Oncorhynchus mykiss pop.	x	
Relict dace	Relictus solitarius	x	
Moapa speckled dace	Rhinichthys osculus moapae	x	
Monitor Valley speckled dace	Rhinichthys osculus ssp. 5	x	
Meadow Valley speckled dace	Rhinichthys osculus ssp. 11	x	
White River speckled dace	Rhinichthys osculus ssp. 7	x	
Oasis Valley speckled dace	Rhinichthys osculus ssp. 6	x	
Pahranagat speckled dace	Rhinichthys osculus velifer	x	
Bull trout	Salvelinus confluentus	x	
Plants			
Meadow pussytoes	*Antennaria arcuata*		x
Eastwood milkweed	*Asclepias eastwoodiana*		x
Broad-pod freckled milkvetch	*Astragalus lentiginosus* var. *latus*		x
Lamoille Canyon milkvetch	*Astragalus robbinsii* var. *occidentalis*		x
Toquima milkvetch	*Astragalus toquimanus*		x
Currant milkvetch	*Astragalus uncialis*		x
Grouse Creek rockcress	Boechera (=*Arabis) falcatoria*		x
Ophir rockcress	Boechera (=*Arabis) ophira*		x
Upswept moonwort	*Botrychium ascendens*		x
Dainty moonwort	*Botrychium crenulatum*		x
Slender moonwort	*Botrychium lineare*		x
Moosewort	Botrychium tunux		x
Goodrich biscuitroot	*Cymopterus goodrichii*		x
Arid draba	*Draba arida*		x
Serpentine draba	*Draba oreibata* var. *serpentina*		x
Pennell draba	Draba pennellii		x
Nevada willowherb	*Epilobium nevadense*		x
Snake Mountain erigeron	*Erigeron cavernensis*		x
Sunflower Flat buckwheat	Eriogonum douglasii var. elkoense		x

Common Name	Scientific Name	BLM	Forest Service
Toiyabe buckwheat	*Eriogonum esmeraldense* var. *toiyabense*		x
Lewis's buckwheat	*Eriogonum lewisii*		x
Basin jamesia	*Jamesia tetrapetala*		x
Grimes lathyrus	*Lathyrus grimesii*		x
Maguire lewisia	*Lewisia maguirei*		x
Elegant penstemon	*Penstemon concinnus*		x
Mt. Moriah penstemon	*Penstemon moriahensis*		x
Bashful penstemon	Penstemon pudicus		x
Rhizome beardtongue	Penstemon rhizomatosus		x
Inconspicuous phacelia	*Phacelia inconspicua*		x
Small-flower phacelia	*Phacelia minutissima*		x
Whitebark pine	*Pinus albicaulis*		x
Marsh's bluegrass	*Poa abbreviata* ssp. *marshii*		x
Williams combleaf	*Polyctenium williamsii*		x
Sagebrush cinquefoil	Potentilla johnstonii		x
Nevada primrose	*Primula cusickiana* var. *nevadensis (=P. nevadensis)*		x
Nachlinger silene	Silene nachlingerae		x
Railroad Valley globemallow	*Sphaeralcea caespitosa* var. *williamsiae*		x
Alpine goldenweed	*Tonestus (=Haplopappus) alpinus*		x
Charleston ground daisy	*Townsendia jonesii* var. *tumulosa*		x
Currant Summit clover	Trifolium andinum var. podocephalum		
Leiberg's clover	Trifolium leibergii		
Rollins clover	Trifolium macilentum var. rollinsii		x
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 on the forest. Requirements to identify and utilize 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 species that respond to habitat changes, are scarce or unique, are of high economic interest, or are listed as federal or state threatened or endangered species. By monitoring and assessing population trends of management indicator species, managers can determine if management actions are affecting species populations and thereby habitats. A Forest Service-specific Management Indicator Species Report is included in **Appendix J**, Forest Service Draft Management Indicator Species Report and Draft Wildlife and Sensitive Plant Specialists Report, 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). 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 ServiceWHBTs were identified in the planning area as displayed on **Figure 3-9**, Wild Horse and Burro Herd Areas, Herd Management Areas, and Territories. Herd areas and territories are locations where wild horse and burro populations were found when the Act was passed. HMAs and WHBTs are areas within 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.

(PDF Map 3–9)

Figure 3.9. Wild Horse and Burro Herd Areas, Herd Management Areas, and Territories

Since the passage of the Act in 1971, management knowledge regarding wild horse 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 has resulted in the BLM shifting program emphasis beyond just establishing an AML and conducting wild horse gathers to include a variety of management actions that further facilitate the achievement and maintenance of viable and stable wild horse populations and a "thriving natural ecological balance." Management actions resulting from shifting program emphasis include increasing fertility control, adjusting sex ratio, 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 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 numbers appear to be limited principally by water availability and winter forage. Predation and disease have not substantially regulated wild horse population levels within or outside the planning area. Throughout the HMAs few predators exist to control wild horse populations. Some mountain lion predation occurs but does not appear to be substantial. Coyotes are not prone to prey on wild horses unless they are young or extremely weak. Being a non-self-regulating species, there would be a steady increase in wild horse numbers for the foreseeable future, which would 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

Within the planning area, there are 6,373,200 acres of wild horse and burro herd areas, HMAs, and WHBTs within PGH and PPH in the planning area. **Table 3-17**, Acres of Wild Horse and Burro Areas and Territories in GRSG Habitat, displays data compiled in a baseline environmental report produced by the US Geological Survey (USGS) for the BLM (Manier et al. 2013).

Table 3.17. Acres of Wild Horse and Burro Areas and Territories in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres within PGH	Acres within PPH	Acres within PGH	Acres within PPH
BLM	III	1,463,200	2,199,200	1,463,200	2,017,600
	IV	601,400	1,177,200	257,800	701,100
	V	1,399,600	2,002,900	139,500	1,447,800
Forest Service	III	136,100	210,100	136,100	210,100
	IV	0	0	0	0
	V	0	0	0	0
Source: Manier et al. 2013					

There are 70 herd areas and territories in the planning area. These areas overlap 2,232,500 acres of PGH and 5,137,500 acres of PPH. These identified herd areas, in their entirety or part, were the basis for current identified HMAs as established and affirmed through LUPs.

The BLM manages 62 HMAs and the Forest Service manages 14 active WHBTs in the planning area, which overlap both PGH and PPH. Wild horse and burro populations in HMAs and WHBTs are managed within AMLs and corresponding forage allocations (AUMs). The AML is defined as the maximum number of wild horses that can be sustained within 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 3-18**, Herd Management Areas and Forest Service Territories in GRSG Habitat.

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

Table 3.18. Herd Management Areas and Forest Service Territories in GRSG Habitat

Herd Management Area or Wild Horse and Burro Territory	BLM Field Office or Forest Service Ranger District	Acres			Appropriate Management Level [1]	Est. Pop. No. [2]
		Total	PGH	PPH		
BLM California						
Bitner	Surprise	53,700	0	47,500	15-20	19
Buckhorn	Surprise	76,300	0	57,900	59-85	172
Carter Reservoir	Surprise	23,400	16,400	5,199	25-35	66
Coppersmith	Surprise	73,100	3,300	56,100	50-75	75
Fort Sage [3]	Eagle Lake	15,600	0	0	55-65	47
Fox Hog	Surprise	127,100	0	120,600	120-220	162
High Rock	Surprise	94,700	0	94,500	78-120	107
Massacre Lakes [4]	Surprise	39,900	5,800	29,900	25-35	192

Herd Management Area or Wild Horse and Burro Territory	BLM Field Office or Forest Service Ranger District	Acres			Appropriate Management Level [1]	Est. Pop. No. [2]
		Total	PGH	PPH		
New Ravendale	Eagle Lake	32,200	0	23,600	10-25	44
Nut Mountain	Surprise	40,200	0	38,200	30-55	41
Twin Peaks	Eagle Lake	756,300	45,300	529,900	448-758 H 72-116 B	1238 H 268 B
Wall Canyon	Surprise	41,200	100	36,00	15-25	49
BLM Nevada						
Antelope	Schell	327,300	54,200	113,400	155-324	344
Antelope Valley	Wells	504,100	67,00	94,100	150-259	662
Augusta Mountains	Humboldt	177,600	31,000	6,800	185-308	387
Bald Mountain	Mount Lewis	139,900	36,400	28,400	129-215	211
Black Rock Range East	Black Rock	93,400	8,200	67,100	56-93	91
Black Rock Range West	Black Rock	93,200	29,200	33,400	56-93	94
Buffalo Hills	Black Rock	131,900	2,600	72,100	188-314	360
Calico Mountains	Black Rock	160,800	9,700	135,700	200-333	329
Callaghan	Mount Lewis	156,200	30,600	106,600	134-237	322
Clan Alpine	Stillwater	302,200	9,800	49,300	619-979	600
Desatoya	Stillwater	161,700	13,600	89,800	127-180	174
Diamond	Mount Lewis	165,600	62,700	28,700	151	78
Diamond Hills North	Tuscarora	71,600	8,400	17,300	37	37
Diamond Hills South	Egan	19,300	4,500	9,600	10-22	46
Dogskin Mountains	Sierra Front	6,500	5,100	0	10-15	26
Eagle	Schell	660,300	88,700	137,400	100-210	626
Fish Creek	Mount Lewis	252,800	48,100	52,700	107-180	256
Flanigan	Sierra Front	17,100	0	13,400	80-125	119
Fort Sage [2]	Sierra Front	2,000	0	1,600	36	80
Goshute	Wells	267,300	17,300	0	74-123	398
Granite Range	Black Rock	103,800	8,800	65,800	155-258	251
Hickison	Mount Lewis	57,300	11,600	23,400	45 B	48 B
Hot Creek	Tonopah	54,700	0	0	41	25
Jackson Mountains	Humboldt	283,800	33,100	6,900	130-217	295
Little Fish Lake	Tonopah	28,700	5,700	22,500	39	183
Little Humboldt	Tuscarora	17,200	7,800	7,900	32-80	23
Little Owyhee	Humboldt	457,800	101,200	345,700	194-298	289
Maverick-Medicine	Tuscarora	323,500	112,600	101,400	166-276	586
New Pass-Ravenswood	Mount Lewis	285,900	47,500	40,300	545-566	515
North Monitor	Mount Lewis	11,500	0	6,800	8	22
Owyhee	Tuscarora	339,100	70,700	264,00	139-231	142
Pancake	Egan	849,600	233,900	90,100	240-493	1,081
Reveille	Tonopah	105,500	23,500	0	83-138	137
Roberts Mountain	Mount Lewis	100,000	5,000	81,800	150	307
Rock Creek	Tuscarora	121,400	39,200	58,900	150-250	424
Rocky Hills	Mount Lewis	84,000	35,900	25,300	86-143	97
Sand Springs West	Tonopah	152,300	8,000	0	34-56	120
Saulsbury	Tonopah	135,100	1,700	0	24-40	145
Seven Mile	Mount Lewis	97,600	9,200	37,800	30-50	154
Seven Troughs	Humboldt	148,900	26,500	9,800	94-156 H 28-46 B	366 H 98 B
Silver King	Schell	575,500	129,700	34,500	60-128	314

Herd Management Area or Wild Horse and Burro Territory	BLM Field Office or Forest Service Ranger District	Acres			Appropriate Management Level [1]	Est. Pop. No. [2]
		Total	PGH	PPH		
Snowstorm Mountains	Humboldt	117,100	38,000	24,00	90-140	537
South Shoshone	Mount Lewis	133,100	300	102,900	60-100	282
South Stillwater	Stillwater	9,800	1,900	3,700	16	19
Spruce-Pequop	Wells	240,700	83,600	14,800	48-82	380
Stone Cabin	Tonopah	406,300	45,600	22,700	219-364	316
Tobin Range	Humboldt	198,200	40,200	49,400	22-42	40
Triple B	Egan	1,232,400	113,600	599,500	250-518	498
Warm Springs Canyon	Black Rock	91,700	19,100	68,500	105-175 H 14-24 B	168 H 38 B
Whistler Mountain	Mount Lewis	43,200	18,400	9,700	24	20
Forest Service						
Butler Basin	Austin	53,500	4,600	15,800	60-100	294
Cherry Spring	Ruby Mountains	23,000	5,600	400	40-68	66
Dobbin Summit	Austin	48,600	1,800	11,700	1-3	0
Hickison	Austin	16,600	4,200	12,400	16-45 B	108 B
Kelly Creek	Austin	20,800	200	3,100	8-16	34
Little Fish Lake	Tonopah	84,800	4,500	39,900	81-93	251
Monitor	Tonopah	338,900	45,300	13,100	51-90	330
Monte Cristo	Ely	93,500	11,600	10,100	72-96	420
North Umberland	Austin	12,400	2,900	2,100	3-8	17
Seven Mile	Tonopah	6,000	100	600	1-3	35
Stone Cabin	Tonopah	1,400	1,100	0	1-3	0
Toquima	Tonopah	143,500	29,100	32,500	15-30	288

Source: BLM and Forest Service GIS 2013

Notes:

H = Wild Horse

B = Wild Burro

[1]AML and Population number refers to wild horses unless noted.

[2]Estimate population numbers as of February 2013.

[3]Fort Sage HMA lies in both CA and NV, each with separate established AML.

[4]Massacre Lakes HMA does not have an established AML. The plan is in progress but is not final.

The estimated population size of wild horses and burros within each HMA/WHBT is based on helicopter inventories, which occur every two to three years. WHBTs within HMA/WHBT Complexes are generally inventoried on the same schedule under cooperative agreement. These population inventory flights provide information pertaining to population numbers, foaling rates, distribution, and herd health. Population estimates in the planning area (February 2013) show a total estimated population of over 17,300 horses and burros. Population estimates indicate that the number of horses and burros substantially exceeds the aggregated AML (approximately 50 percent higher than established AML). Horse populations in 2013 were exceeding the AML in 35 of 62 HMAs and 10 of 14 active WHBTs. Various factors, including drought conditions, historic grazing, wildfires, 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 within those areas.

Wild horses 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 horses and burros on a three- to four-year schedule to ensure that numbers remain within 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, made available for sale, or in long-term holding. Wild horses that establish home ranges outside of HMA, WHBT, or herd area boundaries are removed during gathers. Wild horses are removed from private lands at the request of the landowner and after reasonable efforts to keep the animals off private lands have failed.

Trends

Current conditions in the planning area show that wild horse populations continue to grow, often exceeding AMLs, and continue to expand into areas outside of established boundaries. Wild horses will continue to be removed to maintain AMLs and rangeland health.

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 wildfires.

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 wildland fires in the US. 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 wildland fire 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- and Forest Service-administered lands include the control of wildfires, the use of fire through prescribed burning, or the use of fire through the management of wildfires in order to meet land management goals. Wildland fire management on BLM-administered and

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

Management activities utilize collaborative planning, fuels project prioritization and selection, and community assistance actions to help mitigate wildland fire risks to communities and their values; to protect and enhance threatened and endangered species and their habitat; and to ensure that hazardous fuels reduction treatments and projects conform to and support Forest Management Plan and LUP objectives. The actions that the BLM and Forest Service undertake and conduct 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 hazardous fuels reduction activities include the following guiding principles:

- Employee and public safety is the first priority in every hazardous 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 efforts on wildfire 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 hazardous 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.

- Hazardous fuels reduction treatments are monitored to determine whether short- and long-term (beyond three years) objectives are being met (effectiveness monitoring).

- Report on effectiveness of treatments when intersected by a wildfire.

- Community Assistance grant funding provided through Assistance Agreements and Contracts to cooperating entities will be open to all eligible recipients.

Current Condition

In sagebrush ecosystems, fire has been identified as one of the primary factors linked to loss of sagebrush-steppe habitat. Wildfire has been increasing the loss of habitat due to an increase in fire frequency. This increase in fire frequency has been facilitated by the incursion of nonnative annual grasses, primarily cheatgrass, into the sagebrush ecosystems (Miller and Eddleman 2000). 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 within GRSG habitat.

In addition, suppression actions and some grazing practices in the early late 1800s and early 1900s have facilitated the expansion of native conifers into GRSG habitat by decreasing the fire return interval (Miller and Rose 1999)., and **Table 3-19**, Acres of Sagebrush and Pinyon-Juniper Interface in GRSG Habitat, and **Figure 3-10**, Areas with Sagebrush and Pinyon-Juniper Conifer Interface, display the extent of pinyon-juniper interface within GRSG habitat.

Table 3.19. Acres of Sagebrush and Pinyon-Juniper Interface in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres1 within PGH	Acres1 within PPH	Acres1 within PGH	Acres1 within PPH
BLM	III	394,000	751,400	394,000	539,200
	IV	311,300	938,700	47,700	364,700
	V	346,600	597,500	51,200	448,800
Forest Service	III	86,800	247,000	86,800	124,000
	IV	228,100	248,200	29,500	92,000
	V	29,200	11,300	700	2,600
Tribal and Other Federal	III	4,600	29,400	1,500	1,600
	IV	11,100	10,000	100	200
	V	8,100	44,000	1,500	33,400
Private	III	32,000	217,400	32,000	48,800
	IV	295,200	427,500	31,900	138,400
	V	132,300	106,800	6,600	25,900
State	III	0	47,100	0	400
	IV	69,600	67,700	0	0
	V	7,300	2,700	600	900

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres1 within PGH	Acres1 within PPH	Acres1 within PGH	Acres1 within PPH
Other	III	0	0	0	0
	IV	2,900	6,400	0	0
	V	10,100	61,200	10,100	61,200
Source: Manier et al. 2013					
[1]Includes the number of acres where sagebrush land cover occurs within 120 meters of pinyon-juniper land cover.					

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. 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 3-20**, Fire Regime Groups and Descriptions, and **Table 3-21**, Fire Regime Condition Classes).

(PDF Map 3–10)

Figure 3.10. Areas with Sagebrush and Pinyon-Juniper Conifer Interface

Table 3.20. 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 over story
II	0-35 years	Replacement	High-severity fires replacing greater than 75 percent of the dominant over story vegetation
III	35-200 years	Mixed/low	Generally mixed-severity; can also include low-severity fires
IV	35-200 years	Replacement	High severity fires
V	200+ years	Replacement/any severity	Generally replacement-severity; can include any severity type in this frequency range
Source: Hann et al. 2008			

Table 3.21. Fire Regime Condition Classes

Fire Regime Condition Classes	Attributes
Condition Class 1	● Fire regimes are within or near an historical range. ● The risk of losing key ecosystem components is low. ● Fire frequencies have departed from historical frequencies by no more than one return interval. ● Vegetation attributes (species composition and structure) are intact and functioning within an historical range.
Condition Class 2	● Fire regimes have been moderately altered from their historical range. ● The risk of losing key ecosystem components has increased to moderate. ● Fire frequencies have departed (either increased or decreased) from historical frequencies by more than one return interval. This results in moderate changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. ● Vegetation attributes have been moderately altered from their historical range. .
Condition Class 3	● Fire regimes have been significantly altered from their historical range. ● The risk of losing key ecosystem components is high. ● Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. ● Vegetation attributes have been significantly altered from their historical range.
Source: Hann et al. 2008	

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., insect and disease mortality, 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.

Table 3-22, Fire Regime Groups in PPH and PGH, and **Table 3-23**, Condition Class in PPH and PGH, summarize the current fire regime classification of all lands within 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.

Fuels Treatments

Prescribed fires and other fuels treatments have also occurred throughout the planning area as a management tool for fuels, as well as to help meet resource management goals for other land and resource uses such as vegetation and range management. **Table 3-24**, BLM Hazardous Fuels Treatment (2008-2012), lists the amount of BLM treatments by type and how many acres were treated, while **Table 3-25**, Forest Service Fuels Treatment (2008-2012), lists the amount of Forest Service treatments by type and how many acres were treated.

Table 3.22. 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	25,612	3,982	1,016,606	1,729,375	225,535
PGH - Other	17,535	982	240,848	554,261	141,062
Source: LANDFIRE Fire Regime Groups Layer (USGS 2006a), BLM and Forest Service GIS 2013 Note: Other represents tribal, other federal agencies, state, and private lands					

Table 3.23. 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	745,562	1,420,459	792,305
PGH - Other	101,020	548,300	301,679
Source: LANDFIRE Vegetation Condition Class Layer (USGS 2006b), BLM and Forest Service GIS 2013 Notes: Other represents tribal, other federal agencies, state, and private lands.			

Table 3.24. BLM Hazardous Fuels Treatments (2008-2012)

Treatment Type	Number of Treatments	Acres Treated
Prescribed Fire	72	11,940
Mechanical	351	98,459
Chemical	48	18,642

Treatment Type	Number of Treatments	Acres Treated
Total	**471**	**129,041**
Source: National Fire Planning Operations Reporting System. Data included 2008 – 2012; BLM and Forest Service GIS 2013 Note: A 1-mile buffer was used on the coordinates of the treatments		

Table 3.25. 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 2000 and 2012, over 2 million acres of GRSG habitat in the planning area were affected by wildland fire (see **Table 3-26**, Acres of Wildland Fire in GRSG Habitat).

Table 3.26. Acres of Wildland Fire in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres[1] within PGH	Acres[1] within PPH	Acres[1] within PGH	Acres[1] within PPH
BLM	III	120,400	96,400	120,400	55,400
	IV	965,900	1,809,400	450,900	755,100
	V	157,400	210,100	7,400	113,400
Forest Service	III	5,800	3,700	5,800	200
	IV	161,500	33,900	124,800	31,100
	V	13,000	2,600	400	600
Tribal and Other Federal	III	0	600	0	500
	IV	82,400	58,100	1,200	0
	V	600	14,000	500	1,300
Private	III	97,000	24,600	97,000	15,800
	IV	190,300	417,400	113,400	282,800
	V	26,000	46,600	1,300	9,500
State	III	0	7,500	0	0
	IV	30,900	53,100	0	0
	V	2,700	1,200	0	1,000
Other[2]	III	0	0	0	0
	IV	100	700	0	100
	V	900	15,900	900	15,900
Source: Manier et al. 2013 [1]Acres calculated from wildland fires occurring between 2000 and 2012 [2]Other tribal and other federal					

Wildfire 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, 83 percent were started by lightning, and 91 percent of the acreages affected by fire were caused by lightning. **Table 3-27**, Fire Occurrence (1992-2011), displays the size and number of fires by size class that have occurred in the GRSG habitat in the planning area over the past twenty years. **Table 3-28**, Causes

of Fires (1992-2011), displays the percent of human and lightning caused fire starts and acreage burned by agency and habitat type.

Table 3.27. Fire Occurrence (1992 – 2011)

Population Areas	A: 0 to 0.25 Starts/Acres	B: 0.26 to 9.9 Starts/Acres	C: 10 to 99 Starts/Acres	D: 100 to 299 Starts/Acres	E: 300 to 999 Starts/Acres	F: 1,000 to 4,999 Starts/Acres	G: 5,000+ Starts/Acres
PPH - BLM	971/102	419/868	189/6,333	78/13,896	58/30,888	53/119,454	36/1,035,225
PGH - BLM	697/72	244/458	83/3,229	32/5,958	29/16,656	38/85,437	22/788,988
PPH - Forest Service	85/10	47/116	18/427	6/938	6/3,513	4/9,596	2/16,159
PGH - Forest Service	39/4	25/56	7/251	1/155	3/1,876	5/10,690	3/104,017
PPH - Other	297/32	220/484	71/2,032	31/5,384	20/10,269	23/45,204	21/629,513
PGH - Other	149/16	113/206	38/1,404	12/2,109	9/4,713	14/30,311	10/236,382

Source: Short 2013; BLM and Forest Service GIS 2013

Note: One mile buffer from point of origin used to capture affected populations

Table 3.28. Causes of Fires (1992 – 2011)

Population Areas	Human Starts/ Acres	Natural Starts/Acres	Percent of Human Starts/Acres	Percent of Natural Starts/Acres
PPH - BLM	214/77,515	1,590/1,129,250	12%/41%	88%/59%
PGH - BLM	148/54,434	997/846,364	13%/6%	87%/94%
PPH - Forest Service	34/7,434	134/23,326	20%/24%	80%/76%
PGH - Forest Service	16/3,968	67/113,081	19%/3%	81%/97%
PPH - Other	206/23,675	477/669,243	30%/3%	70%/97%
PGH - Other	114/31,665	231/243,474	33%/67%	67%/88%
Total	**732/198,691**	**3,496/2,008,413**		

Source: Short 2013; BLM and Forest Service GIS 2013

Note: "Other" represents other federal agencies, tribal, state, and private lands.

Trends

Recent scientific research has shown a trend towards increased large fire frequency, longer wildfire durations, and longer wildfire seasons since the mid-1980s (Westerling et al. 2006). The authors suggest that this may involve both climate change and previous land-use effects in California. The spread of cheatgrass and other continuous annual grasses will continue to serve as a catalyst for non-historic 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.

Funding for the hazardous fuels reduction program continues to fall. For fiscal year 2014, a significant reduction will be seen in Nevada. The anticipated reduction in the hazardous fuels program is between 47 and 56 percent. This lack of funding will result in Nevada not being able to maintain full-time staff at current levels, allow for maintenance of ongoing fuels projects, or start new projects. As such, projects to enhance GRSG habitat will be significantly reduced.

There is a cumulative fiscal impact of the combined costs of suppression, emergency rehabilitation, and restoration of new large fire areas in combination with previous large fires. Federal wildfire policy directs fire management programs to be economically viable based upon values to be protected, costs, and land and resource management objectives. Federal agency administrators are directed to reduce costs and increase efficiencies (Forest Service 2009d).

Figure 3-11, Areas with High Fire Probability, shows those areas of the sub-region with the highest fire potential, while **Table 3-29**, Acres with High Probability for Wildland Fire in GRSG Habitat, shows the acreage with a high probability for wildland fire within GRSG habitat in the planning area.

Table 3.29. Acres with High Probability for Wildland Fire in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres [1] within PGH	Acres[1] within PPH	Acres[1] within PGH	Acres[1] within PPH
BLM	III	1,990,900	4,583,100	1,990,900	3,590,800
	IV	4,438,100	11,904,200	742,500	3,581,200
	V	2,801,300	3,545,800	322,100	1,788,000
Forest Service	III	78,900	280,500	78,900	124,600
	IV	621,400	1,163,200	183,100	548,900
	V	40,300	29,900	1,100	8,400
Tribal and Other Federal	III	6,500	120,000	6,500	37,100
	IV	301,900	487,200	1,900	1,700
	V	77,000	351,100	19,700	258,600
Private	III	315,200	1,137,600	315,200	416,800
	IV	2,268,400	4,068,100	390,900	1,487,400
	V	689,500	589,400	44,800	104,100
State	III	100	191,000	100	2,900
	IV	649,700	738,700	400	800
	V	74,200	49,300	2,700	10,800
Other	III	0	100	0	100
	IV	26,300	62,000	0	100
	V	47,100	293,200	46,700	293,200

Source: Manier et al. 2013

[1]Derived from Forest Service FSim Burn data

Note: Other includes other federal agencies, tribal, state, and private lands.

(PDF Map 3–11)

Figure 3.11. Areas with High Fire Probability

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 BLM Manuals and Handbooks.

In addition, the BLM must meet or ensure progress is being made toward meeting the BLM Standards and Guidelines for Livestock Grazing Administration (**Appendix K**, Livestock Grazing) for each allotment. Four fundamentals of rangeland health are listed in 43 CFR 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 the development and implementation of the standards for land health.

Standards and guidelines 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 S&Gs 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 grazing, but also to other rangeland impacts from such activities as recreation, development activities, 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.

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 Forest Service-administered units to produce forage for grazing animals and establish programmatic direction for grazing activities, including goals, objectives, desired conditions, standards, guidelines, 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 Nevada 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 within 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 IMP measures over the planning area.

Active grazing use, management actions, and long-term rangeland health in each allotment are monitored and evaluated on an ongoing basis. 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, improve riparian functioning condition, and 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 wildfires). 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:

- 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 carefully 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 maintaining or improving 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 172,231 AUMs on allotments in GRSG habitat (**Table 3-30**, Northeastern California BLM Allotments in GRSG Habitat).

Table 3.30. Northeastern California BLM Allotments in GRSG Habitat

BLM Field Office	Category 1		Category 2		Category 3		Category 4	
	No. of Allotments	Acres	No. of Allotments	Acres	No. of Allotments	Acres	No. of Allotments	Acres
Eagle Lake	1	53,500	24	764,599	0	0	2	19,340
Alturas	17	154,707	16	66,923	46	184,052	10	20,586
Surprise	7	309,219	29	791,832	15	309,130	8	313,190
Total	**25**	**517,426**	**69**	**1,623,354**	**61**	**493,182**		**353,116**

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).

Source: BLM 2008a, 2008b, 2008c

BLM Nevada

Of the grazing allotments on BLM-administered land in the Nevada portion of the planning area, 555 contain some acreage of identified or possible GRSG habitat. Nevada BLM currently permits approximately 1.8 million AUMs on allotments in GRSG habitat (**Table 3-31**, Nevada BLM Allotments in GRSG Habitat).

Table 3.31. Nevada BLM Allotments in GRSG Habitat

Category 1		**Category 2**		**Category 3**		**Category 4**		**Category 5**	
No. of Allotments	**Acres***	**No. of Allotments**	**Acres***	**No. of Allotments**	**Acres***	**No. of Allotments**	**Acres***	**No. of Allotments**	**Acres***
45	1,740,312	40	2,299,157	37	1,696,512	75	1,901,961	353	10,832,853
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 Causal Factor									
Category 5: Determination Not Complete									
*Acres represent the approximate GRSG habitat acreage present within allotment perimeters. Source: BLM 2012l									

Forest Service

The Humboldt-Toiyabe National Forest manages 225 grazing allotments in the planning area. Of these, 219 allotments, or about 97 percent, contain GRSG habitat totaling about 1,664,568 acres. Livestock are permitted on Forest Service-administered 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 as well as 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. Currently the Humboldt-Toiyabe National Forest permits 276,191 AUMs (386,570 Head Months), in the planning area, including 214,103 (165,297 Head Months) for cattle, 61,600 (220,867 Head Months) for sheep and goats, and 488 (406 Head Months) for horses and burros.

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 3-32, Acres of Grazing Allotments in GRSG Habitat; **Table 3-33**, Acres of Allotments Not Meeting Land Health Standards in GRSG Habitat; and **Table 3-34**, Miles of Fences in GRSG Habitat, describe the current conditions affecting livestock grazing within the planning area. **Figure 3-12**, Existing Lands Open to Livestock Grazing shows BLM- and Forest Service-administered lands open to grazing and the relationship of PGH and PPH to existing grazing allotments.

Table 3.32. Acres of Grazing Allotments in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres within PGH	Acres within PPH	Acres within PGH	Acres within PPH
BLM	III	3,191,900	6,282,000	3,191,900	4,935,600
	IV	4,670,700	13,408,800	763,800	3,566,300
	V	4,051,000	5,056,400	473,000	2,806,900
Forest Service	III	345,100	1,185,600	345,100	581,300
	IV	1,050,800	1,566,700	164,200	587,000
	V	109,800	60,000	7,500	22,700
Tribal and Other Federal	III	5,500	5,300	5,500	3,500
	IV	153,800	266,200	0	900
	V	4,000	1,500	800	400
Private	III	299,400	714,000	299,400	402,100
	IV	1,201,300	3,044,600	306,700	1,255,200
	V	768,400	575,700	39,300	125,000
State	III	200	236,000	200	5,600
	IV	257,900	693,600	400	800
	V	21,100	25,300	500	7,200
Other	III	0	100	0	100
	IV	400	1,500	0	100
	V	43,500	252,300	39,900	252,300
Source: Manier et al. 2013					

Table 3.33. Acres of Allotments Not Meeting Land Health Standards in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres [1] within PGH	Acres[1] within PPH	Acres[1] within PGH	Acres[1] within PPH
BLM	III	654,600	965,400	654,600	877,700
	IV	968,900	2,617,200	242,700	550,600
	V	158,700	417,000	93,800	353,600
Source: Manier et al. 2013					
[1]Only includes allotments not meeting Land Health Standards with grazing as the causal factor. *The Forest Service does not use the Land Health Concept.					

Table 3.34. Miles of Fences in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Miles[1] within PGH	Miles[1] within PPH	Miles[1] within PGH	Miles[1] within PPH
BLM	III	2,000	4,700	2,000	3,200
	IV	7,200	16,100	400	2,400
	V	3,600	4,000	500	1,900
Forest Service	III	600	1,700	600	1,000
	IV	1,900	2,800	200	700
	V	200	100	0	100
Tribal and Other Federal	III	0	100	0	0
	IV	400	400	0	0
	V	100	100	0	0
Private	III	300	1,100	300	400
	IV	3,900	7,400	300	1,400
	V	1,400	1,000	100	200
State	III	0	300	0	0
	IV	500	1,200	0	0
	V	100	100	0	0
Other	III	0	0	0	0
	IV	0	0	0	0
	V	100	300	100	300
Source: Manier et al. 2013					
[1]Derived from a dataset that identifies pasture and allotment borders on BLM- and Forest Service-administered lands as potential fences.					

Current use patterns vary based on local and regional plans, conditions, and grazing allotments. Pastures on BLM- and Forest Service-administered 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 Management Zone IV and western portions of Management Zone III, although BLM-administered lands not meeting wildlife land health standards due to livestock can be found throughout the range of GRSG. 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 6.6 million acres (10.42 percent) of BLM-administered GRSG range did not meet land health standards, and 17.9 percent of priority habitats in Management Zones III and IV did not meet these standards (Manier et al. 2013).

(PDF Map 3–12)

Figure 3.12.

3.9. Recreation

Conditions on BLM-Administered Lands

Management of recreation 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 with other areas used for recreation. SRMAs are managed to protect and enhance a targeted set of activities, experiences, benefits, and desired recreation setting characteristics. SRMAs may be subdivided into recreation management zones to further delineate specific recreation opportunities. Within 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 non-compatible recreation activities, that are detrimental to meeting recreation or other critical resource objectives (e.g., cultural or threatened and endangered species).

There are six 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 three SRMAs in the Elko District: Wilson Reservoir with 5,440 acres, South Fork Owyhee River with 3,500 acres, and Zunino/Jiggs Reservoir with 800 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. Non-compatible uses, including some recreation activities, 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 the 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" (i.e., neither an ERMA nor an SRMA). As such, approximately 36,062,995 acres in the planning area are "undesignated". These BLM-administered lands that are not designated as recreation management areas are managed to meet basic recreation and visitor services and resource stewardship needs. Recreation is not emphasized, but recreation activities 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 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, semi-primitive nonmotorized, semi-primitive 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 3-35, Recreation Opportunity Spectrum Classes, summarizes the various ROS classes within the planning area and in PGH and PPH.

Table 3.35. Recreation Opportunity Spectrum Classes

ROS Class	Acres within PGH	Acres within PPH	Acres within Other	Total Acres in Planning Area
Primitive	22,824	67,316	413,732	503,873
Rural	1,633	8,756	739	11,129
Roaded Natural	113,885	276,588	478,171	868,645
Semi-Primitive Motorized	132,154	331,239	217,210	680,604
Semi-Primitive Non-Motorized	268,795	498,903	1,671,839	2,439,538
Urban	0	198	0	198
Total	**539,292**	**1,183,003**	**2,781,693**	**4,503,989**
Source: BLM and Forest Service GIS 2013				

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, non-motorized, 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 provides 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 purposes. 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 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 areas 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 areas restricted at certain times, in certain areas, or to certain vehicular use. These restrictions may be of any type, but can generally be accommodated within 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; use on designated roads and trails; and other restrictions.

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 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 TTM 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 of 2012. It provides detailed guidance using the designation criteria in 43 CFR 8342.1 for area and route selection. It includes guidance for developing other implementation plans including but not limited to sign plans, education and outreach plans, law enforcement plans, and maintenance plans.

Travel Management on Forest Service-Administered 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 212.55 (a), General criteria for designation of Forest Service-administered roads, Forest Service-administered trails, and areas on Forest Service-administered 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 lands administered by the Forest Service in the planning area. Forest Service-administered 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 3-36**, Travel Area Designations on BLM and Forest Service Lands. The majority of 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 3-37**, Miles of Roads in GRSG Habitat, and **Table 3-38**, Miles of Roads in GRSG Habitat. This does not include two-track primitive roads. Inventory data for two-track primitive roads are incomplete at this time. Miles and acres of railroads are shown in **Table 3-39**, Miles of Railroads in GRSG Habitat, and **Table 3-40**, Acres of Railroads in GRSG Habitat.

Table 3.36. Travel Area Designations on BLM and Forest Service Lands[1]

	Planning Area (acres)	PPH (acres)	PGH (acres)
Open	37,058,100	8,878,900	3,866,000
Closed	2,783,500	731,000	143,600
Limited	10,021,200	3,083,600	1,029,700

	Planning Area (acres)	PPH (acres)	PGH (acres)
TOTAL	49,862,800	12,693,500	5,046,300
Source: BLM and Forest Service GIS 2013			
[1]Acres rounded to nearest 100 acres			

Table 3.37. Miles of Roads in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Miles within PGH	Miles within PPH	Miles within PGH	Miles within PPH
BLM	III	5,300	10,400	5,300	8,000
	IV	6,500	18,900	900	3,400
	V	5,900	5,200	400	1,900
Forest Service	III	400	1,900	400	700
	IV	1,200	1,900	200	500
	V	400	200	0	0
Tribal and Other Federal	III	100	900	0	100
	IV	700	1,000	0	0
	V	200	600	0	300
Private	III	900	4,300	900	1,000
	IV	7,200	8,700	800	2,000
	V	2,900	1,600	100	300
State	III	0	800	0	0
	IV	1,300	1,800	0	0
	V	200	100	0	0
Other	III	0	0	0	0
	IV	100	100	0	0
	V	100	500	100	500
Source: Manier et al. 2013					

Table 3.38. Acres of Roads in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres[1] within PGH	Acres[1] within PPH	Acres[1] within PGH	Acres[1] within PPH
BLM	III	56,900	115,700	56,900	85,800
	IV	68,500	199,400	9,300	36,500
	V	59,900	54,300	5,100	20,600
Forest Service	III	4,400	20,900	4,400	7,300
	IV	12,900	20,100	1,800	5,500
	V	3,600	2,000	100	700
Tribal and Other Federal	III	600	8,800	400	1,400
	IV	8,000	11,200	0	100
	V	2,200	6,900	200	4,300
Private	III	9,800	56,800	9,800	12,200
	IV	83,500	100,900	10,300	24,000
	V	29,400	17,400	1,200	3,400
State	III	0	9,400	0	200
	IV	14,100	18,800	0	0
	V	2,100	1,300	100	200

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres[1] within PGH	Acres[1] within PPH	Acres[1] within PGH	Acres[1] within PPH
Other	III	0	0	0	0
	IV	800	1,200	0	0
	V	1,900	6,200	1,900	6,200

Source: Manier et al. 2013

[1]Assumes footprint of 73.2 meters for interstate highways, 25.6 meters for paved primary and secondary highways, and 12.4 meters for other roads, such as graded county roads. This does not include two track primitive roads.

Table 3.39. Miles of Railroads in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Miles within PGH	Miles within PPH	Miles within PGH	Miles within PPH
BLM	III	22	100	22	26
	IV	100	100	40	45
	V	0	27	0	27
Forest Service	III	0	0	0	0
	IV	1	0	0	0
	V	1	0	0	0
Tribal and Other Federal	III	0	100	0	0
	IV	14	0	0	0
	V	0	0	0	0
Private	III	11	100	11	7
	IV	300	100	100	60
	V	17	0	0	0
State	III	0	0	0	0
	IV	12	0	0	0
	V	0	0	0	2
Other	III	0	0	0	0
	IV	0	0	0	0
	V	3	0	3	31

Source: Manier et al. 2013

Table 3.40. Acres of Railroads in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres[1] within PGH	Acres[1] within PPH	Acres[1] within PGH	Acres[1] within PPH
BLM	III	400	82	97	400
	IV	400	100	200	400
	V	100	0	100	200
Forest Service	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	0	0
Tribal and Other Federal	III	400	0	0	400
	IV	0	0	0	0
	V	0	0	0	0

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres[1] within PGH	Acres[1] within PPH	Acres[1] within PGH	Acres[1] within PPH
Private	III	400	40	28	400
	IV	400	400	200	400
	V	0	0	0	0
State	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	7	0
Other	III	0	0	0	0
	IV	0	0	0	0
	V	0	11	100	0

Source: Manier et al. 2013

[1]Assumes footprint of 9.4 meters

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. Land tenure adjustments focus primarily on land acquisition and disposal (including easement acquisition), while land use authorizations consist of ROWs, communication sites, and other leases or 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.

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

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 Forest Service-administered lands) in the planning area, could affect the Lands and Realty Program.

Current Condition

The planning area includes land in Siskiyou, Modoc, Lassen, Shasta, Plumas, Sierra, Nevada, and Alpine Counties in northeastern California, as well as 16 of 17 counties in Nevada, except Clark County in the southern part of the state. These lands are owned or administered by multiple tribes; federal, state, and local agencies; and private landowners. The configuration of land ownerships and their proximity to each other is an important factor when considering land tenure adjustments and evaluating ROW applications. **Table 1-1** shows the acreage and overall percent ownership for each land owner in the planning area.

Table 3-41, Acres of GRSG Habitat within City Limits, through **Table 3-46**, Acres of ROW Exclusion/Avoidance Areas in GRSG Habitat, list data compiled in a baseline environmental report produced by the USGS and the BLM (Manier et al. 2013). In each table, acreages and mileages are presented by surface management agency and their presence in PGH and PPH in the planning area.

Table 3.41. Acres of GRSG Habitat within City Limits

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres within PGH	Acres within PPH	Acres within PGH	Acres within PPH
BLM	III	2,200	4,100	2,200	100
	IV	19,700	1,100	1,000	0
	V	0	0	0	0
Forest Service	III	0	0	0	0
	IV	700	0	0	0
	V	0	0	0	0
Tribal and Other Federal	III	0	100	0	0
	IV	100	0	100	0
	V	100	0	0	0
Private	III	12,300	51,500	12,300	1,100
	IV	43,400	4,100	1,700	0
	V	4,500	300	4,200	300
State	III	0	1,500	0	0
	IV	2,800	0	0	0
	V	0	0	0	0
Other	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	0	0
Source: Manier et al. 2013					

Table 3.42. Number of Communication Towers in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Number[1] within PGH	Number[1] within PPH	Number[1] within PGH	Number[1] within PPH
BLM	III	53	116	53	77
	IV	163	182	39	30
	V	44	59	10	47
Forest Service	III	3	38	3	19
	IV	36	22	1	11
	V	16	0	0	0
Tribal and Other Federal	III	0	3	0	0
	IV	51	11	0	0
	V	0	0	0	0
Private	III	41	258	41	35
	IV	199	162	18	66
	V	28	9	11	3
State	III	0	13	0	0
	IV	23	17	0	0
	V	7	0	4	0

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Number[1] within PGH	Number[1] within PPH	Number[1] within PGH	Number[1] within PPH
Other	III	0	0	0	0
	IV	3	0	0	0
	V	12	13	12	13

Source: Manier et al. 2013

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

Table 3.43. Acres of Transmission Lines in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres[1] within PGH	Acres[1] within PPH	Acres[1] within PGH	Acres[1] within PPH
BLM	III	14,500	37,900	14,500	23,100
	IV	42,000	83,600	4,900	19,000
	V	29,400	28,200	4,300	11,800
Forest Service	III	400	2,600	400	1,400
	IV	3,500	5,800	1,500	1,300
	V	1,300	0	0	0
Tribal and Other Federal	III	0	800	0	0
	IV	4,700	10,700	0	0
	V	900	0	100	0
Private	III	3,500	43,600	3,500	2,800
	IV	57,900	47,000	6,200	17,500
	V	8,100	5,900	1,200	1,500
State	III	0	6,500	0	0
	IV	11,200	6,500	0	0
	V	200	300	0	200
Other	III	0	0	0	0
	IV	900	2,800	0	0
	V	500	4,100	500	4,100

Source: Manier et al. 2013

[1]Includes transmission lines greater than 115-kV

Table 3.44. Miles of Utility Corridors in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Miles within PGH	Miles within PPH	Miles within PGH	Miles within PPH
BLM	III	100	100	58	69
	IV	200	200	26	102
	V	100	100	19	56
Forest Service	III	0	1	0	0
	IV	0	0	0	0
	V	0	0	0	0
Tribal and Other Federal	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	0	0

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Miles within PGH	Miles within PPH	Miles within PGH	Miles within PPH
Private	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	0	0
State	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	0	0
Other	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	0	0
Source: Manier et al. 2013					

Table 3.45. Acres of Utility Corridors in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone[1]		Planning Area[1]	
		Acres[2] within PGH	Acres[2] within PPH	Acres[2] within PGH	Acres[2] within PPH
BLM	III	39,100	101,600	39,100	45,300
	IV	90,200	131,900	8,900	54,000
	V	57,900	79,300	9,500	40,100
Forest Service	III	300	900	300	500
	IV	300	900	100	0
	V	5,700	100	0	0
Tribal and Other Federal	III	0	300	0	0
	IV	700	0	0	0
	V	0	0	0	0
Private	III	2,000	19,900	2,000	3,300
	IV	21,900	34,000	5,500	18,000
	V	7,900	6,700	1,700	1,700
State	III	0	3,900	0	100
	IV	6,800	4,100	0	0
	V	0	1,900	0	200
Other	III	0	0	0	0
	IV	0	0	0	0
	V	0	10,700	0	10,700

Source: Manier et al. 2013

[1]Includes Section 368 energy corridors

[2]Acreages calculated by buffering corridor centerlines with varying widths based on the corridor width itself. Acreages may appear in ownership with no miles due to size of buffers.

Table 3.46. Acres of ROW Exclusion/Avoidance Areas in GRSG Habitat

	Total Acres	Acres within PGH	Acres within PPH
BLM and Forest Service ROW Exclusion Areas	3,229,500	167,200	453,500
BLM and Forest Service ROW Avoidance Areas	190,900	13,200	101,000
Source: BLM and Forest Service GIS 2013			

Conditions on BLM-Administered Lands

Land Tenure

Land ownership (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, 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 costs. The Ely RMP currently identifies 45,000 acres of public land for sale in potential GRSG habitat, pursuant to the White Pine County Conservation, Recreation, and Development Act of December 20, 2006. 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 archeological and historical resources
- To implement specific acquisitions authorized or directed by acts of Congress

BLM-administered lands determined suitable for sale are offered on the initiative of the BLM. The lands are not sold at less than fair market value. Lands suitable for sale must be identified in a LUP. Any lands to be disposed of by sale that are not identified in the current LUP require a LUPA before a sale 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.

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 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 lands that are reserved and set aside from application of some, or all, of the public land and mining laws in order to provide for a specific designated use or to protect specific resource values such as waterpower, 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 pursuant to FLPMA are limited to a 20-year term, after which the holding agency must reapply for the withdrawal to be extended. Terms established for legislative withdrawals are made at the discretion of Congress.

Land Use Authorizations

The most common form of authorization to permit 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 period of time. Leases may also be authorized pursuant to FLPMA. ROWs and leases are generally authorized for long-term land uses (three years or more), and some ROWs, depending on the use, and permits (e.g., filming permits) are used to authorize short-term uses (less than three years). All ROW applications will be reviewed using the criteria of following existing corridors wherever practical and avoiding the proliferation of separate ROWs.

ROWs

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

- Protects the natural resources associated with public lands and adjacent lands, whether private or administered by a government entity
- Prevents unnecessary or undue degradation to public lands
- Promotes the use of ROWs in common, considering engineering and technological compatibility, national security, and area 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 2801.2)

Private individuals and groups, as well as various businesses and government entities, can hold these 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 3-46,** Acres of ROW Exclusion/Avoidance Areas in GRSG Habitat.

Exclusion areas are closed to any ROW development.

Avoidance areas are open to ROW 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.

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 within the corridor, especially if they are not compatible with other resource uses, values, and objectives in and near the corridors, or if the corridors are already at maximum capacity with existing structures. See **Table 3-45**, Utility Corridors in GRSG Habitat, for an overview of the number and acreages of utility corridors.

Communication Sites

Communication sites contain equipment for various public and private tenants, including phone companies; local utilities; and local, state, and other federal agencies.

Leases and Permits

Leases may be authorized for use, occupancy, and development pursuant to Section 302 of FLPMA as well as 43 CFR 2920. These are generally used for activities that cannot be authorized as a ROW or a withdrawal.

Forest Service-Administered Lands

Humboldt-Toiyabe National Forest

Several aspects of public land management must be considered in the Land and Resource Management Planning process, including land tenure adjustments (i.e., disposals, acquisitions, and withdrawals), ROWs, and permits and leases.

Land Ownership Adjustment

Forest Service-administered lands are exchanged to achieve a desired national forest land ownership pattern that supports forest land and resource goals and objectives, addresses fragmentation, reduces future management costs, and responds to urban and community needs. Lands are purchased primarily through revenues generated from sale of BLM Lands deposited into a special account known as the Southern Nevada Public Land Management Act account or other similarly legislated land acts within the State of Nevada to protect critical resource areas and provide increased public recreation opportunities. Land donations, when determined to be in the public interest, are to consolidate Forest Service-administered lands and protect critical resource areas. Acquisition of road and trail ROWs often provides legal public access to Forest Service-administered lands that are otherwise inaccessible. Opportunities for land ownership adjustments are equally distributed across the affected Ranger Districts on Forest Service-administered lands.

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

for land adjustment. Other parcels not presently identified are evaluated under the merits of each proposal. Nonfederal lands are considered for acquisition through exchange of suitable public land on a case-by-case basis. The objectives of the Forest Service land ownership adjustment program are to achieve the optimum land ownership pattern for the protection and management of resource uses, settle land title claims, and provide resource administrators with title information about the use of and resources on the land they administer. 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 future owners and use of their land.

Purchase. Land purchase can be pursued to facilitate various resource management objectives. Lands considered for purchase would be those lands that meet specific land management goals identified in the Forest Plan. Most funding for purchases comes from the Southern Nevada Public Land Management Act and similarly enacted lands acts generated funds in the State of Nevada.

Special Use Authorizations. SUAs (granting ROWs, permits, easement, and leases) on Forest Service-administered 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. The Forest Service grants special use authorizations on Forest Service-administered lands and acquires ROWs acquisitions across private property when there are willing private property owners. To the extent possible, linear ROWs, such as roads and pipelines, are routed where impacts would be least disturbing to environmental resources, taking into account the point of origin, point of destination, and purpose and need of the project. Although established corridors exist, this does not preclude the location of transportation and transmission facilities in other areas if environmental analysis indicates that the facilities are compatible with other resource values and objectives. Further identification of corridors may not necessarily mandate that transportation and transmission facilities be located within these areas if they are not compatible with other resource uses, values, and objectives in and near the corridors or if the corridors are saturated. 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.

SUAs authorize and administer use of public lands by individuals, companies, organized groups, other federal agencies and state or local levels of government in a manner that protects natural resource values and public health and safety. They authorize uses that contribute to the nation's infrastructure for generating and transmitting energy resources, including electric transmission facilities, oil and gas pipelines, hydropower facilities, and wind and solar facilities. They authorize uses for communications, commerce, public health and safety, and homeland security, including fiber-optic and wireless telecommunications, water development systems, and federal, state, and local highways. **Table 3-47**, Number of Special Use Authorizations on the Humboldt-Toiyabe National Forest, lists the number of each type of special use permit on the National Forest.

Table 3.47. 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

Use	Number of Permits
Dams and reservoirs	15
Recreation residences	98
Club/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
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 yards	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	

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

Recreation Residence Permits. There are three summer home groups with a total of 98 cabins located 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 recreation 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.

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. Because of the large percentage of federal lands compared with state, local government, or private lands, this is expected to continue well into the future.

Trends on Forest Service-Administered 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 for resource values and land adjustment priorities within the state given the limited funding available. Two land adjustments in GRSG habitat are currently 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 Forest Service-administered 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 local communities, state regulators, industry, and other federal agencies in building a clean energy future by providing sites for environmentally sound development of renewable energy facilities on public lands. Renewable energy on BLM- and Forest Service-administered lands includes solar, wind, and biomass resources and siting of transmission facilities necessary to deliver this 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 with ROWs through the Lands and Realty Program.

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

Although geothermal is a renewable energy source, it is managed as a leasable fluid mineral and therefore is discussed in **Section 3.12**, Mineral Resources.

As of 2010, the BLM's renewable energy policy is directed by the following regulations and executive orders:

- The Energy Policy Act of 2005 (Title II, Sec. 211), which requires the DOI to approve at least 10,000 megawatts of renewable energy on public lands by 2015
- Executive Order 13212, Actions to Expedite Energy-Related Projects, which requires federal agencies to expedite review of energy project applications
- Secretarial Order 3285, which requires the DOI to identify and prioritize specific locations best suited for large-scale renewable energy production

Additionally, the BLM has specific guidance for certain types of renewable energy. The primary Instruction Memoranda are summarized here:

- IM 2011-061, Solar and Wind Energy Applications – Pre-Application and Screening provides updated guidance on the review of ROW applications for solar and wind energy development projects on public lands administered by the BLM. This IM updates the Solar Energy Development Policy (IM 2011-003), issued October 7, 2010, and the Wind Energy Development Policy (2009-043) issued December 19, 2008 (BLM 2010b).
- IM 2011-060, Solar and Wind Energy Applications – Due Diligence, provides updated guidance on the due diligence requirements of ROW applicants for solar and wind energy development projects on public lands administered by the BLM, and updates the Solar Energy Development Policy (IM 2011-003) and the Wind Energy Development Policy (IM 2009-043) (BLM 2010c).
- IM 2011-059, National Environmental Policy Act Compliance for Utility-Scale Renewable Energy Right-of-Way Authorizations (BLM 2011g). The purpose of this IM is to reiterate and clarify existing BLM NEPA Policy to assist offices that are analyzing externally-generated, utility-scale renewable ROW applications (BLM 2011g).
- IM 2011-003, Solar Energy Development Policy (BLM 2011h), establishes updated policy for the processing of ROW applications for solar energy development projects on BLM-administered lands and evaluating the feasibility of installing solar energy systems on BLM administrative facilities and projects.
- IM 2009-043, Wind Energy Development Policy (BLM 2008i), provides updated guidance on implementing the ROD for the Programmatic EIS on Wind Energy Development (BLM 2005b) and processing ROW applications for wind energy projects on BLM-administered lands.
- IM 2004-227, Biomass Utilization Strategy (BLM 2004e), updated in July 2005, provides sets of goals to help focus and increase utilization of biomass from BLM-administered lands. In June 2005, the final rule in the *Federal Register* revised the authority of 48 CFR Part 1452 by adding 1452.237-71, which is a new contract clause for removal and utilization of woody biomass generated as a result of land management service contracts whenever ecologically and lawfully appropriate. The BLM issued IM 2009-120 in May 2009, which updated the contract clause for utilization for woody biomass (BLM 2009c).

Section 501(a)(4) of the FLPMA, 43 USC 1761(a)(4) (FSM 2701.1, para. 15), authorizes the Forest Service to issue ROWs for the use and occupancy of Forest Service-administered 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 Forest Service-administered 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-Forest Service-administered 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-Forest Service-administered 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 with special use authorizations in the Forest Service. ROW applications are generally accepted and processed on a first-come, first-served basis. The ROW regulations (43 CFR 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 2804.23(c).

Current Condition

California and Nevada are at the forefront for permitting renewable energy on public lands. The DOI has approved 91 renewable energy projects within California and Nevada, 21 of which are located in the planning area. Renewable energy facilities in the planning area are shown on **Figure 3-13**, Renewable Energy.

(PDF Map 3–13)

Figure 3.13. Renewable Energy

Wind Energy

California and Nevada have more than 150 megawatts of developed wind capacity. An additional 828 to 1,080 megawatts are slated for development by 2014. California and Nevada have the potential to contribute nearly 1,080 megawatts of wind-generated energy. This amount of energy would provide enough energy for over 250,000 homes in California and Nevada.

There are 114,936 acres of wind energy ROWs in the planning area (see **Table 3-48**, Acres of Wind Energy Rights-of-Way in GRSG Habitat); however, there is currently one active industrial-scale wind energy generation facilities in the planning area.

Table 3.48. Acres of Wind Energy ROWs in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres within PGH	Acres within PPH	Acres within PGH	Acres within PPH
BLM	III	67,000	136,600	67,000	65,300
	IV	296,500	580,600	700	900
	V	138,000	300,300	41,500	199,700
Forest Service	III	200	200	200	200
	IV	0	0	0	0
	V	0	0	0	0
Tribal and Other Federal	III	0	0	0	0
	IV	200	1,700	0	0
	V	0	0	0	0
Private	III	3,800	5,500	3,800	5,400
	IV	2,300	13,900	400	800
	V	3,400	6,500	200	5,000
State	III	0	100	0	0
	IV	400	0	0	0
	V	0	0	0	0
Other	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	100	100
Source: Manier et al. 2013					

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 nine wind meteorological tower testing ROW applications. Most wind test ROWs are located throughout Nevada and in northeastern California. These ROWs have an authorized term of three years. When added together, the wind test ROWs encompass approximately 55,100 acres of BLM-administered lands.

Wind energy developments on Forest Service-administered lands have not been proposed as of this time. Although the potential in the forest area for wind energy development is high in many locations, the terrain and lack of accessibility to the grid makes it generally unsuitable for development.

California and Nevada have received five wind energy turbine development ROW applications. These application are in the planning process, have been rejected, or the applicant has withdrawn.

Solar Energy

Although there are solar projects located in California and Nevada, there are no solar energy ROWs in the planning area (Manier et al. 2013).

Biomass

Currently, there is no significant commercial biomass 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. An emerging market may exist within five to ten years as field portable energy concentrating technology becomes available, longer-term and larger area land treatment contracts are established that provide a commercially reliable source of pinyon-juniper feedstock, an

adequate land treatment and biomass transportation service industry is established, the creation of a sustained pinyon-juniper biomass feedstock demand to support, and commercially viable stationary plant or field mobile bioenergy generation facilities are developed.

Trends

Within California and Nevada, greater pressure to develop renewable energy resources on public lands is expected to occur 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. 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 and to develop ways 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

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 include 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 Forest Service-administered lands. This act expands the authority of the Secretary of Agriculture in the management of oil and gas resources on Forest Service-administered lands. Without Forest Service approval, the BLM cannot issue leases for oil and gas on Forest Service-administered lands. With the exception of geothermal activities on unleased lands, the BLM must approve all surface-disturbing activities on Forest Service-administered lands before operations commence. The BLM and Forest Service reserve the right to require additional mitigation measures, in the form of COAs, at the time an APD 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; BLM will not issue leases for lands within the National Park System, National Recreation Areas, fish hatcheries or wildlife management areas administered by the DOI, Indian trust or restricted lands within or outside the boundaries of

Indian reservations, Wilderness Areas or Wilderness Study Areas administered by BLM, Forest Service, or other surface management agencies, or lands designated by Congress as wilderness study areas. In addition, leases are not issued if it is determined by the BLM or Forest Service that issuing the lease would cause unnecessary or undue degradation of public lands and resources.

Leases are issued through a competitive or noncompetitive process. Competitive leases are offered through a bid process in areas nominated by interested parties. Noncompetitive leases are issued over the counter after the competitive bidding process, if the parcels are not sold during the competitive bid process. BLM leasing authority is in accordance with the Mineral Leasing Act of 1920, and associated 43 CFR Part 3100 for oil and gas and Part 3200 for geothermal. During the leasing process, the BLM may apply lease stipulations. 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.

Fluid Mineral Stipulations

During the leasing process, the Forest Service and BLM may apply stipulations to leases in order to provide protections for 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 within the terms of the standard lease contract. There are three types of stipulations: NSO, CSU, TL. 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 time 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.

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 within 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 within the

leasehold to which the restrictive criteria applied. A waiver is a permanent exemption from a lease stipulation. The stipulation no longer applies anywhere within the leasehold.

In addition to the designations and stipulations described above, federal regulations give the BLM the authority to ensure that oil and gas 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 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 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 3-49, Stipulations Related to GRSG and Its Habitat, shows stipulations applicable to actions on BLM- and Forest Service-administered lands.

Solid (Non-energy) Leasable Minerals

Solid leasable minerals are coal, sodium, potash, and phosphate. Similar to fluid leasable minerals, discussed above, non-energy 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 will not be discussed further in this LUPA/EIS because there are no leasable coal deposits in the planning area.

Table 3.49. 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 CA Field Office	Forest Service
Seasonal	Seasonal restrictions from disturbance in GRSG crucial winter habitat apply during the period November 1 to March 15. This stipulation does not apply to operating facilities.	No surface activity would be allowed within winter range for GRSG 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	NV-WDO-WILD-02, TL (2002/2008) Timing limitations on known or potential GRSG habitat. Prior to 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, avoid all development or exploration activities within known or potential nesting, brood-rearing, and winter habitat, and within 1 kilometer (0.6 mile) of known or 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	**Tonopah:** No surface use is allowed during the following time period(s). This stipulation does not apply to operations and maintenance of production facilities. GRSG winter habitat from February 15 to May 15. **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 within ¼-mile of active GRSG leks. Seasonal restrictions from March 1-June 15 within GRSG habitat. From March 1 to June 15, maintenance would not be permitted between 3:00 am and 9:00 am. 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. Eagle Lake:	**Stipulation:** Controlled Surface Use **Objective:** To require that activities be located and/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.

Stipulation Type	Elko District Office	Ely District Office	Winnemucca District Office	Battle Mountain District Office	Carson City District Office	Northern CA Field Office	Forest Service
		if new 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 GRSG.	Winter habitats: October through March.			No Stipulations. Surprise: Within 0.30 mile of leks, reduce human activity in early morning and late evening from March 1to May 15.	
Brood Rearing	Seasonal protection from disturbance. Seasonal restrictions from disturbance on GRSG brood rearing areas apply within 0.5 mile or other appropriate distance based on site-specific conditions from 5/15 to 8/15, inclusive. This	No Stipulation.	Timing limitations on known or potential GRSG habitat. Prior to 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, avoid all development or exploration activities within known or potential nesting, brood-rearing, and winter habitat, and within 1 kilometer (0.6 mile) of known or potential habitat	**Tonopah:** No Stipulation. Mount Lewis: Same as seasonal range.	No Stipulation.	Alturas: Seasonal restrictions from March 1 to June 15 within GRSG habitat. From March 1 to June 15, maintenance would not be permitted between 3:00 am and 9:00 am. Eagle Lake: NA Surprise:	**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 of the area does not contain nesting/early

Stipulation Type	Elko District Office	Ely District Office	Winnemucca District Office	Battle Mountain District Office	Carson City District Office	Northern CA Field Office	Forest Service
	restriction does not apply to operating facilities.		(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			Within 0.30 mile of leks, reduce human activity in early morning and late evening, from March 1 to May 15.	brood rearing habitat or the habitat is not occupied; the SLT would then apply.
GRSG Leks	Seasonal protection from disturbance. No Surface Occupancy is permitted within 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 with the GRSG lek.	No surface occupancy within 3.3 kilometers (2 miles) of known leks at all times.	**Tonopah:** No surface use is allowed within 0.25 mile radius of a GRSG lek(s). 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 within two miles of a GRSG lek from March 1 through May 15. This stipulation does not apply to operations and maintenance of production facilities.	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 within GRSG habitat. From March 1 to June 15, maintenance would not be permitted between 3:00 am and 9:00 am. Exhaust noise from pump jacks must be muffled so as not to exceed 75 decibels, measured at 30 feet from the	**Stipulation:** No Surface Occupancy - 3 kilometers 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 is not active (has not been used in the last 5 years); the SLT would then apply.

Stipulation Type	Elko District Office	Ely District Office	Winnemucca District Office	Battle Mountain District Office	Carson City District Office	Northern CA Field Office	Forest Service
		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 five consecutive years or the habitat has changed such that there is no likelihood the lek would become active.		**Mount Lewis:** Same as Seasonal Range.		source of noise. Exceptions to this requirement will be considered for areas of no or low GRSG strutting activity, or unoccupied habitat, including leks. Eagle Lake: No Stipulation. Surprise: Within 0.30 mile of leks, reduce human activity in early morning and late evening from March 1 to May 15.	
Source: BLM and Forest Service 2008, Forest Service 2007b							

Locatable Minerals

Locatable minerals include, but are not limited to, gold, silver, platinum, copper, lead, zinc, magnesium, nickel, tungsten, bentonite, uranium, vanadium, and uncommon varieties of mineral materials.

Acquisition of locatable minerals is executed by staking a mining claim over the deposit and acquiring the necessary permits to explore or mine. Within a mining claim, the surface lands remain open to the public for other multiple uses. Placer claims, which are for minerals found in geologic sediments rather than in veins, are also managed under the General Mining Law of 1872. Miners locate claims in order to develop the mineral values in a specified area. For operations other than casual use, the claimant is required to submit a Notice or a Plan of Operations. Regulations require the claimant to prevent unnecessary or undue degradation of the land. The BLM may recommend closures to mineral entry (a land use planning decision) by petitioning the Secretary of the Interior to withdraw areas from further location of mining claims or sites. The Forest Service may also ask that lands be withdrawn from mineral entry by a request through the BLM to the Secretary of the Interior.

Mineral Materials

Mineral materials are common varieties of construction materials and aggregates such as sand, stone, gravel, pumice, pumicite, petrified wood, roadbed, and ballast material that may be disposed of under the Mineral Materials Sale Act of 1947. Mineral materials are sold at a fair market value or through free use permits to governmental agencies. Local government agencies and non-profit organizations may obtain these materials free of cost for community purposes. County and state road construction divisions are significant users of gravel and sand resources. 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.

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, Forest Service-administered, private, and state surface are discussed in **Chapters 3** and **4** as being part of the decision area.

Current Conditions

Leasable Minerals

Oil and Gas

There are two major oil- and gas-producing basins in the planning area: Railroad Valley and Pine Valley. Both valleys currently have production in oil only. These areas are described below.

Ely District Office. The highest oil producing region in Nevada is Railroad Valley, much of which is located in the Ely District Office. Railroad Valley is an elongated valley trending north to south; it is approximately 80 miles long and up to 20 miles wide. Railroad Valley is the predominant oil-producing valley in Nevada. 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. As a result, drilling on federal mineral estate in the Ely District Office is expected to increase. Much of the moderate to high potential areas identified for petroleum in the Ely District Office are identified as GRSG habitat.

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 potential and low potential for petroleum. The areas within the Battle Mountain District Office that contain GRSG habitat are identified as moderate to low potential for petroleum. Recent interest has focused on, and will likely continue to focus on, the Chainman Shale and the Pilot Shale. As a result, drilling on federal mineral estate in the Battle Mountain District Office is expected to increase.

Elko District Office. The second highest oil-producing region in Nevada is Pine Valley, which is located in the Elko District Office. Pine Valley is an elongated valley trending north to south; it is approximately 30 miles long and 15 miles wide. Pine Valley lies 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 in Pine Valley. To the east and northeast of Pine Valley is an area identified as moderate potential for the presence of petroleum. There are plans to explore for oil to the west of the City of Wells and in the valleys west of the Ruby Mountains, targeting the Elko formation. As a result, drilling on federal mineral estate in the Elko District Office is expected to increase. Much of the moderate-to-high-potential areas identified for petroleum in the Elko District Office are identified as GRSG habitat.

In 2007, the Humboldt-Toiyabe National Forest issued a ROD which 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 255,603 acres of Forest Service-administered 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 3-50**, Acres Open to Oil and Gas Leasing in GRSG Habitat, and **Table 3-51**, Acres Closed to Oil and Gas Leasing in GRSG Habitat, the majority of the planning area is open to oil and gas leasing; 87 percent is open while only 13 percent is closed. There are currently 4,664,700 acres of lands open to oil and gas leasing in PGH and 11,397,200 acres open in PPH.

Table 3.50. Acres Open to Oil and Gas Leasing in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres[1] within PGH	Acres[1] within PPH	Acres[1] within PGH	Acres[1] within PPH
BLM	III	3,032,100	6,067,200	3,032,100	4,762,700
	IV	4,662,800	12,348,100	743,000	3,467,600
	V	4,118,400	4,399,200	399,700	2,103,400
Forest Service	III	0	610,900	0	0
	IV	240,200	234,200	0	0
	V	0	0	0	0

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres[1] within PGH	Acres[1] within PPH	Acres[1] within PGH	Acres[1] within PPH
Tribal and Other Federal	III	0	19,900	0	0
	IV	500	10,300	0	0
	V	0	0	0	0
Private	III	0	191,500	0	0
	IV	173,100	275,900	0	0
	V	0	0	0	0
State	III	0	46,200	0	0
	IV	8,600	20,400	0	0
	V	0	0	0	0
Other	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	0	0

Source: Manier et al. 2013

[1]Assumes footprint of 9.4 meters

Table 3.51. Acres Closed to Oil and Gas Leasing in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres[1] within PGH	Acres[1] within PPH	Acres[1] within PGH	Acres[1] within PPH
BLM	III	167,700	222,700	167,700	196,200
	IV	261,500	1,304,200	27,000	230,100
	V	78,300	818,700	77,800	817,300
Forest Service	III	68,400	115,800	68,400	115,800
	IV	4,600	69,600	4,500	69,600
	V	0	0	0	0
Tribal and Other Federal	III	200	0	200	0
	IV	442,300	637,300	0	0
	V	600	4,700	600	4,700
Private	III	5,000	8,400	5,000	8,100
	IV	9,800	26,500	2,600	11,500
	V	2,100	25,400	2,100	25,200
State	III	0	0	0	0
	IV	9,300	21,600	0	0
	V	700	0	0	0
Other	III	0	0	0	0
	IV	0	0	0	0
	V	0	700	0	700

Source: Manier et al. 2013

[1]Assumes footprint of 9.4 meters

As shown by the data on **Table 3-52**, Acres of Oil and Gas Leases in GRSG Habitat, there are more than 1,586,200 acres of authorized oil and gas leases in PPH and PGH. As shown in **Table 3-53**, Acres of Oil and Gas Leases Held by Production in GRSG Habitat, there are 4,400 acres held by production in PPH and PGH.

Table 3.52. Acres of Oil and Gas Leases in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres within PGH	Acres within PPH	Acres within PGH	Acres within PPH
BLM	III	499,400	1,175,600	499,400	816,800
	IV	74,500	215,700	28,900	199,800
	V	0	0	0	0
Forest Service	III	0	52,100	0	0
	IV	3,800	1,700	0	0
	V	0	0	0	0
Tribal and Other Federal	III	100	0	100	0
	IV	900	0	0	0
	V	0	0	0	0
Private	III	12,600	31,200	12,600	9,700
	IV	21,000	28,500	5,000	13,900
	V	0	0	0	0
State	III	0	2,000	0	0
	IV	0	0	0	0
	V	0	0	0	0
Other	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	0	0
Source: Manier et al. 2013					

Table 3.53. Acres of Oil and Gas Leases Held by Production in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres within PGH	Acres within PPH	Acres within PGH	Acres within PPH
BLM	III	1,300	18,400	1,300	3,100
	IV	0	0	0	0
	V	0	0	0	0
Forest Service	III	0	13,200	0	0
	IV	0	0	0	0
	V	0	0	0	0
Tribal and Other Federal	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	0	0
Private	III	0	7,300	0	0
	IV	0	0	0	0
	V	0	0	0	0
State	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	0	0
Other	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	0	0
Source: Manier et al. 2013					

Table 3-54, Acres of Oil and Gas Wells in GRSG Habitat, shows the acres of wells in the planning area. **Figure 3-14**, Existing Oil and Gas Leases and Wells, shows the oil and gas lease areas and the oil and gas leases in production in the planning area.

Table 3.54. Acres of Oil and Gas Wells in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres[1] within PGH	Acres[1] within PPH	Acres[1] within PGH	Acres[1] within PPH
BLM	III	200	1,100	200	400
	IV	0	100	0	100
	V	0	0	0	0
Forest Service	III	0	100	0	0
	IV	0	0	0	0
	V	0	0	0	0
Tribal and Other Federal	III	0	400	0	0
	IV	0	0	0	0
	V	0	0	0	0
Private	III	0	1,300	0	0
	IV	100	100	0	100
	V	0	0	0	0
State	III	0	400	0	0
	IV	0	0	0	0
	V	0	0	0	0
Other	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	0	0

Source: Manier et al. 2013

[1]Assumes footprint of 62 square meters per well

Oil and Gas Potential

Swings in the natural gas market price 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).

Geothermal Resources

Geothermal resources are significant within portions of the planning area. In recent years, industry has focused its exploration and utilization 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 include the McGinness Hills Geothermal Power Plant (45-megawatt capacity) and the Jersey Valley Power Plant (15-megawatt capacity). In addition, there are six geothermal power plants approved or pending approval within the planning area that have not been constructed. These plants have the potential to produced approximately 285 megawatts. **Figure 3-15**, Existing Geothermal Leases and Power Plants, shows the lease areas and geothermal power plants in the planning area.

(PDF Map 3–14)

Figure 3.14. Existing Oil and Gas Leases and Wells

(PDF Map 3–15)

Figure 3.15. Existing Geothermal Leases and Power Plants

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 within the Ely Ranger District that are available for geothermal leasing. Under this decision, the Forest Service will consent to lease Forest Service-administered Lands with an NSO stipulation applicable to PGH and PPH.

As shown by the data on **Table 3-55**, Acres of Geothermal Resource Potential in GRSG Habitat, the majority of the planning area is open to geothermal leasing; 88 percent is open while only 12 percent is closed. There are 4,664,700 acres open to geothermal leasing in PGH and 11,397,200 acres in PPH.

Table 3.55. Acres of Geothermal Resource Potential in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres[1] within PGH	Acres[1] within PPH	Acres[1] within PGH	Acres[1] within PPH
BLM	III	3,199,800	5,991,200	3,199,800	4,944,800
	IV	4,927,900	13,710,800	769,900	3,609,900
	V	4,196,700	5,117,600	477,600	2,820,300
Forest Service	III	356,200	781,900	356,200	596,500
	IV	1,111,800	1,613,800	187,000	591,800
	V	114,900	62,200	7,700	23,200
Tribal and Other Federal	III	29,100	118,600	14,600	53,800
	IV	522,500	633,600	2,100	1,900
	V	101,800	717,100	24,900	461,400
Private	III	384,800	966,500	384,800	537,700
	IV	3,414,800	4,890,200	434,700	1,558,700
	V	1,199,000	798,000	56,300	167,200
State	III	200	151,600	200	5,600
	IV	835,800	1,019,400	400	800
	V	115,800	64,900	5,600	11,000
Other	III	0	100	0	100
	IV	31,400	62,900	0	100
	V	79,800	337,500	76,100	337,500
Source: Manier et al. 2013					

As shown by the data on **Table 3-56**, Acres of Geothermal Leases in GRSG Habitat, there are 1,107,200 acres of authorized geothermal leases in the planning area. Of these leases, 37,936 acres are in production status. Within GRSG habitat there are 108,800 acres of geothermal leases in PPH and 60,800 acres in PGH.

Table 3.56. Acres of Geothermal Leases in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres within PGH	Acres within PPH	Acres within PGH	Acres within PPH
BLM	III	52,100	72,600	52,100	72,200
	IV	16,600	56,400	7,700	36,100
	V	31,200	10,600	600	500
Forest Service	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	0	0

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres within PGH	Acres within PPH	Acres within PGH	Acres within PPH
Tribal and Other Federal	III	0	0	0	0
	IV	100	0	0	0
	V	0	0	0	0
Private	III	600	200	600	200
	IV	1,300	1,400	600	1,300
	V	600	300	100	0
State	III	0	0	0	0
	IV	0	100	0	0
	V	0	0	0	0
Other	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	0	0
Source: Manier et al. 2013					

Geothermal Potential

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

Nonenergy Leasable Minerals

Identified solid leasable minerals in the planning area include potassium and sodium. Within the planning area there are 3,660 acres of approved solid leasable leases and prospecting permits. None of these permits are located within PGH or PPH (BLM 2013b).

While solid leasable minerals are present 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 within 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 within the Elko District Office that is located in both PGH and PPH.

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

Locatable Minerals

Mineral exploration and the development of locatable mineral deposits are non-discretionary actions allowed under the General Mining Law of 1872 on all BLM-administered and Forest Service-administered 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 3809.420 or 36 CFR 228.8. 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.

Mineral exploration and the development of locatable mineral deposits are allowed unless they are withdrawn from mineral entry by Secretarial PLO or an act of Congress. There are 6,547,200 acres withdrawn from further location of mining claims or sites in the planning area. The remaining 43,321,500 acres in the planning area are open to locatable mineral exploration and development (**Table 3-57**, Locatable Minerals).

Table 3.57. Locatable Minerals

	Planning Area (acres)	PPH (acres)	PGH (acres)
Petition for withdrawal from locatable mineral entry	6,547,200	1,296,100	374,700
Open to locatable mineral exploration or development	43,321,500	11,397,200	4,664,700
Source: BLM and Forest Service GIS 2013			

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

Table 3-58, Acres of Locatable Mineral Claims in GRSG Habitat, lists data compiled in a baseline environmental report produced by the USGS for the BLM (Manier et al. 2013). Acres are presented by surface management agency and their presence in PGH and PPH in the planning area.

Table 3.58. Acres of Locatable Mineral Claims in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres within PGH	Acres within PPH	Acres within PGH	Acres within PPH
BLM	III	377,700	762,500	377,700	688,700
	IV	189,900	462,100	137,000	230,800
	V	39,900	70,100	31,300	68,600
Forest Service	III	44,200	42,400	44,200	39,700
	IV	56,500	113,700	18,600	87,800
	V	0	0	0	0
Tribal and Other Federal	III	0	100	0	0
	IV	400	500	0	0
	V	300	900	100	900
Private	III	56,900	106,400	56,900	97,500
	IV	80,200	139,200	40,800	105,200
	V	3,000	3,500	2,200	3,200
State	III	0	3,400	0	0
	IV	3,400	3,600	0	0
	V	100	0	0	0
Other	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	0	0
Source: Manier et al. 2013					

Conditions on BLM-Administered Lands

The BLM administers 49,868,700 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 located in the north-central portion of Nevada.

Conditions on Forest Service-Administered Lands

Mining claims for gold, silver, and copper may be found throughout the planning area. However, mining projects are not as common on Forest Service-administered 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 within the decision area, particularly within Nevada. The number of Notices and Plans of Operations reviewed by the California and Nevada BLM is shown in **Table 3-59**, Notices and Plans of Operations Reviewed by the California and Nevada BLM.

Table 3.59. Notices and Plans of Operations Reviewed by the California and Nevada BLM

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

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 and Plan of Operations being reviewed by the BLM in Nevada show a general increase. This increase may be explained by the increase in the price of gold, silver, and copper.

Trends on Forest Service-Administered Lands

The majority of development on Forest Service-administered lands has been in the form of exploration projects. The trend for locatable mineral development has remained fairly constant between 2006 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 non-profit organizations may obtain these materials free of cost for community purposes. The sale or disposal of mineral materials is discretionary. 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 states of California and Nevada, with heavier concentrations on the northern half of the state.

Conditions on BLM- and Forest Service-Administered Lands

Sand and gravel are the primary mineral materials found in the planning area, and are therefore the focus of discussion for this section. **Table 3-60**, Acres of Mineral Material Disposal Sites in GRSG Habitat, 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 within PGH and PPH in the planning area.

Table 3.60. Acres of Mineral Material Disposal Sites in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres within PGH	Acres within PPH	Acres within PGH	Acres within PPH
BLM	III	377,700	762,500	377,700	688,700
	IV	189,900	462,100	137,000	230,800
	V	39,900	70,100	31,300	68,600
Forest Service	III	44,200	42,400	44,200	39,700
	IV	56,500	113,700	18,600	87,800
	V	0	0	0	0
Tribal and Other Federal	III	0	100	0	0
	IV	400	500	0	0
	V	300	900	100	900
Private	III	56,900	106,400	56,900	97,500
	IV	80,200	139,200	40,800	105,200
	V	3,000	3,500	2,200	3,200
State	III	0	3,400	0	0
	IV	3,400	3,600	0	0
	V	100	0	0	0
Other	III	0	0	0	0
	IV	0	0	0	0
	V	0	0	0	0
Source: Manier et al. 2013					

Trends on BLM- and Forest Service-Administered 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

(Including Areas of Critical Environmental Concern, Wilderness Areas, Wilderness Study Areas, National Conservation Areas, National Historic Trails, Byways, and Wild and Scenic Rivers)

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 Forest Service-administered lands and are discussed in this section: Wilderness, inventoried roadless areas, special interest areas, and research natural areas (RNAs).

Table 3-61, Conservation Areas in GRSG Habitat, summarizes special designations that overlap GRSG habitat in the planning area. Special designations in the planning area are shown on **Figure 3-16**, Special Designations and Other Important Resources.

Table 3.61. Conservation Areas in GRSG Habitat

Surface Management Agency	Management Zone	Management Zone		Planning Area	
		Acres[1] within PGH	Acres[1] within PPH	Acres[1] within PGH	Acres[1] within PPH
BLM	III	130,800	170,900	130,800	145,000
	IV	741,400	1,510,700	22,700	121,500
	V	955,900	1,400,900	74,100	821,900
Forest Service	III	56,200	93,900	56,200	93,800
	IV	3,000	26,600	2,600	26,100
	V	100	0	100	0
Tribal and Other Federal	III	3,700	11,000	3,700	10,100
	IV	254,800	76,000	0	0
	V	74,900	695,700	23,900	448,300
Private	III	500	12,900	500	600
	IV	164,300	124,800	0	0
	V	13,400	11,700	200	5,700
State	III	200	6,900	200	5,300
	IV	16,600	22,500	0	0
	V	5,300	2,900	5,300	2,900
Other	III	0	0	0	0
	IV	1,500	0	0	0
	V	800	2,200	800	2,200

Source: Manier et al. 2013

[1]Includes ACECs, USFWS wildlife refuges, national conservation easements, National Park System units, BLM National Landscape Conservation System units, conservation areas on private and state property, and congressionally designated Wilderness.

(PDF Map 3–16)

Figure 3.16. Special Designations and Other Important Resources

3.14.1. Areas of Critical Environmental Concern

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 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 3809.1-4(b)(3), which requires an approved plan of operations for activities resulting in more than five acres of disturbance under the mining laws.

RNAs are areas 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. Under current guidelines, ACEC procedures also are used to designate outstanding natural areas (ONAs).

Current Condition

There are 23 currently designated ACECs, RNAs, and ONAs in the planning area that contain GRSG habitat. These ACECs, RNAs, and ONAs are shown on **Table 3-62**, Designated Areas of Critical Environmental Concern in GRSG Habitat.

Appendix L, Areas of Critical Environmental Concern Report, details the evaluation of relevance and importance criteria for ACECs nominated as part of this effort.

Table 3.62. Designated Areas of Critical Environmental Concern in GRSG Habitat

Name	District	Total Acres	Relevant and Important Value(s)	Acres within PGH	Acres within PPH
Ash Valley	Northern California	1,200	Threatened and Endangered Vegetation	500	0
Baking Powder Flat	Ely	13,640	Vegetation	3,041	481
Bitner	Northern California	1,900	Cultural and Wildlife	0	1,900
Bruneau/Jarbidge River	Jarbidge	11,412	Wildlife and Cultural	6,608	3,357
Buffalo Creek Canyons	Northern California	35,700	Scenic and Cultural Values	0	35,700
Blue Mass	Ely	950	Cultural and Scenic	7	0
Condor Canyon	Ely	4,500	Spinedace Critical Habitat	1,700	1,100
Eagle Lake Basin	Northern California	30,500	Cultural and Wildlife	5,500	0
High Rock Canyon	Winnemucca	5,700	Cultural, Scenic, Wildlife	300	5,200
Lower Smoke Creek	Northern California	900	Watershed and Cultural	100	800
Massacre Rim	Northern California	48,200	Cultural and Wildlife	1,900	46,200
Mountain Peaks	Northern California	3,800	Scenic and Vegetation	0	2,800
North Dry Valley	Northern California	10,200	Cultural, Geologic, Wildlife	0	9,900
Old Growth Juniper	Northern California	3,100	Vegetation	0	1,400
Owyhee River/Big Horn Sheep*	Owyhee	3	Wildlife	3	0
Pine Dunes	Northern California	2,900	Geologic and Vegetation	0	2,900

Name	District	Total Acres	Relevant and Important Value(s)	Acres within PGH	Acres within PPH
Rahilly-Gravelly	Northern California	900	Cultural and Vegetation	0	900
Schlesser Pincushion	Ely	4,930	Threatened and Endangered Vegetation	126	0
Shoshone Ponds	Ely	1,200	Vegetation and Threatened and Endangered Fish	0	300
Snake Creek Indian Burial Cave	Ely	40	Cultural	13	0
White River Valley	Ely	12,900	Vegetation	7	0
Willow Creek	Northern California	2,200	Scenic and Cultural	20	1,600
Yankee Jim	Northern California	1,700	Cultural and Vegetation	0	1,700
Source: BLM and Forest Service GIS 2013 *Nevada Acreage					

3.14.2. Wilderness

In 1964, Congress passed the Wilderness Act (Public Law 88-577), establishing 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 37 Wilderness Areas (20 managed by the BLM and 17 managed by the Forest Service) with GRSG habitat in the planning area. Refer to **Table 3-63**, Wilderness Areas, for information on BLM and Forest Service Wilderness Areas in GRSG habitat.

Table 3.63. Wilderness Areas

Name	Total Acres	Acres within PGH	Acres within PPH
BLM Wilderness			
Becky Peak	18,100	3,200	1,100
Bristlecone	14,100	900	20
Calico Mountains	65,000	6,400	32,600
East Fork High Rock Canyon	52,600	100	52,400
Far South Egans	36,300	0	2,700
Fortification Range	30,500	200	200
Goshute Canyon	42,500	4,700	9,000
Government Peak	6,300	0	200
High Rock Canyon	46,600	20	46,500
High Rock Lake	58,400	3,900	43,600
Highland Ridge	68,500	800	1,900
Little High Rock Canyon	48,700	20	48,600

Name	Total Acres	Acres within PGH	Acres within PPH
Mount Grafton	78,700	4,400	12,700
North Black Rock Range	30,600	16,800	12,600
North Jackson Mountains	23,400	6,200	0
Pahute Peak	56,900	1,400	12,800
Parsnip Peak	43,500	2,200	5,000
South Egan Range	67,100	1,900	1,500
South Jackson Mountains	54,500	3,200	0
White Rock Range	24,200	0	3,600
Forest Service Wilderness			
Alta Toquima	35,500	8,200	3,000
Arc Dome	120,500	10,000	38,800
Bald Mountain	19,400	500	3,000
Currant Mountain	36,700	500	200
Currant Mountain Addition	10,600	2,900	1,400
East Humboldt	32,300	600	3,100
High Schells	121,500	11,000	4,800
Jarbidge	64,300	10	2,400
Jarbidge Addition	46,100	1,500	14,500
Mt. Moriah	71,400	1,700	1,000
Red Mountain	20,500	0	500
Ruby Mountain	92,100	6,600	700
Santa Rosa-Paradise Peak	32,000	600	6,100
Shellback	36,100	400	9,800
South Warner	124,900	70	0
Table Mountain	92,400	2,800	19,800
White Pine Range	40,000	4,700	1,400
Source: BLM and Forest Service GIS 2013			

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 recommendations of lands which consisted of:

> …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 each 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, in a manner 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 47 million acres of public lands in Nevada. A statewide inventory resulted in approximately 5,170,000 acres in 110 areas being designated as Wilderness Study Areas in 1979-1980. Since the inception of the WSAs, various congressional actions

have addressed 45 WSAs (2,055,005 acres). These have been added to the National Wilderness Preservation System as designated wilderness.

Current Condition

Throughout the planning area, there are 38 BLM Wilderness Study Areas that contain GRSG habitat. There are an additional 19 WSAs that do not contain GRSG habitat and will not be addressed further in this document. Only those WSAs that contain GRSG habitat are shown in **Table 3-64**, Wilderness Study Areas. All WSAs are managed under specific guidance regarding activities and other resource management actions which is provided in BLM Manual 6330, Management of Wilderness Study Areas. Under this guidance, all activities are required to meet non-impairment 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 3.64. Wilderness Study Areas

Name	Total Acres	Acres within PGH	Acres within PPH
Wilderness Study Areas			
Alder Creek	5,200	2,200	0
Antelope Range	83,700	9,400	15,100
Augusta Mountains	88,100	11,600	0
Bad Lands	9,300	0	9,300
Blue Lakes	20,000	5,400	1,100
Bluebell	54,400	4,700	0
Buffalo Hills	45,700	0	45,400
Cedar Ridge	9,500	4,100	1,100
China Mountain	10,200	100	8,300
Clan Alpine Mountains	195,800	9,600	13,300
Desatoya Mountains	51,000	2,300	18,100
Disaster Peak	12,500	2,500	9,200
Dry Valley Rim	70,600	2,100	70,600
Fandango	43,400	2,600	6,700
Goshute Canyon	300	0	0
Goshute Peak	70,100	6,600	0
Job Peak	89,600	5,200	26,800
Kawich	67,900	13,700	1,000
Lahontan Cutthroat Trout ISA	11,900	4,300	7,500
Little Humboldt River	41,200	17,000	18,000
Massacre Rim	100,700	11,100	88,300
Morey Peak	19,200	3,300	1,200
Mountain Meadow ISA	20	20	0
North Fork of the Little Humboldt River	69,600	100	66,200
Owyhee Canyon	21,500	5,400	16,000
Park Range	48,800	10,800	0
Poodle Mountain	141,700	2,800	101,000
Red Spring	7,600	2,500	10
Roberts Mountain	15,200	6,100	1,500
Rough Hills	6,500	100	6,400
Sheldon Contiguous	222300	0	23,500
Simpson Park	49,300	50	19,500
Skedaddle	600	0	500
South Fork Owyhee River	7,800	30	5,600
South Pequop	40,300	9,400	200
South Reveille	115,400	200	0

Name	Total Acres	Acres within PGH	Acres within PPH
Tobin Range	13,100	7,600	2,300
Twin Peaks	70,500	13,100	50,600
Wall Canyon	46,300	200	46,300
Source: BLM and Forest Service GIS 2013			

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 (WSR Act; Public Law 90-542, as amended; 16 USC1271-1287). 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 suitable rivers is to manage their 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 that are within the State of Nevada or are managed by Nevada BLM. Of these river segments, approximately 3 miles of the East Fork of the Carson River in California is managed by the BLM Carson City District. This river segment was determined to be suitable with a tentative classification of Scenic in the Humboldt-Toiyabe Forest Management Plan for the Sierra Nevada Division (Carson and Bridgeport Ranger Districts).

The BLM has determined Twelve-mile Creek in the northwestern corner of the state as suitable with a tentative classification of Recreational under the Lakeview RMP (Oregon) and the Surprise RMP (California). The creek enters into Nevada for approximately 2 miles before crossing back into Oregon.

Both of these river segments have been designated as suitable through the land use planning process and are documented through their respective LUPs but have not been designated into the National Wild and Scenic Rivers System. The East Fork of the Carson River does not cross GRSG habitat. The Twelve Mile creek segment in northwestern Nevada is tentatively classified as recreational. 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. Both of these river segments are determined to be suitable but have not been designated into the National Wild and Scenic Rivers System and will not be 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 within the state of Nevada: Black Rock Desert – High Rock Canyon Emigrant Trails NCA, Red Rock Canyon NCA, and Sloan Canyon NCA. Of these three NCAs,

only Black Rock Desert – High Rock Canyon Emigrant Trails NCA contains GRSG habitat. The other two NCAs do not contain GRSG habitat and will not be analyzed further in this document.

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

There are approximately 381,282 acres of GRSG habitat within the NCA. Of that acreage, 53,649 acres are PGH, and approximately 327,633 acres are PPH.

National Scenic and Historic Trails

An NHT is congressionally designated 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 NHTs Management Corridors (BLM 2012e) These corridors are to be established in order to assist in the management of the resources, qualities, values, and associated settings and the primary use or uses for which the NHT was designated by Congress. The designation of NHTs 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.

Within Nevada, there are two national historic trails in the planning area, the California NHT and the Pony Express NHT, which cross lands that contain GRSG habitat.

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 within 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 within the planning area.

Pacific Crest National Scenic Trail. The Pacific Crest National Scenic Trail is administered by the Forest Service. The Forest Service partners with the BLM, NPS, California State Parks, and the Pacific Crest Trail Association to provide effective management and protection of the trail (Forest

Service 2012e). Approximately 200 miles of the Pacific Crest National Scenic Trail fall within the planning area. The trail does not traverse any PPH or PGH 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 improvements such as motorized trails, fences, outfitter camps, and evidence of historical logging activities. As required by 36 CFR 219.17, inventoried roadless areas are identified during Forest Plan development or revision and are qualified for study if they meet the following criteria:

- They are 5,000 acres in size or larger.
- They are less than 5,000 acres, but contiguous to an existing Wilderness Area.
- There are no classified roads (A classified road was defined at the time of inventory as a road constructed or maintained for long-term highway vehicle use. Therefore, inventoried roadless areas may contain motorized and non-motorized trails and user created roads).

3.15. Water Resources

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

Water quality on BLM- and Forest Service-administered lands is regulated by the Clean Water Act (CWA), 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 1251 et seq.) requires maintenance and restoration of the physical, biological, and chemical integrity of waters of the US. 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 Forest Service-administered lands. The EPA supports this perspective in their guidance, “Nonpoint Source Controls and Water Quality Standards” (EPA 1987).

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. Several potential outcomes exist for runoff that flows from the mountain blocks

and into the valley bottom. As surface water moves from the mountains into the valley setting, 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 central portions of the valley); 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 diversion 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 rain storms and snow melt generate runoff that contributes to temporary stream-flow 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.

Within 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 precipitation events. Intermittent streams flow during spring runoff for an average water year, but generally dry up later in the summer. Perennial streams contain some water all year for an average water year. Lakes can be permanent or temporary. Wetlands and floodplains vary in extent and depth throughout the year. Permanent waters can also be in the form of ponds and reservoirs developed for human or livestock consumption.

Surface Water

The US 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 3-65**, Hydrologic Sub-basins in the Planning Area, lists the sub-basins in the planning area.

Table 3.65. Hydrologic Sub-basins in the Planning Area

Sub-basin Name	8-Digit Hydrologic Unit Code Number	Total Sub-basin Size (acres)	Sub-basin Size in Planning Area (acres)	BLM/Forest Service-Administered Lands in Sub-basin in Planning Area (acres)	Length of Streams in Sub-basin in Planning Area (miles)	Length of Streams Crossing BLM/Forest Service-Administered 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
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

Sub-basin Name	8-Digit Hydrologic Unit Code Number	Total Sub-basin Size (acres)	Sub-basin Size in Planning Area (acres)	BLM/Forest Service-Administered Lands in Sub-basin in Planning Area (acres)	Length of Streams in Sub-basin in Planning Area (miles)	Length of Streams Crossing BLM/Forest Service-Administered Lands in Sub-basin in Planning Area (miles)
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
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

Sub-basin Name	8-Digit Hydrologic Unit Code Number	Total Sub-basin Size (acres)	Sub-basin Size in Planning Area (acres)	BLM/Forest Service-Administered Lands in Sub-basin in Planning Area (acres)	Length of Streams in Sub-basin in Planning Area (miles)	Length of Streams Crossing BLM/Forest Service-Administered Lands in Sub-basin in Planning Area (miles)
Spring-Steptoe Valleys	16060008	3,403,400	3,402,500	2,926,300	7,200	5,800
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 2013						

Surface water resources in the planning area include 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. Stream flow has been altered by management activities such as water impoundments, water withdrawal, road construction, vegetation manipulation, grazing, wildland fire activities, 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 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.

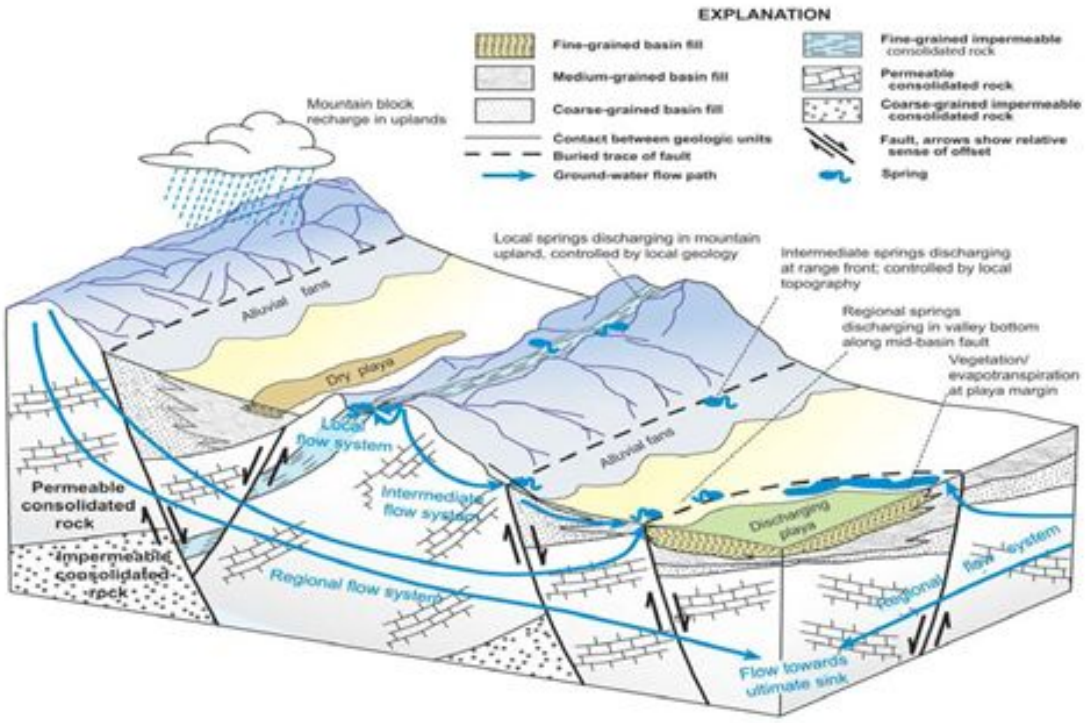
Water developments, such as troughs for livestock, are not influential sources of water for GRSG. However, water developments provide additional and alternative sources of water for wildlife and livestock and can decrease the use of riparian areas as water sources, thereby resulting in improved meadow conditions.

Groundwater

Groundwater resources in the planning area include local basin-fill aquifers, deep, regional aquifers and, in some areas, geothermal aquifers. **Figure 3-17**, Conceptual Groundwater Flow System, shows a conceptual model of a groundwater flow system typically found within the planning area (Welch et al. 2007).

Groundwater is primarily used for irrigation, domestic use, and livestock use in the planning area. 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.



Source: Welch et al. 2007

Figure 3.17. Conceptual Groundwater Flow System

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 of these springs 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. Activities such as livestock or wild horse grazing and watering, recreation use, mining, road construction, and vegetation management have affected spring systems in the past. Activities such as well drilling or blasting can affect springs by reducing the amount of water in their aquifers or by affecting subsurface flow patterns.

Riparian Areas and Wetlands

As described in **Section 3.4**, Riparian Areas and Wetlands, 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).

Condition and trend of riparian areas and wetlands varies throughout the planning area (refer to **Table 3-13**, Lotic and Lentic Riparian Areas Meeting Goals for Rangeland Health Standards, and discussion in **Section 3.4**, Riparian Areas and Wetlands).

Water Quality

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. The states of Nevada and California are required to identify impaired surface water bodies under Section 303(d) of the CWA. There are approximately 4,076 miles of Section 303(d)-listed streams and water bodies within the planning area.

The most common impairments for Section 303(d)-listed waters in the planning area include 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 non-point 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 include removal of riparian vegetation and destabilization of stream banks. Removal of 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 solar energy 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 stream flow; 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 include roads, trails, water withdrawal, reservoir storage and release, altered physical characteristics of the stream, and wetlands alteration.

Water Availability

Water availability can vary on a yearly basis depending on the amount of water recharged and the amount 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 amount 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 amount of water used in the planning area is dependent 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 management of water appropriations in the planning area is administered by the Nevada Division of Water Resources in Nevada and the California State Water Resources Control Board in California. The BLM authorizes the use of water on

BLM-administered lands if the applicant has been permitted by the BLM 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 within 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 Nevada 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 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 within the planning area include agricultural, municipal, mining and milling, industrial, stock watering, and wildlife uses.

Since all water within 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 does recognize 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.

Within the State of 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 only applies for a wildlife water right 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 currently require a water right in the State of Nevada (Masto 2011).

In Nevada, the BLM and Forest Service have been precluded from being able to apply for water rights for stock watering use in most cases. Under Nevada water law, the Nevada State Engineer will issue a permit to appropriate water for the purpose of 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 in state law apply to any water application processed by the Nevada State Engineer after June 12, 2003. Water developments such as troughs for livestock are not influential sources of water for GRSG. 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 riparian's rights are superior to the rights of an appropriator except in cases where the water had been appropriated before the riparian

acquired the patent to his land, and after the passage of the 1866 Mining Act that recognized appropriation. Generally, a reasonable use by a riparian will trump an appropriative right so long as the patent to the riparian parcel was acquired from the United States prior to 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 causing undue interference with the riparian's reasonable use of the water.

3.16. Soil Resources

The BLM and Forest Service 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, 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 GRSG is dependent upon the presence of sagebrush, and sagebrush type and viability are dependent on soil type and quality, soils are an important element in GRSG habitat.

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 ridge tops. On uplands where rainfall is moderate to low, medium-textured soils may produce favorable conditions, depending on land uses such as livestock grazing. Soils that feature shallow claypans, hardpans, or salts 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 degradation occurs in semi-arid, high desert regions, natural processes are slow to return site productivity. Prevention of soil degradation is far more cost- and time-effective than remediation or waiting for natural processes. Management practices such as proper stocking rates for livestock, rotation of grazing, periodic rest from grazing, improved design, construction and maintenance of roads, selective logging, rehabilitation of unneeded

surface disturbance, restricting vehicles to roads and trails, rehabilitating mined areas, and control of concentrated recreational activities have reduced erosion effects and improved soil conditions.

Soil Erosion

Erosion is a continuing natural process that can be accelerated by human disturbances. Factors that influence soil erosion include soil 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 semi-arid planning area has between 17,730,500 acres of native vegetation and 189,200 acres of non-native vegetation, allowing the soils to erode naturally in wind and during infrequent rain events.

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

The term 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 utilize them for public benefit. Fragile and irreplaceable, cultural resources represent an integral part of American heritage. Cultural resources represent physical locations of human activity, occupation, or use identified through field inventories, historical documentation, or 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 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 in or eligible for listing in 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, described below:

- The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association
- 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 (NPS 1997)

Current Condition

Cultural resources, including historic properties (those 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 the ROD. All future project-related activities analyzed in order to implement the goals and objectives set forth in the ROD will be in compliance 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 include 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 (BLM 1990d); BLM Handbook H-8120-1, Guidelines for Conducting Tribal Consultation (BLM 2004g); USDA Department Regulations 1340-007 and 1350-002; Forest Service Manual FSM 1500, External Relations (Forest Service 1990); Forest Service Handbook Direction FSM 1509 (Forest Service 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 time 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 the GRSG 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 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). Bonneville Estates Rockshelter is located in eastern Nevada along the Nevada-Utah border. Burned GRSG bones with stone tool cut marks were found lying next to hearths dating back 12,000 years ago. GRSG 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 bones of pygmy rabbit (*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, and the Native Americans who occupied the shelter hunted GRSG 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, located 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 GRSG 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 GRSG at least 12,000 years ago. The known distribution of GRSG between circa 14,000 to 9,500 years ago included habitats that currently do not support GRSG due to a lack of suitable sagebrush habitat (such as near Bonneville Estates Rockshelter), as well as habitats that continue to support sagebrush and GRSG (such as near Smith Creek Cave). During the relatively cool and moist climates of the Late Pleistocene-Early Holocene, sagebrush habitats that supported active GRSG populations were present 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 GRSG. 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, GRSG 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 with the Middle Holocene, but several significant sub-climatic phases have been identified. These include 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 include 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, GRSG 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). Hunting of GRSG was generally done in the spring at leks. Deadfalls, hunting blinds, nooses, snares, and even nets with associated brush wings were all commonly used (Steward 1941; Steward 1943). In some cases, a hunter wore a deer or antelope costume to hunt GRSG (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 amongst Western Shoshoni bands located at Battle Mountain, Egan, Elko, Ely, Hamilton, Ione Valley, Morey, Ruby Valley, and Snake River.

Quantitative information on the significance of GRSG 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 GRSG was and is the most commonly hunted bird by the *Kidü- dökadö*. Amongst the *Toe- dökadö*, it is a favorite due to its size and flavor, but they 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.

Sage-Grouse 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 GRSG saved fire during the world flood. The GRSG, the only bird (or animal in other variants) to survive the flood, protected a fire on a mountain top, 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 which 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 the 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's 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 in response to climatic conditions that were either favorable or unfavorable to sagebrush. Sage-Grouse bones and feathers have been recovered across the entire study region at various times in the past. Sage-Grouse have been hunted in the study area for the past 12,000 years, and were actively hunted by Native American families at historic contact. Sage-Grouse, therefore, have been hunted by Native Americans in the study area from the Late Pleistocene through the Industrial/Modern climatic phases.

Consultation with Modern Native American Tribes

Letters requesting a consultation meeting to discuss the details of the GRSG planning efforts, including a fact sheet about the LUPA/EIS effort and maps showing GRSG preliminary habitat and management units, were sent to the tribes listed in **Table 3-66**, Tribal Consultation and Outreach Efforts for the Nevada and Northeastern California Sub-region Sage-Grouse LUPA/EIS. Each of the tribes listed in **Table 3-66** were also invited to participate in the planning effort as cooperating agencies. **Table 3-66** summarizes the tribes consulted, as well as the results of the joint consultation efforts by the BLM and the Forest Service. Although the process of participating in the effort 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 **Table 3-66**.

Table 3.66. Tribal Consultation and Outreach Efforts for the Nevada and Northeastern California Sub-region Sage-Grouse LUPA/EIS

Tribe	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
Battle Mountain Band	12/7/2011 – Invitation as cooperating agency 6/5/2012 – Consultation invitation letter sent 7/25/2012 – Consultation with Battle Mountain Band (Vice Chair and tribal members), BLM Battle Mountain District (Doug Furtado and Tim Coward), and Forest Service (Steve Williams)	Did not sign MOU as a cooperating agency. Tribe mentioned concerns that disturbance from people and crows eating eggs are affecting GRSG populations.
Yomba Shoshone	12/7/2011 – Invitation as cooperating agency 6/5/2012 – Consultation invitation letter sent 6/8/2012 – Consultation with Yomba Shoshone (Chair and tribal members), BLM Battle Mountain District (Chris Cook and Tim Coward), and Forest Service (Steve Williams)	Did not sign MOU as a cooperating agency. No GRSG-related comments received.
Fallon Paiute	12/7/2011 – Invitation as cooperating agency 6/12/2012 – Consultation invitation letter sent 7/17/2012 – Consultation with Fallon Paiute (Vice Chair and tribal members), BLM Carson City District (Teresa Knutson and Susan McCabe)	Did not sign MOU as a cooperating agency. Tribe expressed concerns about restricted access to pine nutting areas. Tribal members sometimes access pine nutting areas by OHVs and 4-wheel drive vehicles. Tribe expressed concerns that the current drought and jets breaking the sound barrier may disrupt GRSG especially during hatching season.
Reno-Sparks Indian Colony (RSIC)	11/17/2011– Consultation with RSIC (Michon Eben, Cultural Resource Director), and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood) 12/7/2011 – Invitation as cooperating agency 3/1/2012 – Phone Conversation with RSIC (Michon Eben) and BLM Carson City District (Jim Carter) 4/6/2012 – Consultation with RSIC (Michon Eben, Cultural Resource Director) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood) 6/12/2012 – Consultation invitation letter sent – Carson City District 7/2/2012 - Update on EIS sent. 9/19/2012 - Consultation with RSIC (Michon Eben, Cultural Resource Director) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood)	No GRSG-related comments received. Did not sign MOU as a cooperating agency. Tribe has concerns with GRSG habitat. No GRSG-related comments received. No GRSG-related comments received. No GRSG-related comments received. No GRSG-related comments received. No GRSG-related comments received.

Tribe	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
	2/1/2013 - Consultation with RSIC (Michon Eben, Cultural Resource Director) and BLM Eagle Lake Field Office (Ken Collum, Sharynn Blood, and Marilla Baker)	
Walker River Paiute	12/7/2011 – Invitation as cooperating agency 6/12/2012 – Consultation invitation letter sent 6/29/2012 – Consultation with Walker River Paiute (Vice Chair and tribal members), BLM Carson City District (Teresa Knutson and Susan McCabe)	Did not sign MOU as a cooperating agency. No GRSG-related comments received.
Washoe	11/1/2011 – Consultation with Washoe Tribe (Darrel Cruz, Tribal Historic Preservation Officer), and BLM Eagle Lake Field Office (Sharynn Blood) 12/7/2011 – Invitation as cooperating agency 2/29/2012 – Phone conversation with Washoe Tribe (Darrel Cruz, Washoe Tribal Historic Preservation Officer) and BLM Carson City District (Jim Carter) 3/2/2012 - Phone conversation with Washoe Tribe (Marie Barry, Washoe Environmental Director) and BLM Carson City District (Jim Carter) 4/18/2012 - Update on EIS sent and phone call. 6/12/2012 – Consultation Invitation Letter sent by Carson City BLM. 7/2/2012 - Update on EIS sent by Eagle Lake Field Office. 11/13/2012 - Consultation with Washoe Tribe (Darrel Cruz, Tribal Historic Preservation Officer), BLM Eagle Lake Field Office (Sharynn Blood)	No GRSG-related comments received. Signed MOU as a cooperating agency. Comments received on May 8, 2013. Tribe is concerned about invasive species, as well as the impact of tree thinning projects on juniper trees. Juniper trees are important to the tribe. Tribe is very concerned about GRSG habitat. Tribe has previously commented on GRSG and habitat for Pine Nut Plan Amendment, and hopes those comments will be moved forward during BLM's GRSG planning efforts. No GRSG-related comments received. No GRSG-related comments received. No GRSG-related comments received. No GRSG-related comments received.
Yerington Paiute	12/7/2011 – Invitation as cooperating agency 3/1/2012 – Phone Conversation with Yerington (Shelly Pugh) and BLM Carson City District (Jim Carter) 6/12/2012 – Consultation invitation letter sent	Did not sign MOU as a cooperating agency. No GRSG-related comments received. No further contacts.

Tribe	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
Duck Valley Sho-Pai	12/7/2011 – Invitation as cooperating agency 6/6/2012 – Consultation invitation letter sent 6/26/2012 – Consultation with Duck Valley Sho-Pai (Chairman, Vice-Chair, tribal facilitator, tribal members) and Forest Service (Jeanne Higgins) 8/3/2012 – 2nd Consultation invitation letter sent by Elko BLM	Did not sign MOU as a cooperating agency. Tribe is concerned that cattle grazing and military flights negatively impact GRSG populations. In particular, sonic booms from military jets adversely impact GRSG eggs and breeding at leks. No GRSG-related comments received.
Te-Moak Tribe	12/7/2011 – Invitation as cooperating agency 6/6/2012 – Consultation invitation letter sent 8/3/2012 – 2nd Consultation invitation letter sent by Elko BLM	Did not sign MOU as a cooperating agency. No GRSG-related comments received.
Wells Band	12/7/2011 – Invitation as cooperating agency 6/6/2012 – Consultation invitation letter sent 8/3/2012 – 2nd Consultation invitation letter sent by Elko BLM	Did not sign MOU as a cooperating agency. No GRSG-related comments received.
South Fork Band	12/7/2011 – Invitation as cooperating agency 6/6/2012 – Consultation invitation letter sent 8/3/2012 – 2nd Consultation invitation letter sent by Elko BLM	Did not sign MOU as a cooperating agency. No GRSG-related comments received.
Elko Band	12/7/2011 – Invitation as cooperating agency 6/6/2012 – Consultation invitation letter sent 8/3/2012 – 2nd Consultation invitation letter sent by Elko BLM	Did not sign MOU as a cooperating agency No GRSG-related comments received.
Goshute Tribe	12/7/2011 – Invitation as cooperating agency 2/10/2012 – Consultation with Goshute Tribe (Chair and tribal members) and BLM Utah (Kevin Oliver and Quincy Bahr) and BLM Ely District (Elvis Wall) 6/6/2012 – Consultation invitation letter sent 7/6/2012 - Consultation with Goshute Tribe (Chair, Vice Chair, and tribal members), BLM Ely District (Michael Herder and Elvis Wall), and Forest Service (Jose Noriega)	Did not sign MOU as a cooperating agency. No GRSG-related comments received. Tribe identified GRSG habitat on the reservation. Tribe was concerned that Nevada BLM and Utah might not have a consistent approach toward GRSG management. Tribe was concerned how the GRSG plan would affect grazing. Tribe supports efforts to enhance GRSG habitat.

Tribe	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
Duckwater	12/7/2011 – Invitation as cooperating agency 6/6/2012 – Consultation invitation letter sent 7/2/2012 - Consultation with Duckwater Tribe (Chair and tribal members), BLM Ely District (Rosemary Thomas, Miles Kreidler, and Elvis Wall)	Did not sign MOU as a cooperating agency. No GRSG-related comments received.
Ely Shoshone	12/7/2011 – Invitation as cooperating agency 6/6/2012 – Consultation invitation letter sent 7/10/2012 - Consultation with Ely Shoshone Tribe (Chair and tribal members), BLM Ely District (Rosemary Thomas and Elvis Wall)	Did not sign MOU as a cooperating agency. Tribe noted that there are GRSG habitat areas within the reservation lands. Tribe expressed concerns that the undertaking might restrict their access to pine nutting areas and wild game hunting through road closures. Tribe expressed concern that GRSG are a hunted species while at the same time their numbers are dwindling.
Pyramid Lake Paiute	12/7/2011 – Invitation as cooperating agency 2/29/12; 3/1/2012 – Left phone messages regarding letter of 12/7/2011 4/26/12 – Consultation with Pyramid Lake Paiute Tribe (Chair and tribal members) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood) 6/8/2012 – Consultation invitation letter sent 6/27/2012 - Consultation with Pyramid Lake Paiute Tribe (Chair and tribal members), BLM Winnemucca District (Mark Hall) 7/2/2012 – Update on EIS sent. 1/23/2013 – Consultation with Pyramid Lake Paiute Tribe (Chair, Vice Chair, Tribal Historic Preservation Officer, tribal members) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood)	Signed MOU as a cooperating agency. No GRSG-related comments received. Tribe asked if it is possible to manage for both cattle and birds. BLM responded that it should be possible. Tribe indicated that GRSG was a sacred bird, but they needed to balance this interest with economic reality of grazing and energy development. Tribe hopes the EIS will result in better grazing management practices. Corvids and raptors nesting on utility and transmission lines are negatively impacting GRSG populations. No GRSG-related comments received. No GRSG-related comments received.

Tribe	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
Summit Lake Paiute	12/7/2011 – Invitation as cooperating agency 6/8/2012 – Consultation invitation letter sent 7/21/2012 - Consultation with Summit Lake Paiute Tribe (Chair and tribal members), BLM Winnemucca District (Gene Seidlitz and Mark Hall)	Signed MOU as a cooperating agency. Comments received on May 8, 2013. Tribe is concerned that current planned projects involving road realignments and land acquisition to expand reservation boundaries may be impacted. Tribe is concerned that restrictions may be placed on tribal members observing lekking behavior for traditional cultural practices. Tribe believes wild horses are impacting GRSG leks, and additional conservation measures may be necessary to reduce these impacts. Tribe indicated they would work with the USFWS to complete a GRSG survey and banding of birds on their reservation lands. Tribe feels that OHV use is negatively impacting GRSG populations.
Fort McDermitt	12/7/2011 – Invitation as cooperating agency 6/8/2012 – Consultation invitation letter sent 6/18/2012 – Consultation with Fort McDermitt Tribe (Chair and tribal members, Forest Service (Jeff Ulrich) 7/17/2012 - Consultation with Fort McDermitt Tribe (Chair and tribal members), BLM Winnemucca District (Gene Seidlitz, Mark Hall, and Kathy Ataman)	Did not sign MOU as a cooperating agency. Tribe expressed desire to be more involved in the EIS process, especially the Governor's alternative. Tribe has particular concerns with GRSG populations in the Double H Mountains. Tribe has multiple needs; they recognize that cattle ranching can pose a threat to GRSG, yet they rely on ranching activities as well. GRSG holds a special role for the tribes in traditional culture. Tribe is concerned that NDOW allows GRSG to be hunted while their numbers are in decline.
Lovelock Colony	12/7/2011 – Invitation as cooperating agency 6/8/2012 – Consultation invitation letter sent 9/19/2012 - Consultation with Lovelock Colony (Chair), BLM Winnemucca District (Ken Loda and Mark Hall)	Did not sign MOU as a cooperating agency. No GRSG-related comments received.
Winnemucca Colony	12/7/2011 – Invitation as cooperating agency 6/8/2012 – Consultation invitation letter sent	Did not sign MOU as a cooperating agency. No GRSG-related comments received.

Tribe	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
Pit River Tribe	10/6/2011 – Consultation invitation letter sent 12/7/2011 – Invitation as cooperating agency 1/5/2012 – Consultation with Pit River Tribe (Chair, Vice-Chair, and tribal members), BLM Alturas, Eagle Lake, and Redding Field Offices (Tim Burke, Ken Collum, Jennifer Mata, Dennis Benson, Eric Ritter, Jack Scott, Sharynn Blood, Charlie Wright, Randy Chatterton, Jim Hunt, and Dereck Wilson) 4/5/2012 - Consultation with Pit River Tribe (Chair, Vice-Chair, and tribal members), BLM Alturas, Eagle Lake, and Redding Field Offices (Tim Burke, Ken Collum, Jennifer Mata, Eric Ritter, Jack Scott, and Sharynn Blood) 7/5/2012 - Consultation with Pit River Tribe (Chair, Vice-Chair, and tribal members), BLM Alturas and Eagle Lake Field Offices (Tim Burke, Ken Collum, Jack Scott, Sharynn Blood, Spencer Pelton, Jen Rovanpera, and Devin Snyder) 10/4/2012 - Consultation with Pit River Tribe (Chair, Tribal Historic Preservation Officer, and tribal members), BLM Alturas and Eagle Lake Field Offices (Tim Burke, Ken Collum, Jack Scott, Sharynn Blood, Jen Rovanpera, Rich Estabrook, and James Haerter) 2/7/2013 – Consultation with Pit River Tribe (Chair and tribal members), BLM Alturas and Eagle Lake Field Offices (Tim Burke, Ken Collum, Jack Scott, Sharynn Blood, Jen Rovanpera, and Emily Jennings)	Did not sign MOU as a cooperating agency. No GRSG-related comments received. No GRSG-related comments received. No GRSG-related comments received. No GRSG-related comments received. One tribal member noted that wind farms do not seem conducive to GRSG habitat. Another tribal member discussed porcupines and GRSG and the irony of forest management plans. The Forest Service used to kill porcupines because they were killing the juniper trees. Now the Forest Service is killing the juniper trees to conserve water. She then wondered what would be next-would they then plant trees that need water?
Klamath Tribes	12/7/2011 Invitation as cooperating agency 2/1/2012- Consultation with Klamath Tribe (Perry Chocktoot, Klamath Tribes cultural and Heritage Department Director), BLM Alturas Field Manager (Tim Burke)	Did not sign MOU as a cooperating agency and no specific comments received. No GRSG-related comments received.

Tribe	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
Susanville Indian Rancheria (SIR)	8/3/2011 – Consultation invitation letter sent	No GRSG-related comments received.
	8/3/2011 – Consultation with SIR (Chair, Tribal Historic Preservation Officer, tribal members) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood)	No GRSG-related comments received.
	12/7/2011 – Invitation as cooperating agency	Signed MOU as a cooperating agency. No GRSG-related comments received.
	10/20/2011 – Consultation with SIR (Chair, Tribal Historic Preservation Officer, tribal members) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood)	No GRSG-related comments received.
	1/6/2012 - Consultation with SIR (Chair, Tribal Historic Preservation Officer, tribal members) and BLM Eagle Lake Field Office (Ken Collum, Sharynn Blood, Charlie Wright, Randy Chatterton, Dereck Wilson, and Jim Hunt)	No GRSG-related comments received.
	1/10/2012 - Consultation with SIR (Chair, Tribal Historic Preservation Officer, tribal members) and BLM Alturas Field Office (Tim Burke and Jack Scott)	No GRSG-related comments received.
	4/6/2012 - Consultation with SIR (Chair and tribal members) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood)	No GRSG-related comments received.
	7/6/2012 - Consultation with SIR (Tribal Historic Preservation Officer and tribal members) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood)	No GRSG-related comments received.
	10/5/2012 - Consultation with SIR (Chair and Tribal Historic Preservation Officer) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood)	No GRSG-related comments received.
	1/16/2013 - Consultation with SIR (Tribal members) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood)	No GRSG-related comments received.
	4/12/2013 – Consultation with SIR (Vice Chair, Tribal Historic Preservation Officer, tribal members) and BLM Eagle Lake Field Office (Sharynn Blood)	No GRSG-related comments received.

Tribe	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
Greenville Rancheria	12/7/2011 – Invitation as cooperating agency	Did not sign MOU as a cooperating agency.
	5/8/2012 – Consultation invitation letter sent	No GRSG-related comments received.
	5/18/2012 Consultation with Greenville Rancheria (Lacie Miles, Environmental Director) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood)	No comment received.
	7/2/2012 – Update on EIS sent.	No GRSG-related comments received.
	10/11/2012 – Consultation with Greenville Rancheria (Lacie Miles, Environmental Director) and BLM Eagle Lake Field Office (Sharynn Blood)	No GRSG-related comments received.
	1/25/2013 – Update on EIS sent.	No GRSG-related comments received.
Hanylekim Maidu (Not Federally Recognized)	12/7/2011 – Invitation as cooperating agency	Did not sign MOU as a cooperating agency.
	7/2/2012; 11/30/2012; 1/30/2013 – Updates on EIS Sent	No GRSG-related comments received.
Fort Bidwell Tribe	12/7/2011 – Invitation as cooperating agency	Did not sign MOU as a cooperating agency.
	1/21/2012 – Consultation invitation letter sent	Tribe commented that the EIS sounded like a good idea.
	11/14/2012 – Consultation with Fort Bidwell Tribe (Tribal members), and BLM Surprise Field Office (Tim Burke)	No GRSG-related comments received.
	3/9/2013 – Consultation with Fort Bidwell Tribe (tribal members), and BLM Surprise Field Office (Tim Burke)	No GRSG-related comments received.
Cedarville Rancheria	12/7/2011 – Invitation as cooperating agency	Did not sign MOU as a cooperating agency.
	1/3/2012 – Consultation invitation letter sent	No GRSG-related comments received.
	2/28/2013 – Consultation with Cedarville Rancheria (Tribal Administrator and tribal members), and BLM Surprise Field Office (Tim Burke)	

Tribal concerns are summarized below. The implications of each of the six alternatives analyzed in this LUPA/EIS to these concerns are discussed in **Chapter 4**.

- Fort McDermitt Tribe is especially concerned with GRSG populations in the Double H Mountains.
- Summit Lake Tribe is concerned that proposed road realignment projects near their reservation that were planned prior to the GRSG planning efforts may be negatively impacted by management actions within occupied habitat.
- Summit Lake Tribe is concerned that the GRSG planning efforts 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 efforts 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 GRSG are approved, while GRSG numbers are dwindling.

3.19. Lands with Wilderness Characteristics (BLM)

The LUPA/EIS for GRSG Planning is limited to making land use planning decisions specific to the conservation of GRSG habitats. No decisions related to the management of LWCs will be made as part of this planning effort; therefore, management of LWCs is considered outside the scope of this LUPA process.

As part of the original FLPMA Section 603-mandated inventories, inventories that were conducted during past LUP revisions and amendment efforts, and through other various LWC inventory updates that have recently taken place. Inventories for wilderness characteristics were conducted between 2008 and 2013 and reflect the most up-to-date LWC baseline information for this planning area. 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 (BLM 2012f, BLM 2012g). LWC 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 on LWCs identified through previous or updated inventory efforts.

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. This data is shown in **Table 3-67**, Lands with Wilderness Characteristics, below.

Table 3.67. Lands with Wilderness Characteristics and GRSG Habitat in the Planning Area

District	Unit Name	LWC (acres)	PGH (acres)	PPH (acres)
Winnemucca	Buckhorn Peak	23,399	521	20,538
	Granite Peak	43,202	7,514	10,370
	Bluewing Mountains	25,651	0	0
	Fence Maker	50,282	0	0
	N. Sahwave Mountains	45,687	0	0
	Tobin Range	33,854	3,498	25,794
	Warm Springs	18,058	2,784	15,036
Northern California	Hart Mountain	30,916	0	30,899
	Lost Creek	46,571	0	35,664
	Crooks	129,015	33,111	87,485
	Pinto Springs	18,804	0	18,776
	Calcutta	65,260	2,359	63,847
	Antelope	52,500	0	52,422
	Total	**583,199**	**49,787**	**360,831**
Source: BLM and Forest Service GIS 2013				

With the issuance of BLM manuals 6310 and 6320, districts 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 in the draft RMP phase and are in the process of implementing 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 , nor is there a GIS database on a statewide basis available for GIS supported analysis.

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, and 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 within each of these classes. The most restrictive class in terms of visual impacts is VRM Class I, and the least restrictive class is VRM Class IV. The objectives for each of these classes is as follows:

- Class I. The objective of this class is to preserve the existing character of the landscape. This class 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 repeating the basic elements.

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).

Forest Service

Historically, the Forest Service managed visual quality using the Visual Management System. The key component of the Visual Management System 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 within the first year.

- Modification – Management activities may visually dominate the characteristic landscape. However, landform and vegetation alterations must borrow from naturally established form, line, color, or texture so as to blend in with the surrounding landscape character. The objective should be met within 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 within the surrounding landscapes or character type. When viewed as foreground or middle ground, they may not appear to completely borrow from naturally established form, line, color, or texture. Alterations may also be out of scale or contain detail which is incongruent with natural occurrences as seen in foreground or middle ground. Reduction of contrast should be accomplished within 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 on-going 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 within the area influence air quality throughout the region, not just within the planning area boundaries. This section describes the existing air quality conditions within 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 include carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO2), ozone (O3), particulate matter with a diameter less than or equal to 10 microns (PM10), particulate matter with a diameter less than or equal to 2.5 microns (PM2.5), and sulfur dioxide (SO2). In addition, California and Nevada have established state standards for hydrogen sulfide (H2S) and California has established state standards for sulfates (SO42-) and vinyl chloride (chloroethene). Two additional pollutants, nitrogen oxides (NOX) 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 within the state. Within the planning area, only two California air quality management districts are involved. They are 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 PM10 standards (150 µg/m3 concentration in ambient air). The WCAQMD encompasses all of Washoe County, Nevada; however, the actual sub-area which is in nonattainment is the smaller Reno Planning Area (see **Figure 3-18**, Designations for the Particulate Matter PM10 National Ambient Air Quality Standards). 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 PM10 standard of 50 grams per cubic meter.

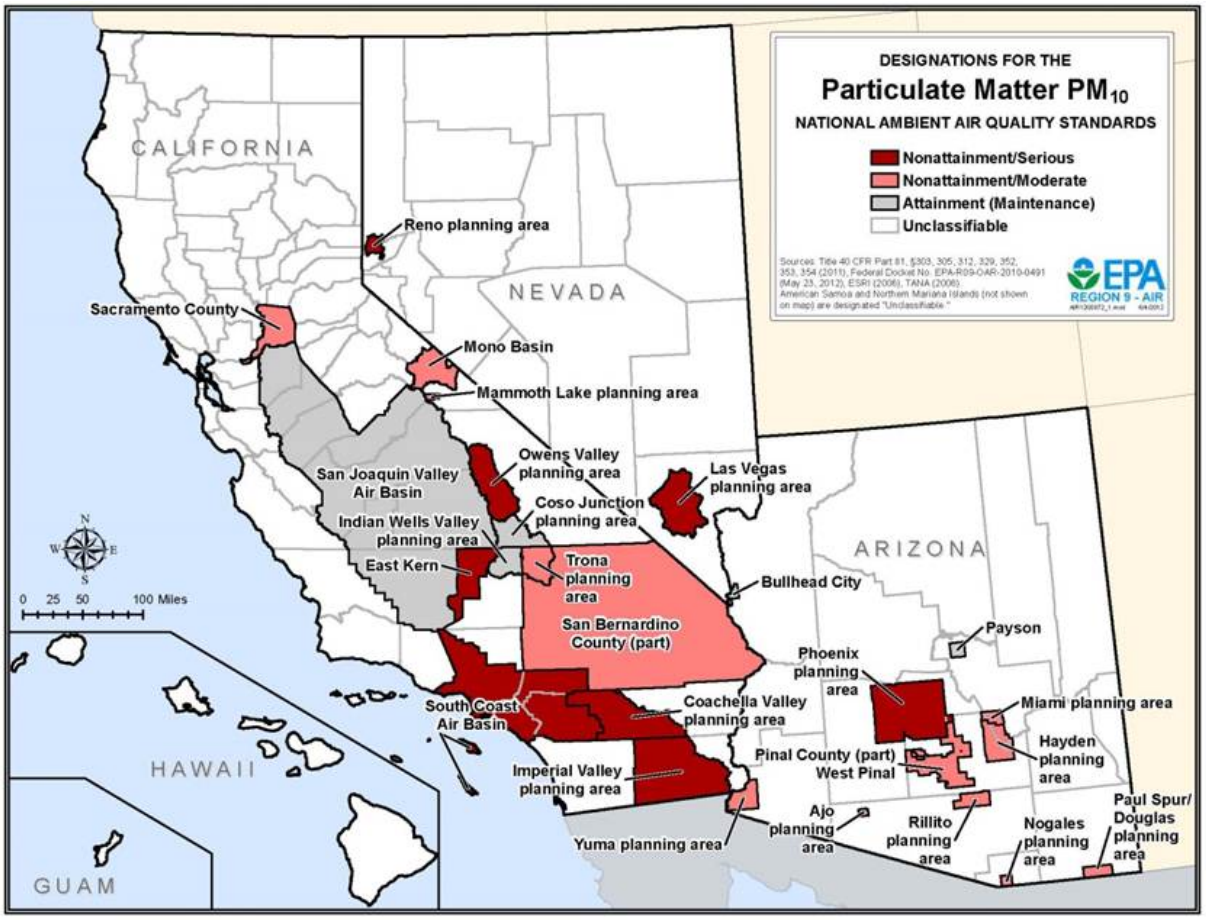


Figure 3.18. Designations for the Particulate Matter PM[10]National Ambient Air Quality Standards

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 and, consequently, the elevated levels of PM10 will not impact any known habitat of concern. Portions of LCAPCD and MCAPCD (California counties of Lassen and Modoc) do contain GRSG habitat, but since these air pollution control districts meet the NAAQS (federal standards), 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, oil and gas operations, etc.). Their concentrations, although oftentimes significant onsite, are generally mitigated through dispersion downwind before reaching significant amounts of GRSG habitat. There is little information concerning the effects of particulate matter (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 a series of 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 tasks within the Order requires each bureau and office within the department to consider and analyze the potential climate change impacts in planning exercises and when making decisions affecting department resources (Kempthorne 2009).

The BLM is currently 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 two components: 1) Facilitated Adaptation, which refers to actions to adjust to and reduce the negative impacts of climate change on ecological, economic, and social systems; and 2) 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 is 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 semi-arid area covering approximately 10,855,900 acres of PPH and PGH within 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 per year (WRCC 2013; Fiero 1986). Precipitation typically falls during the winter as snow in higher elevations, with occasional rain storms 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. Climatic conditions of the eastern Sierra Nevada and western Great Basin are influenced by the rain shadow effect. The rain shadow effect results in relatively little precipitation due to the topography of the Sierra Nevada mountain 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 within 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 prior to formation of the snowpack and explains, in part, the effectiveness of the snowpack in producing runoff. The daily diurnal temperature variation can range in excess of 50°F (Fiero 1986). The wide daily ranges in temperature are 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. Predominately 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 wildfire, 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, resulting in a considerable decrease in the daily diurnal temperature during the study period. Precipitation in the CBR has increased overall 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 within the area since the 1950s, with less precipitation coming as snow and an earlier spring resulting in higher streamflows and impacting plant phenology (Mote et al. 2005; Chambers 2008).

Changes in temperature and precipitation across the CBR have resulted in changes to vegetation cover and wildfire 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 sage-brush have seen increasing stands of pinyon-juniper as well as cheatgrass (see **Section 3.3**, Vegetation). Changes in wildfire regimes 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 in size (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, most mountainous regions, and 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 amongst 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).

The USDA provides water supply outlook for the western United States, including selected Streamflow forecasts, summary of snow accumulation to date, and storage in larger reservoirs. These data are monitored and utilized 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 within drought conditions for seven of the past ten years (Redmond 2013; Drought Monitor Archives 2013). Precipitation during this period was below average with the exceptions of 2004, 2005, and 2010, which all had higher than average precipitation. Mean average temperature has also been above average for nine of the past ten years with the exception of 2011, which was below average. The year 2012 was the second warmest year on record, with average daily temperatures around 51.8°F. The 2013 water year is proving to be one of the driest years on record, with no major winter snow accumulations since early January. Current stream flow forecasts show most of the major river systems in the planning area will be at 25 to 50 percent of average for 2013 (USDA 2013).

Climate change was analyzed in the CBR REA (Comer et al. 2012a) based on the current conditions within 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, and the use of several global climate models analyzed for the Intergovernmental Panel on Climate Change Fourth Assessment Report (IPCC 2007; Comer et al. 2012a) to project if future climate change values exceeded natural variability. These models 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. Public criticism regarding the use of modeled predictions from climate change models still occurs, 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 ability to predict current climate regimes. 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 places 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 months in either the near term (2020s) or midcentury (2050s) projections (Comer et al. 2012).

Results for temperature showed increases in daily maximum temperature, particularly during the summer months from July to September for 2025 and in July and August for 2060. **Table 3-68**, Temperature Variations in the Planning Area, lists the summary of areal extent of climate change

for individual variables that have at least two standard deviations of projected change from the baseline (1900 to 1979) mean (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 (**Figure 3-19**, Forecasted Monthly Maximum Summer Temperature Change (degrees F) by the 2020s, for July, August, and September and **Figure 3-20**, Forecasted Monthly Maximum Summer Temperature Increases (degrees F) for 2060, for July and August). 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 wildfire regimes (Comer et al. 2012a).

Table 3.68. Temperature Variations in the Planning Area

Variable (Month, 2060 Forecast)	%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 Min Temp	0.2%	7.67	6.24	8.77	0.57
March Min Temp	0.6%	5.62	4.67	6.97	0.50
April Min Temp	8.9%	4.94	3.68	6.71	0.39
May Max Temp	0.005%	5.57	5.57	5.57	NA
May Min Temp	4.4%	4.52	3.79	6.26	0.31
June Max Temp	6.6%	6.52	5.43	9.06	0.39
June Min Temp	54.6%	5.42	4.24	8.22	0.47
July Max Temp	90.5%	5.51	4.25	8.70	0.45
July Min Temp	90.6%	6.03	4.17	9.47	0.59
August Max Temp	85.1%	6.14	4.46	8.59	0.39
August Min Temp	93.9%	6.76	4.71	9.76	0.55
September Max Temp	9.5%	6.09	5.07	7.46	0.42
September Min Temp	90.6%	6.77	4.98	10.12	0.56
October Max Temp	0.6%	7.16	5.68	8.33	0.46
October Min Temp	61.2%	5.76	4.33	8.27	0.58
November Min Temp	0.1%	5.39	4.57	5.87	0.36
December Min Temp	0.1%	6.05	5.43	7.57	0.62
Source: Comer et al. 2012a					

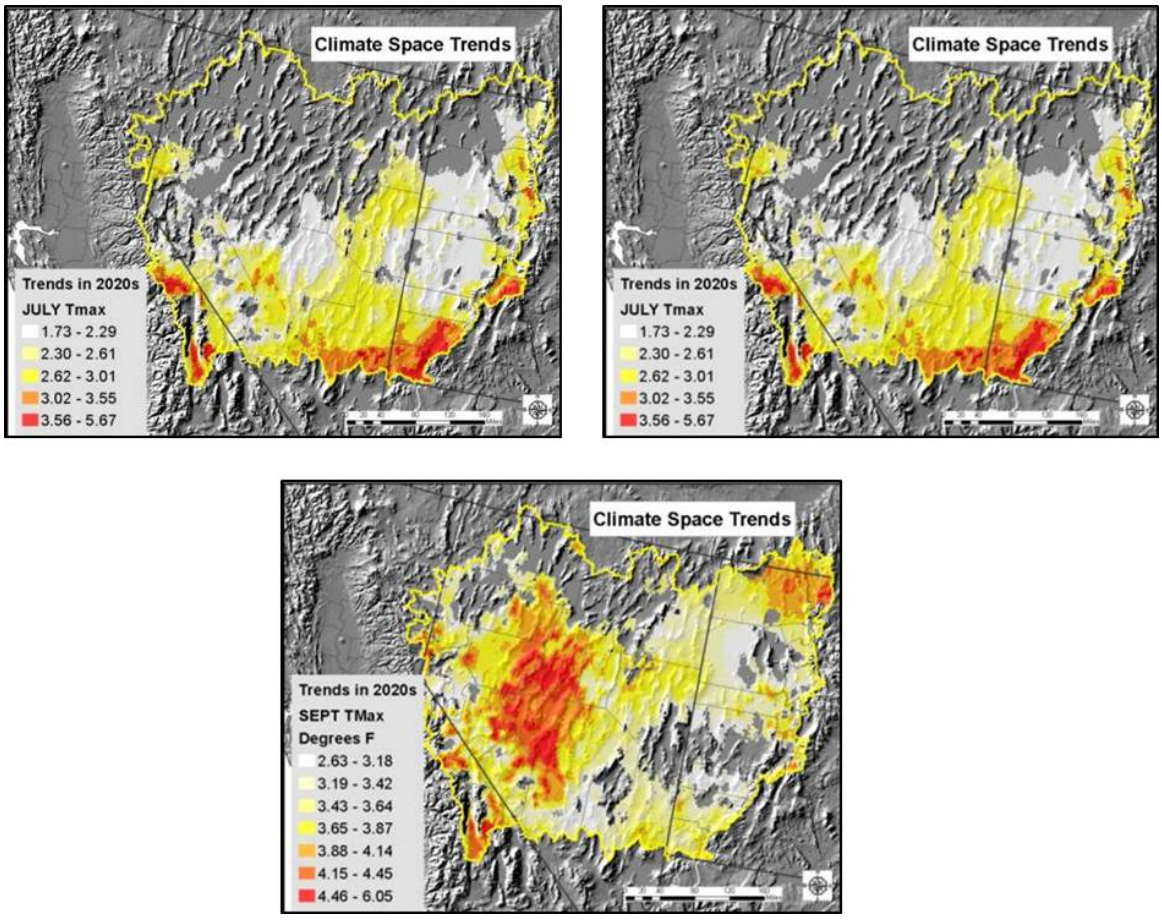


Figure 3.19. Forecasted Monthly Maximum Summer Temperature Change (degrees F) by the 2020s, for July, August, and September (Comer et al. 2012a)

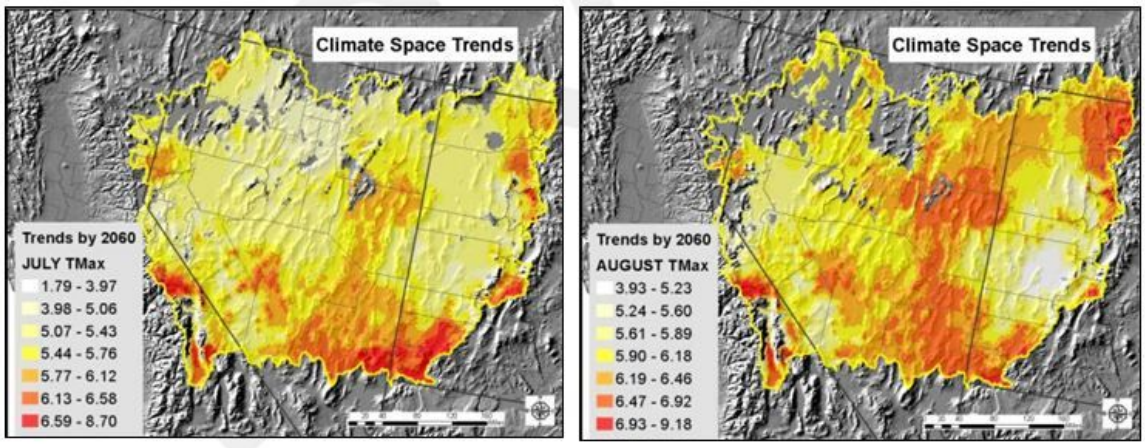


Figure 3.20. Forecasted Monthly Maximum Summer Temperature Increases (degrees F) for 2060, for July and August (Comer et al. 2012a)

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 the timeframe of 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).

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 their 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 but not limited to 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 regarding 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 sage. 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 2 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 Sage

Wyoming Big Sage 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 Sage 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 herbivorous/granivorous 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 are dependent on the herbage, fruits, and seeds of native grasses and forbs. The native understory is also important to the sustenance of abundant, diverse arthropod communities important as food sources for reptiles such as the greater and pygmy short-horned lizards, insectivorous mammals such as Merriam's, Preble's, and Inyo shrew, as well as all the brood-rearing songbirds including Sage Thrasher, Brewer's Sparrow, Sage Sparrow, and Loggerhead Shrike. In turn, several of these species are preyed upon by predators, including Burrowing Owl, Ferruginous Hawk, Bald Eagle, and Prairie Falcon.

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 wildfire, land disturbance, and the encroachment of pinyon and juniper trees from their characteristic sites primarily through natural seed dispersal and fire suppression. Invasive grasses and forbs change the community through the eventual replacement of the native understory with species whose seeds and herbage are of less nutritional value and are available in nutritious form for a shorter period of time compared with the native understory. Eventually, through the change in fire regime facilitated by annual grass/exotic forb build-up 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 Thrasher, Brewer's Sparrow, and Sage Sparrow, 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 Sparrow (CalPIF 2005). GBBO bird response analysis predicted that among three species, Sage Thrasher, Brewer's Sparrow, and Sage Sparrow, Sage Sparrow demonstrated the greatest negative sensitivity to 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 Thrasher, 18 percent reduction in area occupied by Sage Sparrow, and an 11 percent reduction in area occupied by Brewer's Sparrow 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 maintain their occurrence 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.

An evaluation of the relative values of the different classes of sagebrush leads to the identification of uncharacteristic classes that will have definite impacts on wildlife's ability to stay on the landscape. For the purposes of 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 wildfire or applied management) can be expected to be abandoned by shrub-associated wildlife species for the first 12 or so years, but 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 the shrub-nesting birds such as Sage Thrasher, Brewer's Sparrow, and Sage Sparrow which seem to be non-responsive to changes in understory condition as long as the shrubs persist, particularly in their mature stages. GRSG should conceivably find the depleted and shrub-annual grass-perennial grass classes acceptable as wintering habitat as the understory would be under the snow, but assign lower suitability to the depleted class during nesting summer foraging. The lack of understory impacts nesting success through increased nest predation (Coates and Delehanty 2010) and lack of herbaceous material and associated herbivorous 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 where sagebrush types are more typically montane or associated with montane dry washes, and largely restricted to the Spring Mountains and Sheep Range, 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 wildfire. 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 regions might particularly affect Sage Sparrow, a species associated more prevalent with Wyoming Big Sage biophysical setting than other types of sagebrush. Pygmy rabbits might particularly suffer range retractions in the 2 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 Sparrow, 20 percent for Sage Sparrow, and 21 percent for Sage Thrasher based on the TNC climate change analysis. Whether or not 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 within the Nevada and Northeastern California Sub-region that contain GRSG habitat and within which social and economic conditions might reasonably be expected to change based on alternative management actions. In addition, the BLM reviewed the need to include additional counties that may not contain habitat, but are closely linked from an economic and/or social perspective to counties

that do contain habitat. This latter category includes what are sometimes called "service area" counties, or counties from which businesses operate that regularly provide critical economic services, such as recreational outfitting or support services for the livestock grazing sector, within the counties that contain habitat (METI Corp/Economic Insights of Colorado 2012). Including service area counties could be important because a change in economic activity in a county containing habitat may result in changes in economic activity within service area counties as well.

The socioeconomic study area contains 12 counties, all containing GRSG habitat: 2 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 3-69**, Commuter Patterns in the Socioeconomic Study Area, 2010, shows the share of workers employed in a given county of the socioeconomic study area that 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 3-69**) do depend considerably on Washoe County as a source of employment (e.g., Storey County) but 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, no secondary study area has been identified.

Table 3.69. Commuter Patterns in the Socioeconomic Study Area, 2010

Geographic Area of Employment	Live in Same Area of Employment	Other Counties Where Considerable Share of Workers Live
Primary Socioeconomic Study Area		
Lassen County, California	75.7%	Shasta (3.4%), Plumas (3.1%), Washoe, Nevada (2.6%)
Modoc County, California	63.3%	Siskiyou (10.0%), Klamath, Oregon (7.5%), Shasta (4.7%), Lassen (2.5%)
Churchill County, Nevada	70.6%	Washoe (9.2%), Lyon (6.6%), Clark (2.1%)
Elko County, Nevada	75.3%	Washoe (2.9%), Humboldt (2.5%), Clark (2.4%), Tooele, Utah (2.4%), Twin Falls, Idaho (2.2%)
Eureka County, Nevada	25.3%	Elko (56.0%), Lander (10.6%)
Humboldt County, Nevada	64.2%	Elko (11.7%), Washoe (5.8%), Pershing (3.9%), Lander (3.8%)
Lander County, Nevada	56.8%	Elko (18.3%), Humboldt (11.8%), Washoe (2.4%)
Lincoln County, Nevada	73.2%	Clark (15.1%), 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%), Carson City (2.7%)
Washoe County, Nevada	80.6%	Clark (4.0%), Lyon (3.1%), Carson City (2.8%), Douglas (2.0%)
White Pine County, Nevada	75.7%	Elko (9.3%), Clark (4.3%)
Source: US Census Bureau 2012a		

Table 3-70, BLM and Forest Service Plans within the Socioeconomic Study Area, Management Units, and Counties, 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 within the area encompassed by those plans. Although **Table 3-70** shows additional

counties (other than the 12 counties 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 LUPA/EIS are likely to be small relative to the 12 study area counties.

Table 3.70. BLM and Forest Service Plans within 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, Esmeralda (Nevada)
	Black Rock Desert National Conservation Area RMP (2004)	Surprise Field Office, Winnemucca District Office (Black Rock, Humboldt River Field Offices)	Humboldt, Pershing, Washoe (Nevada)
	Carson City RMP	Carson City District Office (Sierra Front, Stillwater Field Offices)	Washoe, Storey, Carson City, Douglas, Lyon, Churchill, Mineral, Nye (Nevada); Sierra, Alpine, Plumas, Lassen (California)
	Elko RMP (1987)	Elko District Office (Tuscarora, Wells Field Offices)	Elko, Eureka, Lander (Nevada)
	Ely RMP (2008)	Ely District Office (Egan, Schell, Caliente Field Offices)	White Pine, Lincoln, Nye (Nevada)
	Wells RMP (1985)	Elko District Office (Tuscarora, Wells Field Offices)	Elko (Nevada)
	Winnemucca RMP	Winnemucca District Office (Black Rock, Humboldt River Field Offices)	Humboldt, Pershing, Washoe, Lyon, Churchill (Nevada)
	Alturas RMP (2008)	Alturas Field Office	Lassen, Modoc, Shasta, 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, Santa Rosa Ranger Districts	Nye, Elko, White Pine, Humboldt,
	Toiyabe National Forest LRMP (1986)	Austin, Bridgeport, Carson, Tonopah, Spring Mountains National Recreation Area Ranger Districts	Nye, Lander, Mineral, Lyon, Eureka, Washoe, Douglas, Clark, Lincoln, Carson City (Nevada); Mono, Alpine, Sierra, Nevada, Lassen, El Dorado (California)

Current Condition

Social Conditions

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

Population and Demographics

Table 3-71, Population Growth, 1990-2010, shows current and historic populations in the socioeconomic study area. While the population of California grew at nearly the same rate as the United States as a whole between 1990 and 2010 (24.1 percent and 25.0 percent, respectively), the population in Nevada increased by 124.7 percent over the same time 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. 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 within 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 time period.

Table 3.71. 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				

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 within 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. Susanville, the county seat of Lassen County, California (NACO 2012), is a former mining town. Susanville is also home to two California Department of Corrections and Rehabilitation facilities: High Desert State Prison and California Correctional Center.

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 3-72**,

Demographic Characteristics, Share in Total Population (percent), 2010, 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 within 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 within the socioeconomic study area, Lassen County, California, and Pershing County, Nevada, 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 3.72. 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, and 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 have requested to receive a copy of the Draft LUPA/EIS is provided in **Chapter 6**, Consultation and Coordination. Interest groups within the socioeconomic study area include, but are not limited to, the following: federal agencies, state agencies, county agencies, local agencies, congressional representatives, local representatives, academic institutions, civic organizations, local chambers of commerce, environmental groups, land conservation groups,

outdoors 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, but are not limited to, the following: 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 recreational purposes 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 3-80**, Geothermal Electrical Generation: Sales Volume and Sales Value from BLM-Administered Resources). Churchill County's Master Plan states that its natural areas, historical and archaeological sites, and developed recreational facilities are valued and used by the residents and 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. Recreational opportunities include opportunities to camp, hike, fish, and hunt, among other activities. Elko County also hosts many annual recreational, historical, cultural, and ethnic special events and attractions. Elko County embraces the multiple use concept of public land management and expects federal land management agencies to maximize public access and usage of lands while still 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 of the county (Leaming 2010).

Humboldt County, which is located to the east 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 land. According to the Humboldt County Regional Master Plan, Humboldt County 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 Humboldt's County 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 the 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 County 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).

Within Eureka, Lander, and Nye Counties, specific groups to whom management of public lands is of particular interest include, but are not limited to, local governments and school districts, ranchers (including those with livestock grazing permits), local sportsmen, mineral claims holder and mineral estate owners, oil and gas leaseholders, 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 M**, Detailed Employment and Earnings Data). According to information provided by the county, local communities and private landowners adjacent 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 recreational 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 are at least partially dependent 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 comprised of 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 use, 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, whose residency choices are largely independent of a specific work site or location, to move to the area (BLM 2007e).

In some areas of the socioeconomic study area, historic, economic, and cultural connections with activities taking place on public lands (e.g., timber production and the livestock industry) 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 is substantially dependent 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, contribute to the trend to convert valuable agricultural land to other, non-productive – 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 a rural county with a population of less than 10,000 that 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 the economy of the county 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 but not limited to agriculture, sustainable forestry, recreation, mining, and transportation (Modoc County 1995).

Comments received in response to the Scoping Report and the June 2012 Economic Strategies Workshop for this planning effort reflected many of the themes discussed above (BLM and Forest Service 2012; BLM 2012o). Residents expressed strong support for multi-use 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 within 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 nonanthropogenic impacts on GRSG habitat, major development projects likely to occur within 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 located within their jurisdictions. County-level LUPs were identified for nine of the twelve counties within 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). Of the nine counties with identified LUPs, six of the 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 identifies and 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 within the socioeconomic study area is summarized in Table 3-73, Employment by Sector within the Socioeconomic Study Area, and Table 3-74, Labor Income by Sector within the Socioeconomic Study Area (2010 dollars). See Appendix M for equivalent data by county.

Table 3.73. Employment by Sector within 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, & 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%

Socioeconomic Study Area	Absolute			Percentage of total		Percent Change 2001-2010
	2001	2010	Change 2001-2010	2001	2010	
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 estimate 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 underestimate 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 M**. Bureau of Economic Analysis data reflects 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 methodological details, please see http://www.bea.gov/regional/methods.cfm

[2]The values 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 nondisclosed data, whereas the three following lines do not.

Table 3.74. Labor Income by Sector within the Socioeconomic Study Area (2010 dollars)

Socioeconomic Study Area	Absolute (Millions)			Percentage of total[1]		Percent Change 2001-2010
	2001	2010	Change 2001-2010	2001	2010	
Total Labor Earnings	**$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, & 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%**

Socioeconomic Study Area	Absolute (Millions)			Percentage of total[1]		Percent Change 2001-2010
	2001	2010	Change 2001-2010	2001	2010	
Total Personal Income[5]	$24,982.3	$28, 424.9	$3,442.6	100%	100%	13.8%

Sources: Headwaters Economics 2012; BEA 2012a. Values reported in 2001 dollars were converted to 2010 dollars using the Consumer Price Index (BLS 2012a).

[1]Industry earnings are reported as a share of total labor earnings. 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 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 nondisclosed 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" consists of payments by employers, employees, the self-employed, and other individuals who participate in the following government programs: Old-age, Survivors, and Disability Insurance; Medicare; unemployment insurance; railroad retirement; pension benefit guarantee; veterans' life insurance; publicly administered workers' compensation; military medical insurance; and temporary disability insurance (BEA 2012b).

[5]Total personal income is reported by place of residence.

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 with 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. Within 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 M 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, Nevada, but contributed a much higher share in Eureka County, Nevada (79.6 percent); Lander County, Nevada (44.1 percent); Humboldt County, Nevada (18.9 percent); and Pershing County, Nevada (16.2 percent). Mining in Eureka County employs residents not only of Eureka but also 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, Nevada, to 21.6 percent in Elko County, Nevada. 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, Nevada, and higher shares in Lincoln County, Nevada (11.2 percent); Humboldt County, Nevada (11.5 percent); and Nye County, Nevada (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, Nevada), although the industry did support a high of 12.7 percent of employment in Modoc County, California. See **Appendix M** 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 the local government industry (9.9 percent); the healthcare and social services industry (9.8 percent); and the mining trade industry (7.2 percent). The management of companies and enterprises industry, the farming industry, and the mining industry 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 time period, the information industry and the forestry, fishing, and related activities industry experienced declines of 32.0 percent and 27.8 percent, respectively, the greatest declines of all the industry sectors.

Appendix M provides county-level labor earnings figures for 2010. 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, Nevada, at 92.1 percent, followed by Lander County, Nevada, at 66.8 percent. Mining labor earnings in Eureka and Lander Counties reflect, in part, labor earnings of residents in neighboring counties. At the other end of the range, mining contributed a negligible amount (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 requirements. The share of earnings from the farm industry varied across the 12 counties in the study area. In Washoe County, Nevada, 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 3-75, Annual Unemployment, 2007 – 2011, presents the unemployment rates for each county in the Socioeconomic Study Area, as well as the rates for the 12 counties aggregated and the states of 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 unemployment rate ranged from a low of 6.0 percent in Eureka County, Nevada, to a high of 16.5 percent in Nye County, Nevada.

Table 3.75. Annual Unemployment within the Socioeconomic Study Area, 2007 – 2011

Geographic Area	2007	2008	2009	2010	2011
Churchill County, Nevada	4.5%	6.3%	8.9%	10.6%	11.0%
Elko County, Nevada	3.4%	4.5%	6.5%	7.4%	7.1%
Eureka County, Nevada	4.3%	5.5%	6.8%	7.6%	6.0%
Humboldt County, Nevada	3.7%	5.2%	7.5%	8.1%	7.2%
Lander County, Nevada	3.4%	4.6%	6.0%	7.1%	6.6%
Lassen County, California	8.2%	9.5%	12.6%	14.0%	13.5%
Lincoln County, Nevada	4.4%	5.8%	9.2%	12.6%	13.7%
Modoc County, California	8.0%	9.6%	12.3%	14.4%	14.9%
Nye County, Nevada	6.8%	10.2%	14.3%	16.5%	16.5%
Pershing County, Nevada	5.1%	7.3%	10.0%	10.9%	11.7%
Washoe County, Nevada	4.5%	7.1%	11.4%	13.1%	13.1%
White Pine County, Nevada	3.8%	4.9%	7.2%	8.8%	8.4%
Socioeconomic Study Area	4.7%	7.0%	10.8%	12.4%	12.3%
California	5.4%	7.2%	11.3%	12.4%	11.7%
Nevada	4.7%	7.0%	11.6%	13.7%	13.5%
Source: BLS 2012b					

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 non-travel and tourism-related 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 not related to travel and tourism (Headwaters Economics 2012). [1]

Although much of the recreation use on BLM-administered lands is dispersed and far from counting devices (e.g., trail registers, fee stations, or vehicle traffic counters), approximations of the number of visitors to BLM-administered land can be obtained from the BLM Recreation Management Information System (RMIS) database, in which BLM recreation specialists provide estimated total visits and visitor days to various sites[2].**Table 3-76**, Estimated Annual Visits by Planning Unit, summarizes BLM visitation data within the study area for fiscal year (FY) 2011 (i.e., the fiscal year ending September 30, 2011) and Forest Service visitation data from Round 2 of the National Visitor Use Monitoring program (NVUM).

Table 3.76. 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 is for fiscal year (FY) 11 (BLM 2012p); data for the Routt National Forest is for FY07 (Forest Service 2012f). FY11 is the year ending September 30, 2011. Note: For the Carson City District Office, recreation data were not available by Field Office (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. The profiles break down recreation spending by type of activity, day use versus overnight use, local versus non-local visitors, and "non-primary" visits (i.e.,

[1]All dollar values were converted to 2010 dollars using the Consumer Price Index (BLS 2012a).
[2] In RMIS, a *visit* is defined as the entry of any person onto lands or related waters administered by the BLM for any time period. A same day reentry, negligible transit, and entry to another recreation site or detached portion of the management area on the same day are considered a single visit. RMIS defines a *visitor day* as equivalent to twelve visitor hours.

incidental visits where the primary purpose of the trip was other than visiting public lands). **Table 3-77**, Visitor Spending from Recreation on BLM and Forest Service Land in Socioeconomic Study Area, FY 2011, summarizes individual and party visits and expenditures by trip type and estimated direct expenditure.

Table 3.77. Visitor Spending from Recreation on BLM and Forest Service Land in Socioeconomic Study Area, FY 2011

Trip Type	Percent of Visits[1]	Estimated Number of Individual Visits	Average Party Size[1]	Estimated Number of Party Visits	Estimated Party spending per visit (2010 $)[1]	Estimated direct expenditure (Millions $)
Non-local Day Trips	10	489,675	2.5	195,870	$63.68	$12.5
Non-local Overnight on Public Lands	9	464,057	2.6	178,483	$237.27	$42.3
Non-local Overnight off Public Lands	14	753,798	2.6	289,922	$522.63	$151.5
Local Day Trips	49	3,302,861	2.1	1,572,791	$33.56	$52.8
Local Overnight on Public Lands	4	228,200	2.6	87,769	$165.14	$14.5
Local 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 Forest Service land 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 3-77** shows, the estimated total visitor spending on BLM-administered and Forest Service-administered 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 ($41,963; Headwaters Economics 2012).

Table 3-78, Farm Earnings Detail, 2010 (2010 dollars), 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.[3]

Table 3.78. Farm Earnings Detail within 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)	$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%

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

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]
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](D) 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 3-78 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 3-78** 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 3-78** 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 3-79, Active and Billed Animal Unit Months (AUMs), provides information on active and billed AUMs on BLM-administered and Forest Service-administered 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 Economic Research Service budgets, then converted that information to a per-AUM figure based on average forage requirements for a cow, including other livestock (e.g., bulls and replacement heifers) that are needed to support the production from the cow (Workman 1986). Based on these calculations, 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 is supported by **Table 3-79** (Tuscarora and Wells Field Offices) 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

Table 3.79. Active and Billed Animal Unit Months (AUMs)

Geographic Area	Active (2011)	% Billed (2011)	Billed (2011)	Cattle (%)	Sheep (%)	Other (%)	Allotments	Acres per AUM	Gross Receipts (millions)
Alturas Field Office	51,918	58%	30,185	100%	0%	0%	138	8.8	$2.6
Black Rock Field Office	55,619	93%	51,580	94%	6%	0%	11	33.5	$2.8
Caliente Field Office	170,614	32%	53,776	96%	3%	1%	97	29.5	$8.6
Eagle Lake Field Office	51,958	63%	32,531	90%	10%	0%	53	19.2	$2.6
Egan Field Office	147,479	39%	58,076	75%	24%	0%	64	24.5	$7.4
Humboldt River Field Office	279,331	70%	195,806	96%	4%	0%	95	26.5	$14.0
Mount Lewis Field Office	250,371	73%	182,630	89%	11%	0%	60	17.3	$12.6
Schell Field Office	199,641	42%	83,623	57%	43%	0%	71	12.4	$10.0
Sierra Front Field Office	57,560	53%	30,409	88%	12%	0%	42	19.9	$2.9
Stillwater Field Office	101,117	60%	60,925	99%	0%	0%	36	38.6	$5.1
Surprise Field Office	87,857	74%	64,828	95%	5%	0%	49	16.5	$4.4
Tonopah Field Office	134,092	64%	85,800	100%	0%	0%	31	45.4	$6.7
Tuscarora Field Office	372,320	64%	239,593	97%	2%	0%	142	8.0	$18.7
Wells Field Office	320,578	67%	216,229	92%	8%	1%	97	13.1	$16.1
Humboldt-Toiyabe National Forest	276,191	85%	234,786	79%	21%	0%	N/A	N/A	$13.9

Geographic Area	Active (2011)	% Billed (2011)	Billed (2011)	Cattle (%)	Sheep (%)	Other (%)	Allotments	Acres per AUM	Gross Receipts (millions)
Total	**2,556,646**								**$128.4**

Sources: BLM 2012l; Forest Service 2012g, 2013d; Workman 1986; USDA ERS 2012

N/A - Not available

Gross receipts are calculated based on active 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.

this period (e.g., Wells Field Office). It is important to remember, as well, that the data are only for forage values on BLM-administered and Forest Service-administered 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.

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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- and Forest Service-administered 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 semi-private 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 retains ownership of the lands, it should be noted 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, which had 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.

Collection of wildlings (live transplants) and woody biomass, cutting of Christmas trees, and use of wood for posts are all allowed on BLM-administered lands with a permit or through purchase. Permits are also available on BLM-administered and Forest Service-administered lands for collection of firewood. The collection of 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 2013 (BLM 2011j). There is also a solar power plant located 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 located in Nye County, Esmeralda County, and Lander County (BLM 2011j). Currently, 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; BLM 2013c). There has been some interest in developing wind energy within the Winnemucca planning area. Current activity includes placement of meteorological towers (BLM 2010d). 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 LUPA/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, and 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, the State of Nevada had generated over $44 million from BLM geothermal leasing activities, and that the State of Nevada and counties with geothermal resources should receive an additional $12.9 million from recent (as of 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 3-80, Geothermal Electrical Generation: Sales Volume and Sales Value from BLM-Administered Resources, FY2011, 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 3.80. Geothermal Electrical Generation: Sales Volume and Sales Value from BLM-Administered Resources, FY2011

County	Sales Volume (kWh)	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		

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 within the Battle Mountain District are potentially valuable geothermal resource areas, located mainly in the Esmeralda and Lander Counties. Pending lease application sites cover less than one percent of the potentially valuable lands and are located in Nye County 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 within 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 within the planning area, ranging in generation capacity from 5.8 to 30 megawatts (BLM 2010d). In the Eagle Lake planning area, Honey Lake Power, which is located in Lassen County, is currently 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 currently 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 currently cooperating with Modoc County on a biomass study area for use of juniper for biomass fuel (BLM 2012r), and other individual projects for use of biomass are under development in Modoc County.

As previously mentioned, collection of firewood is allowed on BLM-administered and Forest Service-administered lands with a permit. Although use of 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 is more likely to be relied upon by low and middle income families (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 magnesite, 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 include 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 3-81, Oil Sales Volume and Sales Value from BLM-Administered Resources, FY2011, 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 3.81. Oil Sales Volume and Sales Value from BLM-Administered Resources, FY2011

County	Sales Volume (bbl)	Sales Value (Millions)
Eureka	41,362	$3.6
Nye	369,908	$29.8
Total	**411,270**	**$33.4**
Source: ONRR 2012		

Table 3-82, Mining Sector Employment by County, provides data on the number of jobs in the mining sector by county within the Socioeconomic Study Area.

Table 3.82. 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%
Socioeconomic Study Area	9,620	4.5%
California	21,425	0.2%
Nevada	10,922	1.1%
US	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 N,** Non-Market Valuation Methods. **Appendix N**, **Table N-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 activities 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 GRSG. This section and the related appendix describe the use and non-use economic values associated with recreation, populations of GRSG, and land that is currently used for livestock grazing and ranch operations. The sections that follow discuss each of these values in turn. **Appendix N** provides more discussion of the concepts and measurement of use and non-use non-market values. It is important to note that these non-market values are not directly comparable to previous sections that describe output (sales or expenditures) and jobs associated with various resource uses on BLM-administered and Forest Service-administered lands (see **Appendix N** for more information).

Values Associated with Recreation

Actions that promote the conservation of GRSG habitat may result in changes in recreation activity, by changing opportunities or access for different recreational activities. Opportunities for some activities such as wildlife viewing may increase as the amount of habitat may increase for species that depend on public lands, including GRSG. 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 N** provides an explanation of consumer surplus. Fees to use public lands for recreation are typically very low or non-existent, so the value people place on public land recreation opportunities is not fully measured simply by the entrance fees people pay.

Economists estimate the consumer surplus from recreation by measuring how the variation in visitors' travel costs corresponds to the number of visits taken. This "travel cost method" has been developed extensively in academic literature and is used by federal agencies in economic analyses; the method is explained more fully in **Appendix N**. 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 N**, visitors to natural areas, such as lands managed by the BLM and Forest Service, 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 Forest Service-administered lands in the study area was estimated to be about $285 million per year (see **Appendix N** 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 use, 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.

Values Associated with Populations of Sage-Grouse

The existence and perseverance of the ESA and similar acts reflects the values held by the American public associated with preventing species from going extinct. Economists have long recognized that rare, threatened, and endangered species have economic values beyond those associated with active use through viewing. This is supported by legal decisions and technical analysis (see **Appendix N** 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 N** 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 GRSG. No existing studies on valuation specific to GRSG 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 GRSG, including being a candidate for listing as threatened or endangered and being a hunted species. These studies find average stated willingness to pay of between $15 and $58 per household per year in order to restore a self-sustaining population or prevent regional extinction (see **Appendix N** for details). These values represent a mix of use and non-use values, but the non-use components of value are likely to be the majority share, since the studies primarily address species that are not hunted. Since GRSG protection is a public good available to all households throughout the intermountain west, if similar per-household values apply to the species the aggregate regional existence value could be substantial.

Values Associated with Grazing Land

Public land managed for livestock grazing provides both market values (e.g., forage for livestock) and non-market values, including open space and western ranch scenery, which provide value to some residents and outside visitors, and may also provide some value to the non-using public (e.g., the cultural icon of the American cowboy). Many people who ranch for a living or who otherwise choose to live on ranches value the ranching lifestyle in excess of the income generated by the ranching operations. This could be seen as a non-market value associated with livestock grazing. On the other hand, some residents and visitors perceive non-market opportunity costs associated with livestock grazing. Although some scholars and policy makers have discussed non-market values associated with livestock grazing, the process for incorporating these values into analyses of net public benefits remains uncertain, and the BLM 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 adjacent to public lands with historic leases or permits for grazing on public land. Economists typically use a method called the hedonic price method to estimate values associated with particular amenities; this method may be used to explain the factors that influence the observed sale prices of ranch land. **Appendix N** 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[4].

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 FY 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 federal governments 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 resources from local sources (property taxes and other), 30 percent from state sources 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 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 school 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 to 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. Payments in Lieu of Taxes are federal government payments based on the presence of all federal lands (not just BLM-administered lands) within each county. Table 3-83, Payments in Lieu of Taxes Received in the Socioeconomic Study Area by County, 2010, shows the PILT payments each county received in 2010. The non-taxable status of federal lands is of interest to local governments, which must provide public safety and other services to county residents. BLM revenue-sharing programs provide resources to local governments in lieu of property taxes

[4] States where employment may not require membership in labor unions or payment of fees to labor unions.

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 FY 2008 and FY 2013), without which it is an appropriated program that may be less than fully funded (NACO 2013).

Table 3.83. Payments in Lieu of Taxes Received in the Socioeconomic Study Area by County, 2010

Geographic Area	PILT (Thousands of dollars)[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 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 has attempted to limit this decline (Congressional Research Service 2012), this legislation expires at the end of the current fiscal year (i.e., September 2013). There is the potential for decreases in payments to states, should legislation for Secure Rural Schools or similar support fail to be reauthorized; uncertainty remains about reauthorization of this legislation or funding for 2014, and in years beyond 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 pay federal royalties. 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 from which 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 within the area and by spending on project related goods and services. Contracts for facilities maintenance, shuttling vehicles, and projects contribute directly to the area economy and social stability. **Table 3-84**, BLM

Employment and Related Expenditures in the Socioeconomic Study Area, provides available information on the BLM and Forest Service expenditures, including both labor and non-labor expenditures.

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.

Table 3.84. 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
	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

Agency	Office	Employment, 2011 (FTEs)	Non-labor Expenditures, 2011 (2010 dollars)
Forest Service	Humboldt -Toiyabe National Forest	238	$19,421,940
Source: 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).			

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 3-85, Population Race and Ethnicity, 2010, summarizes the percentage of the population made up of ethnic minority groups in each county of the socioeconomic study area, 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 3-86, Low-Income Populations, 2006-2010 Average, 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).

Within 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 counties have a 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 3.85. Population Race and Ethnicity, 2010

Geographic Unit Analyzed	Total Population	Percent of Total Population								
		White	Black or African American	Alaska Native or American Indian	Asian	Native Hawaiian & Other Pacific Islander	Other Race	Two or More Races	Hispanic or Latino[1]	Total Minorities[2]
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

Geographic Unit Analyzed	Total Population	Percent of Total Population								
		White	Black or African American	Alaska Native or American Indian	Asian	Native Hawaiian & Other Pacific Islander	Other Race	Two or More Races	Hispanic or Latino[1]	Total Minorities[2]
United States	308,745,538	72.4	12.6	0.9	4.8	0.2	6.2	2.9	16.3	36.0

Source: US Census Bureau 2010b.

1. Individuals who identify themselves as Hispanic or Latino might be of any race; the sum of the other percentages under the "Percent of Total Population" columns plus the "Hispanic or Latino" column therefore does not equal 100 percent, and the sum of the percentages for each racial and ethnic category does not equal the percentage of "total minorities."".

2. The total minority population, for the purposes of this analysis, is the total population for the geographic unit analyzed minus the non-Latino/Hispanic white population.

Table 3.86. 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 will be 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 3-87, Federally Recognized Tribes of Nevada (Nevada Indian Territory 2012).

Table 3.87. 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

Tribe	In Primary Study Area
Wells Band	Yes
Timbisha Shoshone Tribe	No
Walker River Paiute Tribe	No
Washoe Tribe of Nevada & 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).	

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 GRSG 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.