

Greater Sage-Grouse

Centrocercus urophasianus



Photo by Steve Ting

Habitat Use Profile

Habitats Used in Nevada	
Sagebrush Montane Shrubland Wet Meadow (Agriculture, Springs) (Montane Riparian, Aspen) (Great Basin Lowland Riparian)	
Key Habitat Parameters •	
Plant Composition	All sagebrush species (esp. Wyoming big sagebrush, mountain big sagebrush, and low sagebrush ^{E0}), flowering forbs, agricultural crops (particularly alfalfa), variety of montane shrubs, aspen, alder, willow
Plant Seasonal Composition, Mosaic, Density, & Height ^{6, 24}	<u>Winter:</u> dense sagebrush that reaches above snow <u>Lek:</u> open areas near good nesting habitat <u>Nest:</u> 15-38% sagebrush cover, 36 - 79 cm [14 - 31 in] shrub height, with significant herbaceous understory <u>Brood:</u> dense forb layer in wet meadows or agricultural lands <u>Pre- and post-breeding:</u> montane shrubs and meadows with forbs
Response to Fragmentation	Very sensitive to fragmentation of habitats ²⁴
Distance to Water	Proximity to water probably important for brood-rearing and post-breeding season ²⁴
Response to Vegetation Removal	Negative ^{E0}

Conservation Profile

Priority Status	
Conservation Priority Species	
Species Concerns	
ESA listing: Candidate Species Historical and recent declines Habitat threats High stewardship responsibility	
Other Rankings	
Continental PIF Audubon Watchlist NV Natural Heritage USFWS BLM USFS NDOW NV Upland Game Management Plan	Watch List Yellow S3S4 Candidate Species, Bird of Conservation Concern Sensitive Species Sensitive Species Conservation Priority, Gamebird Very High Concern
Trends	
Historical • Recent •	Large declines and range contraction ²⁴ Continuing declines, but possibly stabilized in some areas ⁵
Population Size Estimates	
Nevada • Global • Percent of Global	68,000-88,000 ¹⁸ 150,000 ^{23, 24} ~ 50%
Population Objective	
Increase by 100% ²³	
Monitoring Coverage	
Source Coverage in NV	NDOW lek counts; intensive research Good
Key Conservation Areas	
Protection Restoration	Montana, Bilk Creek, Santa Rosa, and Jarbidge ranges; Sheldon NWR; n. Washoe, Humboldt, and Elko counties Meadow, riparian, and sagebrush habitat throughout Great Basin

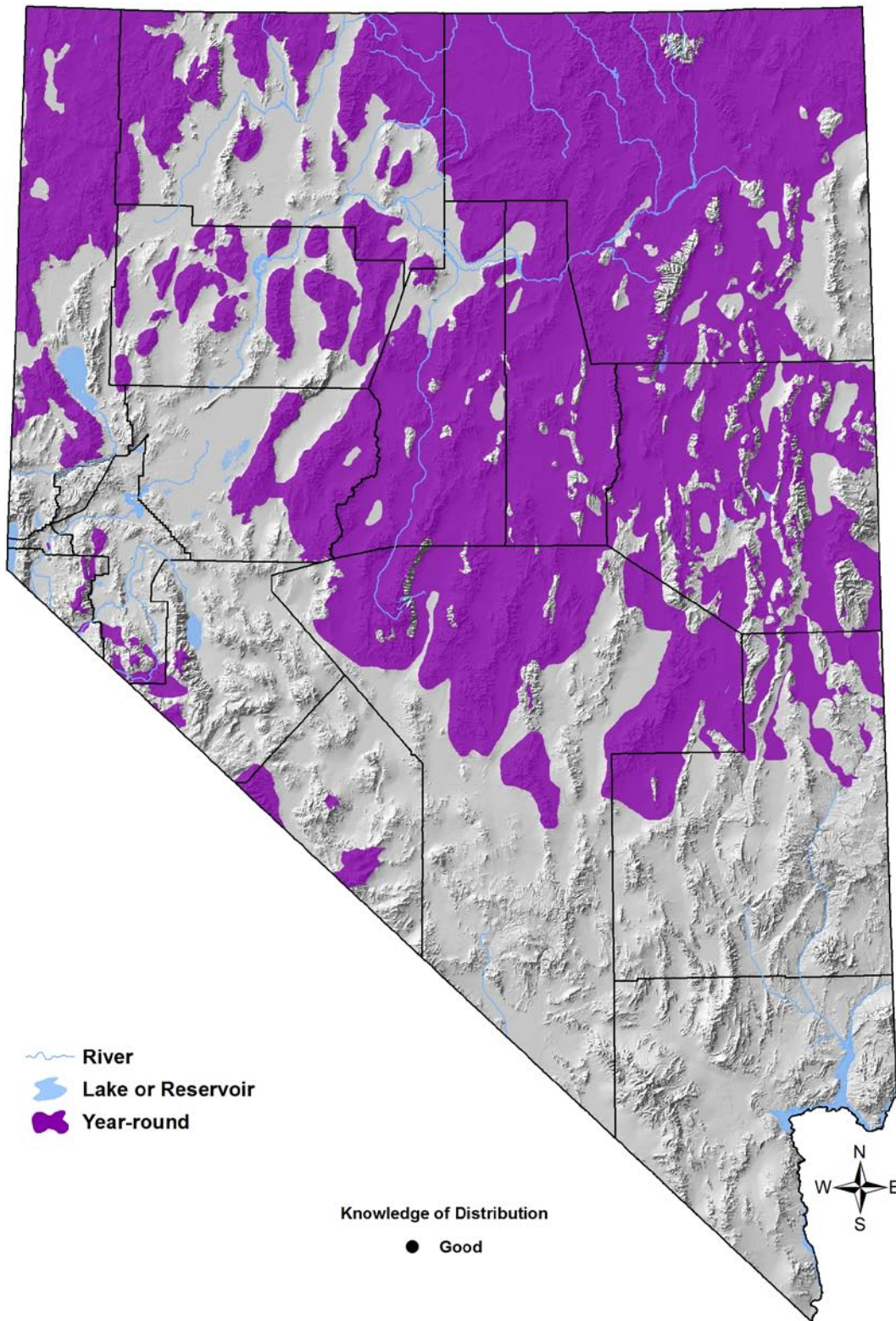
Habitat Use Profile - continued

Area Requirements •	
Minimum Patch Size	Unknown; but > 4,000 ha [10,000 ac] ⁶
Recommended Patch Size	1,500 km ² [580 mi ²] ^{E0}
Home Range	Up to 442 km ² [170 mi ²] over annual cycle for most populations, ²⁴ but up to 2,700 km ² [1,000 mi ²] for some ⁴

Natural History Profile - see p. Spp-8-3

Greater Sage-Grouse

Centrocercus urophasianus



Darker colors represent basins and/or mountain ranges where the species has been recorded in the past 12 years. Map adapted from NDOW (2008).

Greater Sage-Grouse

Centrocercus urophasianus

Natural History Profile

Seasonal Presence in Nevada	
Year-round (substantial seasonal movements)	
Known Breeding Dates in Nevada	
Early March – mid May (nesting), through late July (broods) ^{24, E0}	
Nest and Nesting Habits	
Nest Placement	On ground under shrub, with adequate herbaceous cover ⁶
Site Fidelity	High for lek and nesting areas ²⁴
Other	Lek sites, nest and brood areas all important for conservation
Food Habits	
Basic	Forages from ground, primarily herbivorous
Primary Diet	Sagebrush leaves, buds, and flowers of forbs in fall through spring ²⁴
Secondary Diet	Insects and forbs during breeding and brood rearing ²⁴

Overview

Because of its persistent population declines, well-documented threats, and ESA candidate status, no other bird within our state has probably been the subject of greater study or conservation interest than the Greater Sage-Grouse. Nevada still has many intact sagebrush landscapes and hosts roughly half of the global sage-grouse population, but the continuing loss, degradation, and fragmentation of high-quality habitat to fire and other threats in recent years is cause for concern.¹⁰ In an effort to stabilize and recover populations, the Nevada Department of Wildlife and its partners have pursued a strategy of proactive management and monitoring, which is organized into 62 Population Management Units and draws upon many ongoing research projects and local conservation efforts.¹⁸ The bi-state population of sage-grouse in the Mono Basin area of California and adjacent portions of Nevada has been recognized by the USFWS as a Distinct Population Segment (DPS), and is itself a candidate for ESA protection. Given that this DPS is relatively isolated and may have distinctive habitat requirements, it is covered by its own local conservation plan under the *Greater Sage-Grouse Conservation Plan for Nevada and Eastern California*.^{13,18}

Sage-grouse require the presence of several distinct landscape components, as described in the Habitat Profile table above. Over the course of an annual cycle, they can travel long distances across large elevational ranges in order to reach seasonally-appropriate habitat.²⁶ Thus, interspersed and juxtaposition of required habitats, or the lack thereof, are likely to have a substantial influence on landscape quality as it relates to sage-grouse.⁶ Efforts to conserve, recover, or restore any one required habitat component are unlikely to be fully effective for sage-grouse conservation if they occur in landscapes where other critical habitat components are absent or degraded.⁸

Greater Sage-Grouse

Centrocercus urophasianus

Even within sagebrush habitat, sage-grouse exhibit temporally-variable structural preferences. Preferred shrub height ranges from 25–80 cm [9 – 31 in] seasonally, and shrub canopy cover ranges from 12–43%.⁶ For nesting, presence of adequate herbaceous cover may be as important as shrub density in determining nest success,⁶ and chick survival is directly linked to availability of food (forbs and insects) and cover of short grasses.^{11,21} High quality brood-rearing habitat, where forbs remain green through late summer, may be a limiting factor in much of Nevada.² Although sage-grouse have a high reproductive potential, it is not realized in most years,⁷ and large recruitment spikes, presumably associated with high-precipitation years, may be important for long-term population persistence.²⁷ For this reason, the effects of climate change on precipitation levels in Nevada are of concern to sage-grouse conservation.

On a landscape scale, the long-term persistence of sage-grouse populations requires at least 25% cover (preferably 65%) of good-quality sagebrush within a given 30 km [19 mi] radius.¹ Fires, particularly in recent years, have pushed many areas below this threshold.^{10,16} For this reason, the Western Association of Fish and Wildlife Agencies (WAFWA) recommends that managers avoid burning Wyoming big sagebrush as a habitat management measure, but instead implement alternative treatments to maintain sagebrush cover.²⁸ Burning may be beneficial in mountain sagebrush systems with high shrub cover (> 35%), conifer encroachment, and few invasive weeds, but should probably not be used where sagebrush cover is in danger of falling beneath the 25% minimum cover threshold.⁷

This overview can only briefly summarize the wealth of material available on sage-grouse ecology, management, and conservation. Resource managers should consult the references listed below in the Nevada Specific Studies and Analysis section for additional detail.

Abundance and Occupancy by Habitat

No comprehensive assessment for many seasonal habitats was available for Nevada in this plan version, but NDOW collects and maintains a long-term, statewide database for lek attendance

Nevada-Specific Studies and Analyses

Key findings from several important Nevada-focused studies are briefly summarized as follows:

- Atamian et al. (2010):² During the late brood rearing period, high-quality brood habitat on which sage-grouse chicks were successfully reared represented 0.3% of the study area and was highly restricted in spatial distribution. This suggests that availability of suitable brood-rearing habitat may be a critical limiting resource for sage-grouse in some areas

Greater Sage-Grouse

Centrocercus urophasianus

- Coates and Delehanty (2010):³ Increased raven numbers have negative effects on sage-grouse nest success, especially in areas with relatively low shrub canopy cover
- Lammers et al. (2007):¹⁴ Golden Eagle predation appears to play only a minor role in sage-grouse population dynamics, even where eagles have artificial perch sites available
- Rebholz (2007):²¹ Increasing amounts of grass cover beneath the nest shrub improved the likelihood of nest success. Conversely, grass cover at early brood sites was negatively associated with chick survival, while greater forb cover was associated with a higher probability of chick survival
- Van Kooten et al. (2007):²⁷ Long-term variation in population data from Elko County showed strong effects of yearly climate variation, a possible weak effect of cattle stocking rates, and no apparent effect of predator control. It was not possible to discern an overall population trend

In addition, the following resources provide critical information about sage-grouse conservation and management, although several have a regional, rather than a statewide, focus:

- SAGEMAP - A GIS Database for Sage-Grouse and Shrubsteppe Management in the Intermountain West: <http://sagemap.wr.usgs.gov/index.aspx>
- Nevada Department of Wildlife Sage-Grouse Conservation site: <http://www.ndow.org/wild/conservation/sg/index.shtm>
- Nevada Upland Game Species Management Plan¹⁷
- Greater Sage-Grouse Conservation Plan for Nevada and Eastern California:¹⁸ <http://www.ndow.org/wild/conservation/sg/plan/index.shtm>
- Energy and Infrastructure Development Standards to Conserve Greater Sage-Grouse Populations and their Habitats in Nevada”¹⁹ http://www.ndow.org/wild/conservation/sg/resources/nevada_energy_standards_for_sage-grouse_2010.pdf
- Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats:⁵ <http://www.ndow.org/wild/conservation/sg/resources/assessment.shtm>
- Ecology and Conservation of Greater Sage-Grouse: a Landscape Species and its Habitats:¹² <http://sagemap.wr.usgs.gov/monograph.aspx>
- Sage-Grouse Habitat Restoration Symposium Proceedings:²⁵ http://www.fs.fed.us/rm/pubs/rmrs_p038.html
- Greater Sage-Grouse Comprehensive Conservation Strategy:²⁶ <http://www.wafwa.org/documents/pdf/GreaterSage-grouseConservationStrategy2006.pdf>

Greater Sage-Grouse *Centrocercus urophasianus*

Finally, established monitoring protocols are covered in:

- Monitoring Populations of Sage-Grouse. Proceedings of a Symposium:²²
<http://sgrp.usu.edu/files/uploads/grouseProcdngs4.pdf>
- Nevada Department of Wildlife Lek Survey Protocol:
http://www.ndow.org/wild/conservation/sg/plan/SGPlan063004_G.pdf

Main Threats and Challenges

Habitat and Other Threats

- As presented in the *Greater Sage-Grouse Management Plan for Nevada and Eastern California*,¹⁸ the greatest threats are:
 - Loss of habitat to:
 - Fire
 - Pinyon-juniper encroachment
 - Decline in habitat quality due to:
 - Invasive plants
 - Inadequate grazing management systems, which can particularly impact brood-rearing meadows⁷
- Other threats that have been identified include:
 - Fragmentation of landscapes and simplification of the flora across landscapes. This process can reduce availability of, or connectivity between, seasonally important habitats
 - Energy (solar and wind) development⁹
 - Raven predation of eggs and young may be high in some areas³
 - Sage-grouse are vulnerable to adult mortality from West Nile virus,¹⁵ but the disease's overall impacts in Nevada are not yet known

Research, Planning, and Monitoring Challenges

- Further research is needed to determine the best management strategies for the pinyon-juniper / sagebrush interface zone for multi-species benefits
- Although short-term fire management strategies are established, further research and planning is needed to clarify the most beneficial longer-term fire management strategies

Greater Sage-Grouse

Centrocercus urophasianus

Conservation Strategies

Established Strategies

- Detailed management strategies for the Greater Sage-Grouse already exist in several of the sources identified above.^{18,26,30} Key strategies presented in the *Greater Sage-Grouse Management Plan for Nevada and Eastern California*¹⁸ include:
 - Protect key habitat from wildlife by emphasizing importance of these areas to federal firefighting personnel
 - Improve grazing management systems to better protect important brood-rearing habitat and other seasonally important habitats
 - Undertake appropriate pinyon-juniper management projects in encroached areas
 - Pursue opportunities to restore large crested wheatgrass plantings to native grasses and forbs where feasible
 - Expand efforts to restore former habitat impacted by recent fires, especially in areas formerly dominated by Wyoming big sagebrush, mountain big sagebrush, and low sagebrush
- *Energy and Infrastructure Development Standards to Conserve Greater Sage-Grouse Populations and their Habitats in Nevada*¹⁹ provides additional strategies relevant to energy development projects

Habitat Strategies

- Sagebrush (p. Hab-17-1), Montane Shrubland (p. Hab-14-1), and Wet Meadow (p. Hab-20-1) habitat conservation strategies benefit this species.
- In addition, we recommend that pinyon-juniper management projects consider the importance of maintaining a natural, interspersed interface zone between sagebrush shrublands and pinyon-juniper woodlands, as discussed in the Pinyon-Juniper habitat account (p. Hab-16-1)
- Prescribed burning should be avoided unless restoration of native vegetation can be expected on a particular site.²⁸ Prescribed burns > 50 ha [124 ac], or that burn > 20% of an area used by sage-grouse during winter, or that are within a period shorter than local sagebrush habitat recovery time may be problematic⁴
- Manage livestock grazing and other land uses to minimize damage to perennial herbaceous cover and to minimize invasive weeds

Research, Planning, and Monitoring Strategies

- Identify and map high-quality sagebrush habitat and landscapes, which are characterized by availability of patches with:
 - 15 – 25% sagebrush canopy cover
 - Perennial herbaceous cover > 18 cm [7 in] high, with 15% canopy cover of grasses and 10% cover of diverse forbs⁴

continued

Greater Sage-Grouse

Centrocercus urophasianus

Conservation Strategies (continued)

- A landscape that contains at the recommended patch size (see Habitat Profile table, above):
 - Multi-aged sagebrush shrubland with structurally-diverse patches as quantified above
 - Brood-rearing areas with sufficient perennial herbaceous cover, and preferably with sufficient moisture to allow persistence of green forbs until late summer
 - Suitable fall/winter habitat, which may vary among different regions
 - Historical lek sites
- Conduct additional research to determine how to pinyon-juniper management projects can both benefit sage-grouse and the larger suite of birds that use the pinyon-juniper / sagebrush interface zone (see p. Hab-16-1)
- Conduct additional research and planning to generate a fire-management strategy balancing the need for short-term protection and the need for long-term habitat viability
- Further study of the relative impacts of grazing by livestock, horses, and burros on habitat quality
- Investigate the possible impacts of losses of traditional water sources on sage-grouse such as springs, wet meadows, and other wetlands

Public Outreach Strategies

- Continue outreach to diverse stakeholders, as exemplified by the Nevada Governor's Sage-Grouse Conservation Team^{18,19}

References: ¹Aldridge et al. (2008); ²Atamian et al. (2010); ³Coates and Delehanty (2010); ⁴Connelly et al. (2000); ⁵Connelly et al. (2004); ⁶Connelly et al. (2011; *in press*); ⁷Crawford et al. (2004); ⁸Doherty et al. (2010); ⁹Drew and Espinosa (2008); ¹⁰Espinosa and Phenix (2008); ¹¹Gregg and Crawford (2009); ¹²Knick and Connelly (2011; *in press*); ¹³Kolada et al. (2009); ¹⁴Lammers et al. (2007); ¹⁵Naugle et al. (2005); ¹⁶Nelle et al. (2000); ¹⁷NDOW (2008); ¹⁸Nevada Governor's Sage-Grouse Conservation Team (2004); ¹⁹Nevada Governor's Sage-Grouse Conservation Team (2010); ²⁰Paige and Ritter (1999); ²¹Rebholz (2007); ²²Reese and Bowyer (2007); ²³Rich et al. (2004); ²⁴Schroeder et al. (1999); ²⁵Shaw et al. (2005); ²⁶Stiver et al. (2006); ²⁷Van Kooten (2007); ²⁸WAFWA (2009); ²⁹Wisdom et al. (2002); ^{EO} Expert opinion