

Bi-State Sage Grouse Forest Plan Amendment

Domestic Livestock Grazing Report

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for:
Humboldt-Toiyabe National Forest

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Introduction

Domestic livestock grazing is a widespread use of the Forest Service and BLM administered public lands within the amendment area. This report will address the current grazing management within Bi-State sage grouse habitat and the effect of the proposed action as it relates to grazing management.

Overview of Issues Addressed

Alternatives B and C would result in changes to range improvements, utilization standards, grazing seasons, and livestock management practices. The resulting effect of the Alternative B standards and guidelines are unable to be quantified at the scale of this plan amendment. Project level analyses would need to be conducted to determine the specific impacts of Alternative B.

Issue Indicators

Table 1 shows the indicators used in this analysis.

Table 1. Comparison of Indicators by Alternatives

Indicator	Alternative A - No Action	Alternative B - Modified Proposed Action	Alternative C
Active AUMs in allotments containing BSSG habitat	85,886	85,886	0
Restrictions to the ability to construct or maintain range improvements	No Change	Increase	Increase
Allotment acres closed to livestock grazing in BSSG habitat	0	0	2,118,811
Allotment acres open to livestock grazing that contain BSSG habitat	2,118,811	2,118,811	0
Changes to timing, duration or frequency of authorized use, including temporary closures	No Change	Increase	Not Applicable, No Grazing Use Proposed

Appendix A contains detailed information for Forest Service and BLM grazing allotments within BSSG habitat.

Affected Environment

Existing Condition

Domestic livestock grazing is currently authorized on approximately 66 percent of Forest Service and BLM administered public lands within the amendment area. An additional 4 percent of the amendment area is included in vacant or closed grazing allotments.

There are 87 grazing allotments that contain BSSG habitat within the amendment area. These allotments encompass 2,118,811 acres and contain 649,992 acres of BSSG habitat. These allotments are currently permitted for 85,886 AUMs. Forty-three allotments are grazed by cattle and 29 are grazed by sheep. There are 15 additional allotments within the amendment area that are either closed or vacant for various reasons. About two-thirds of the permitted use is for spring

and/or summer use and the other one-third is for fall and/or winter use. Table 2 summarizes the livestock grazing information within the amendment area.

Table 2. Livestock Grazing Information

Forest Service Ranger District or BLM District	No. of Allotments containing BSSG Habitat	Allotment Acres	Permitted AUMs	Acres of Sage Grouse Habitat in Allotments
Bridgeport Ranger District	50	796,088	33,744	376,705
Carson Ranger District	10	52,879	5,578	42,594
Battle Mountain District	5	704,290	18,520	57,459
Carson City District	22	565,554	28,044	173,234
Total	87	2,118,811	85,886	649,992

The Humboldt-Toiyabe National Forest manages 60 grazing allotments that contain BSSG habitat. These allotments encompass 848,967 acres within the amendment area and are currently permitted for 39,322 AUMs. A total of 419,299 acres of BSSG habitat is found in these allotments.

The Bureau of Land Management manages 27 grazing allotments that contain BSSG habitat. These allotments encompass 1,269,844 acres within the amendment area and are currently permitted for 46,564 AUMs. A total of 230,693 acres of BSSG habitat is found in these allotments.

The critical disturbance period for sage grouse is typically March 1 to June 30. Of the 87 grazing allotments containing sage grouse habitat, 55 have permitted seasons of use that overlap with the critical disturbance period. There are 7 allotments where the full season of use falls between March 1 and June 30.

The primary management objectives for livestock grazing have been to improve rangeland health, improve riparian functioning condition, and restore native plant communities. These objectives are accomplished through the strategic placement of range improvements (fences and water) and salt, use of rest-rotation and deferred rotation grazing systems, and herding. Annual adjustments are made according to forage availability and the prevalence of drought conditions or above-average precipitation.

Range improvements are found throughout the amendment area and help distribute livestock across the grazing allotments. Range improvements include fences and water developments. Fences are typically three- to four-strand barbed wire, although other types of fences are present. Water developments include 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 troughs or tanks. Reservoirs and developed springs are typically located in drainages and depressions, while wells and their associated delivery tanks are typically located on uplands. Table 3 summarizes the range improvements in Bi-State sage grouse habitat.

Table 3. Range Improvements within BSSG Habitat

Forest Service Ranger District or BLM District	Miles of Fence within BSSG Habitat	No. of sections with fence densities >1.6 miles per section	No. of Watering Facilities within BSSG Habitat	No. of Handling Facilities within BSSG Habitat
Bridgeport Ranger District	173	22	89	7
Carson Ranger District	26	6	4	0
Battle Mountain District	4	0	2	0
Carson City District	9	1	0	0
Total	212	29	95	7

All grazing permits for allotments within BSSG habitat have terms and conditions that set limits on allowable forage utilization. Limiting forage utilization ensures that residual forage is left as a metabolic reserve that plays an important role in photosynthesis after defoliation and protects the plant crown. Repeated overgrazing depletes the metabolic reserve, shrinks the root system and results in plant mortality. This leaves the site vulnerable to erosion and invasion by noxious and invasive species (Holechek et al 2011).

Current levels of allowable utilization for upland areas range from 25% to 60%. Riparian utilization standards range from 40% to 65%. In some allotments, stubble heights are used instead of percent utilization for riparian areas. Stubble heights range from 3 to 6 inches. Grazing permittees are responsible for ensuring that they manage their livestock to comply with the terms, conditions and utilization standards in their grazing permits, allotment management plans and/or annual operating instructions. Permittees are required to monitor forage utilization levels and move their livestock to the next scheduled pasture or allotment or off of federal allotments when the standards are met. Agency rangeland management specialists conduct monitoring of grazing allotments to verify if grazing permittees are in compliance with the terms and conditions of their permits, allotment management plans and/or annual operating instructions.

Forage utilization along with other range management actions has an effect on range condition or health. Many approaches have been used over the years to determine range condition. Traditionally, condition has been assessed by comparing the current vegetation seral stage to a potential climax community. Grazing has been assumed to act as a disturbance that sets a sagebrush community back from a climax stage and that release from grazing would allow the sagebrush community to return to that climax stage. Due to the complex dynamics of sagebrush communities and differing plant responses to grazing, concerns have arisen about the predictability of secondary succession to climax models for western rangelands (Holechek et al 2011). The current trend in assessment of rangeland condition and grazing effects is based on indicators of soil characteristics and erosion, plant communities and underlying processes to evaluate the health of the ecosystem (National Research Council 1994).

In the Bi-State area, the Forest Service and BLM conduct assessments of rangeland health on grazing allotments. The analysis techniques vary by managing office but all use some combination of qualitative and/or quantitative methods to assess the biotic, hydrologic and soil attributes within grazing allotments. Tables 4, 5 and 6 display the current rangeland health assessments of allotments in BSSG habitat.

Table 4. Rangeland Health Assessment Status

Rangeland Health Assessment Status	Number of Allotments	Percent of Allotments
Rangeland Health Assessment Completed	58	67%
Allotment Status: Active	50	57%
Allotment Status: Other	8	9%
Rangeland Health Assessment Not Completed	29	33%
Allotment Status: Active	17	14%
Allotment Status: Other	12	20%
Total	87	100%

Table 5. Upland Rangeland Health Assessments

Rangeland Health Assessment Completed	Number of Allotments	Percent of Allotments
Meets Upland Standards	43	74%
Does Not Meet Upland Standards	7	12%
Livestock grazing identified as a significant cause	5	9%
Livestock grazing not identified as a significant cause	2	3%
No Data Available*	8	14%
Total	58	100%

*Data has been collected but not analyzed to determine rangeland health

Table 6. Riparian Rangeland Health Assessments

Rangeland Health Assessment Completed	Number of Allotments	Percent of Allotments
Meets Riparian Standards	27	47%
Does Not Meet Riparian Standards	8	14%
Livestock grazing identified as a significant cause	6	10%
Livestock grazing not identified as a significant cause	2	4%
No Data Available*	23	40%
Total	58	100%

*Data has either been collected but not analyzed to determine rangeland health or no riparian areas exist on the allotments

In addition to rangeland health, long-term monitoring studies have been established on most allotments within BSSG habitat. Long-term monitoring is critical to the determination of trend. Trend is the primary measure of long-term range management effectiveness (Holechek et al 2011). As is the case with rangeland health assessments, long term monitoring techniques vary by managing office but all use some combination of qualitative and quantitative methods to assess the direction of change for the biotic, hydrologic and soil attributes at monitoring sites.

Monitoring is a critical component of rangeland management. It provides documentation of changes in resource status which should be used to make management adjustments and improve progress toward meeting management objectives or desired conditions. The Forest Service and BLM conduct monitoring at varying intervals to ensure compliance with grazing permit terms,

conditions and forage utilization standards, document actual livestock use and assess rangeland health and trend. When resource problems are documented, livestock grazing management is adjusted to address the problems. A combination of grazing capacity, utilization, ecological condition and trend information is needed for sound management decisions (Holechek et al 2011). Lack of a full complement of monitoring data to support the determination that livestock is a cause of the resource problem and justify the resultant corrective action has been identified as a concern (Veblen et al 2014).

Desired Condition

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, Federal Land Policy and Management Act (FLPMA), Forest Rangeland Renewable Resources and Planning Act of 1974, National Forest Management Act of 1976, 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, the Toiyabe National Forest Land and Resource Management Plan identifies 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 Land and Resource Management Plan (LRMP), 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.

The primary laws that govern grazing on lands administered by the Bureau of Land Management 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 for each allotment. Four fundamentals of rangeland health are listed in Title 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 standards and guidelines 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.

Environmental Consequences

Methodology

The analysis is largely based on analysis of GIS layers and information from BLM and Forest Service documents. The information used in this report was gathered from several GIS layers and documents from the BLM and Forest Service.

Assumptions

The analysis includes the following assumptions:

Alternative C - Allotments with Bi-State sage grouse habitat would be completely closed to grazing. BSSG habitat areas are generally large sagebrush communities and riparian areas that provide the bulk of forage within grazing allotments.

Alternatives A and B - Livestock grazing is a diffuse form of disturbance that exerts repeated pressure on the landscape over many years. Grazing effects are typically detected as altered processes and functioning of ecosystems as opposed to discrete disturbances such as fires (Connelly et al 2004). However, concentrated livestock use in areas near water sources, range improvements and bed grounds would constitute discrete disturbances (Manier et al 2013).

Alternative B - The construction and maintenance of range improvements would continue in the planning area as needed. New range improvements would be subject to limitations as defined in the alternative. Range improvements are generally intended to improve livestock distribution and management, which would maintain or improve rangeland health and could benefit the forage base, wildlife and Bi-State sage grouse habitat.

Past, Present, and Foreseeable Activities Relevant to Cumulative Effects Analysis

Domestic livestock grazing has occurred in the amendment area since the mid-1800s. The BLM and Forest Service have updated the terms and conditions of grazing permits in order to improve rangeland health, improve riparian functioning condition, and restore native plant communities and will continue to do so in the future. Allotments that are currently vacant could be closed or re-authorized for livestock grazing in the future.

Alternative A – No Action

Summary of Effects

Selecting Alternative A, the No Action Alternative, will not change the current grazing management in the amendment area. Domestic livestock grazing would continue under the terms and conditions of the current grazing permits until updated by allotment level NEPA analyses.

Alternative B – Modified Proposed Action

Direct/Indirect Effects

The Modified Proposed Action contains goals, objectives, standards and guidelines that are intended to restore and improve BSSG habitat and eliminate or reduce negative impacts to BSSG and its habitat. Alternative B contains multiple standards and guidelines that are designed to eliminate or reduce negative impacts from domestic livestock grazing. Due to the large amount

of land grazed by livestock within the amendment area, the greatest land-use adjustment that might bring about passive restoration is to change livestock management (Pyke 2011). Simply removing livestock grazing from federal lands may not provide desired or expected outcomes such as increases in herbaceous and forb cover or species diversity (Anderson and Holte 1981, Manier and Hobbs 2006, West et al. 1984). Livestock grazing can both positively and negatively affect sage grouse habitat (Beck and Mitchell 2000). Permitted livestock grazing is recognized as a low threat to Bi-State sage grouse (Bi-State Action Plan 2012). However, excessive grazing by domestic livestock during the late 1800s and early 1900s, along with severe drought, resulted in long-term effects on sagebrush ecosystems that persist today (Knick et al. 2003). Modifications to grazing management might be considered as prescriptive techniques in conjunction with other ecosystem management options to achieve desired habitat conditions (Pyke 2011).

Standard B-RP-S-01 would ensure that grazing permits and annual operating instructions include terms, conditions, and directions to move rangeland condition toward or to maintain Bi-state sage grouse habitat desired conditions. Livestock grazing could be modified by restricting areas open to grazing, changing grazing systems, adjusting seasons of use or class of livestock and placing additional restrictions on the construction of range improvements. These changes would result in direct effects to livestock grazing.

Updated utilization standards would be applied to BSSG habitat within grazing allotments. Standard B-RU-S-01 would require managing grazing to maintain residual cover of herbaceous vegetation within 3 miles of active leks during the breeding and nesting season (March 1 - June 30). Standard B-RU-S-02 would apply the utilization standards in Table 7 to BSSG habitat within grazing allotments in addition to Standard B-RU-S-01.

Table 7. Forage Utilization Standards for Bi-State Sage Grouse Habitat

Community Type	Percent Utilization of Key Species	Terms and Conditions
Mountain Big Sagebrush	<45% herbaceous species; <35% shrub species	Livestock removed in 3 to 5 days of reaching utilization level
Wyoming and Basin Big Sagebrush	<35% herbaceous species; <35% shrub species	Livestock removed in 3 to 5 days of reaching utilization level
Black Sagebrush	<35% herbaceous species; <35% shrub species	Livestock removed in 3 to 5 days of reaching utilization level
Riparian and Wet Meadows	<50% herbaceous species; <35% woody species or Average stubble height of at least 4 to 6 inches (depending on site capability and potential) for herbaceous riparian vegetation.	Average stubble height 4 to 6 inches – Livestock removed in 3 to 5 days of reaching utilization level based on site. Or (sequential action) No grazing from May 15 to August 30 in brood rearing habitat.
Sources: Holechek 1988; Holechek et al 2011; Gregg et al 1994; Sveum et al 1998		
Monitoring would be conducted using accepted protocols (including but not limited to: Burton et al. 2011; BLM 1996).		

The rangelands of the intermountain west have had a several thousand year period in which large hoofed grazers were rare (Connelly et al 2004, Reisner 2010). As a result, many of the native bunchgrasses are highly sensitive to grazing (Adler et al 2004, Mack and Thompson 1982). Most plants can withstand some grazing and still remain in productive condition. The amount of grazing that can be tolerated depends on the plant species as well as environmental conditions.

Grazing can occur frequently and during critical growth periods if sufficient leaf area remains to sustain a high level of photosynthesis (Holechek et al 2011).

In the arid areas of the intermountain region, current science shows that utilization levels between 25% and 40% will maintain forage productivity (Holechek et al 2011). Utilization levels for sagebrush communities receiving 8 to 12 inches of annual precipitation are recommended to be set between 30% and 40% for key forage species (Holechek 1988). Most Wyoming and basin big sagebrush and black sagebrush communities fall within this precipitation zone. As average annual precipitation increases, utilization can be increased (Holechek et al 2011). Mountain big sagebrush communities occur at a higher elevation and receive more precipitation than the other sagebrush communities which enable them to withstand a higher utilization level. Livestock grazing needs to be kept at conservative levels (25% to 35%) for high nesting success by sage grouse (Gregg et al 1994; Sveum et al 1998).

Percent use of forage is well related to changes in forage productivity, livestock performance and financial returns. Decreased forage utilization leads to higher amounts of forage production. Forage production was found to increase by an average of 23% when switching from heavy to moderate use levels and 36% when switching from heavy to light utilization levels (Holechek et al 1999). Conservative stocking, as defined by range researchers, involves about 35% use of forage and optimizes ranching risk, financial returns, vegetation productivity and livestock productivity (Holechek et al 2011).

Abundant cover of tall perennial grasses and other residual vegetation cover, in conjunction with big sagebrush, are critical for high nesting success by sage grouse (Gregg et al 1994, Sveum et al 1998). Residual ungrazed forage has many other benefits as well. It plays a critical role in soil protection and water infiltration which contributes to increased forage production (Holechek et al 2011). It also protects plants from extreme temperatures and protects the growing points from insects, small mammals and pathogens. Heavy use during dormancy reduces forage production almost as much as during active growth (Holechek et al 2011).

The utilization standards in Table 7 are generally more restrictive than what is currently permitted within BSSG habitat. Reducing allowable utilization in BSSG habitat will directly affect livestock grazing. Livestock management practices may need to change in order to comply with the utilization standards. This could include changes in grazing systems, increased herding of livestock, shortened seasons of use or reductions in permitted livestock numbers. These changes could increase the grazing permittee's operating costs and reduce their permitted AUMs.

Implementation of the residual cover and utilization standards could result in late turn-out and/or early removal of livestock from federal grazing allotments. When utilization standards are met, operators are required to move their livestock to the next scheduled pasture or allotment or back to the home ranch. Reductions in grazing seasons or livestock numbers on federal grazing allotments could lead to increased utilization and impacts on private lands.

In late summer, as upland sagebrush habitats dry out, sage grouse regularly use wet meadows and irrigated pastures in search of succulent forbs and insects. Juvenile sage grouse rely heavily on insects and forbs during their first few months of life (Connelly et al 2004). In the intermountain west, only 2% of the landscape is comprised of wet meadows and riparian habitats. However, 80% of those habitats are located on private lands. The majority of which were created and sustained through irrigation associated with farming and ranching (Sage Grouse Initiative 2014).

Increased impacts on private lands and variable seasons of use can create uncertainty for livestock producers which could lead to the sale and subdivision of ranches. The greatest benefit to the Bi-State sage grouse provided by working ranches is the retention of large, contiguous blocks of native shrubland. Often when ranches are sold, they are converted to uses entirely unsuitable for BSSG habitat such as housing developments (USDI FWS 2013).

Standards B-RI-S-01, B-RI-S-02, B-RI-S-03, B-RI-S-04, B-RI-S-05, B-RI-S-06, B-RI-S-07, B-RI-S-08, B-RI-S-09, B-LUSU-S-10 and Guidelines B-RI-G-01 and B-RI-G-02 apply to range improvements, supplemental feeding locations and sheep bedding grounds. Range improvements would still be constructed under Alternative B; however, their primary purpose would be to maintain or improve BSSG habitat desired conditions. Existing range improvements would be modified or removed to reduce impacts to BSSG and its habitat. Supplemental feeding stations would be located away from leks and riparian areas.

Cumulative Effects

The Forest Service and BLM will continue to analyze livestock grazing allotments under project level NEPA decisions. Future decisions could involve re-authorizing grazing use on allotments, changing terms and conditions of grazing permits, and closing allotments.

Alternative C

Direct/Indirect Effects

Standard C-RP-S-01 would close all grazing allotments containing BSSG habitat. Eighty-seven grazing allotments would be closed to domestic livestock grazing. Permitted AUMs on the allotments would be eliminated. Construction and maintenance of range improvements would cease. Existing range improvements would be removed or modified to eliminate impacts to Bi-State sage grouse and its habitat.

Closing grazing allotments in BSSG habitat could lead to increased utilization and impacts on private lands as discussed in the effects analysis of Alternative B. The magnitude of the effects would be greater under Alternative C.

Cumulative Effects

The Forest Service and BLM would continue to analyze livestock grazing allotments under project level NEPA decisions outside of BSSG habitat. Future decisions could involve re-authorizing grazing use on allotments, changing terms and conditions of grazing permits, and closing allotments.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

All three alternatives comply with the various laws pertaining to BLM and Forest Service livestock management, the Toiyabe LRMP, the Carson City RMP, Battle Mountain RMP, and BLM directives and policies.

Summary of Effects

Implementation of Alternative B would eliminate or reduce negative impacts from domestic livestock grazing to BSSG and its habitat. Alternative B reduces allowable utilization in BSSG habitat and requires maintenance of residual forage cover during the sage-grouse breeding and nesting season. Implementation of the residual cover and utilization standards could result in late

turn-out and/or early removal of livestock from federal grazing allotments which could lead to increased utilization and impacts to BSSG habitat on private lands. Alternative B would result in changes to livestock management to move rangeland condition toward or to maintain Bi-state sage grouse habitat desired conditions. Livestock grazing could be modified by restricting areas open to grazing, changing grazing systems, adjusting seasons of use or class of livestock and placing additional restrictions on the construction of range improvements. These changes could increase the grazing permittee's operating costs and reduce their permitted AUMs. The magnitude of these effects on current livestock management and any potential losses of permitted AUMs are unable to be predicted without allotment-specific assessments.

Implementation of Alternative C would result in closing 87 grazing allotments and eliminating 85,886 permitted AUMs. Existing range improvements would be removed or modified to eliminate impacts to Bi-State sage grouse and its habitat. Closing grazing allotments in BSSG habitat could lead to increased utilization and impacts to BSSG habitat on private lands.

References

- Adler, P.B., Milchunas, D.G., Lauenroth, W.K., Sala, O.E., Burke, I.C. 2004. Functional Traits of Graminoids in Semi-Arid Steppes: A Test of Grazing Histories. *Journal of Applied Ecology* Vol. 41, No. 4, p. 653-663.
- Anderson, J.E. and K.E. Holte. 1981. Vegetation Development over 25 Years without Grazing on Sagebrush-dominated Rangeland in Southeastern Idaho. *Journal of Range Management*. Vol. 34, No. 1, p. 25-29.
- Beck, J.L. and D.L. Mitchell. 2000. Influences of Livestock Grazing on Sage Grouse Habitat. *Wildlife Society Bulletin*. Vol. 28, No. 4, p. 993-1002.
- Bi-State Action Plan. 2012. Unpublished Report. Prepared by the Bi-State Technical Advisory Committee. http://www.ndow.org/Nevada_Wildlife/Sage_Grouse/
- Connelly, J.W., S.T. Knick, M.A. Schroeder, S.J. Stiver. 2004. Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, WY. Ch. 4, p. 10, Ch. 7, p. 29, 30.
- Gregg, M.A., J.A. Crawford, M.S. Drut, A.K. DeLong. 1994. Vegetational Cover and Predation of Sage Grouse Nests in Oregon. *The Journal of Wildlife Management* Vol. 58, p.162-166.
- Holechek, Jerry L. 1988. An Approach for Setting the Stocking Rate. *Rangelands*, Vol. 10, No. 1, p. 10-14.
- Holechek, Jerry L. and T. Stephenson. 1983. Comparison of Big Sagebrush Vegetation in Northcentral New Mexico under Moderately Grazed and Grazing Excluded Conditions. *Journal of Range Management* Vol 36, No. 4, p. 455-456.
- Holechek, J.L., H. Gomez, F. Molinar, D. Galt. 1999. Grazing Studies: What We've Learned. *Rangelands*, Vol. 21, No. 2, p. 12-16.
- Holechek, J.L., R.D. Pieper, C.H. Herbel. 2011. *Range Management: Principles and Practices*. 6th edition. Prentice-Hall. Upper Saddle River, NJ, p. 80, 81, 82, 133-135, 138, 141, 152, 153.
- Knick, S.T., D.S. Dobkin, J.T. Rotenberry, M.A. Schroeder, W.M. Vander Haegen, and C. van Riper III. 2003. Teetering on the Edge or Too Late? Conservation and Research Issues for Avifauna of Sagebrush Habitats. *The Condor* Vol. 105, No. 4, p. 611-634.
- Mack, R.N. and Thompson, J.N. 1982. Evolution in Steppe with Few Large, Hooved Mammals. *The American Naturalist*. Vol. 119, No. 6, p. 757-773.
- Manier, D.J. and N.T. Hobbs. 2006. Large herbivores influence the composition and diversity of shrub-steppe communities in the Rocky Mountains, USA. *Oecologia* Vol 146, p. 641-651.
- Manier, D.J., D.J.A. Wood, Z.H. Bowen, R.M. Donovan, M.J. Holloran, L.M. Juliusson, K.S. Mayne, S.J. Oyler-McCance, F.R. Quamen, D.J. Saher, and A.J. Titolo. 2013, Summary of science, activities, programs, and policies that influence the rangewide conservation of Greater Sage-Grouse (*Centrocercus urophasianus*): U.S. Geological Survey Open-File Report 2013-1098. p. 92.

- National Research Council. 1994. Rangeland Health: New Methods to Classify, Inventory, and Monitor Rangelands. Washington, DC: The National Academies Press, p. 8.
- Pyke, David A. 2011. Restoring and Rehabilitating Sagebrush Habitats, *in* Knick, S.T. and Connelly, J.W., eds, Greater Sage-Grouse: ecology of a landscape species and its habitats: Berkeley, CA, University of California Press, Cooper Ornithological Union, p. 531-548.
- Reisner, Michael D. 2010. Drivers of Plant Community Dynamics in Sagebrush Steppe Ecosystems: Cattle Grazing, Heat and Water Stress. Doctor of Philosophy Dissertation. Oregon State University.
- Sveum, C.M., W.D. Edge, J.A. Crawford. 1998. Nesting Habitat Selection by Sage Grouse in South-Central Washington. *Journal of Range Management* Vol. 51, No. 3 p. 265-269.
- USDI Fish and Wildlife Service. 2013. Federal Register. Endangered and Threatened Wildlife and Plants: Threatened Status for the Bi-State Distinct Population Segment of Greater Sage-Grouse With Special Rule. Vol. 78 FR 64358 (October 28, 2013).
- Veblen, K.E., D.A. Pyke, C.L. Aldridge, M.L. Casazza, T.J. Assal, and M.A. Farinha. 2014. Monitoring of Livestock Grazing Effects on Bureau of Land Management Land. *Rangeland Ecology and Management* Vol. 67, p. 68-77.
- West, N.E, F.D. Provenza, P.S. Johnson, M.K. Owens. 1984. Vegetation Change after 13 Years of Livestock Grazing Exclusion on Sagebrush Semidesert in West Central Utah. *Journal of Range Management*. Vol 37, No. 3, p. 262-264.

Appendix A: Grazing Allotment Information

Tables 5 and 6 display allotment specific information for Forest Service and BLM grazing allotments.

Table 8. Forest Service Grazing Allotment Information

Allotment Number	Allotment Name	Allotment Acres within the Planning Area	BSSG Habitat Acres	Status	Permitted AUMs	Kind
Forest Service - Bridgeport Ranger District						
20284	Aurora S&G	22,456	17,124	Vacant		
20227	Bald Mountain S&G	28,577	15,569	Active	541	sheep
20200	Buckeye C&H	3,512	3,191	Active	672	cattle
20229	Burcham S&G	9,205	7,713	Active	586	sheep
20230	Cameron Canyon S&G	4,196	3,439	Active	1,006	sheep
20201	Conway C&H	11,465	10,004	Active	312	cattle
20231	Cottonwood S&G	13,170	9,260	Active	586	sheep
20271	Dalzell C&H	3,988	3,819	Active	363	cattle
20243	Desert Creek C&H	198	277	Vacant		
20232	Desert Peak S&G	18,579	10,333	Active	313	sheep
20233	Dunderberg S&G	6,272	5,136	Active	1,006	sheep
20202	Eagle Creek C&H	887	418	Active	404	cattle
20272	East Walker C&H	41,817	4,515	Active	2,373	cattle
20273	Four Mile C&H	3,361	5,321	Active	262	cattle
20203	Frying Pan - Murphy Creek C&H	31,278	18,907	Active	955	cattle
20234	Green Creek S&G	766	1,306	Vacant		
20204	Hunewill C&H	1,052	1,108	Active	141	cattle
20205	Huntoon C&H	68,437	1,530	Active	1,081	cattle
20207	Junction C&H	2,624	3,829	Active	523	cattle
20261	Larkin Lake C&H	12,803	5,040	Active	581	cattle
20208	Little Walker C&H	24,033	19,080	Active	2,024	cattle
20209	Lost Cannon C&H	9,748	5,260	Active	454	cattle
20210	Masonic C&H	33,694	18,020	Active	371	cattle
20211	Mill Canyon S&G	7,081	2,241	Active	253	sheep
20212	Mount Jackson C&H	7,090	1,508	Active	353	cattle
20280	Nine Mile C&H	49,619	38,630	Active	3,118	cattle
20235	North Swauger S&G	3,750	2,743	Active	118	sheep
20213	Nye Canyon C&H	6,820	1,567	Active	20	cattle
20236	Pine Grove S&G	17,087	4,485	Active	302	sheep
20237	Poison Creek S&G	18,136	7,858	Active	1,203	sheep
20215	Powell Mountain C&H	60,790	9,238	Active	898	cattle
20238	Rickey S&G	6,573	4,701	Active	1,006	sheep
20239	Risue S&G	12,960	7,120	Active	465	sheep
20216	Robinson Creek C&H	339	842	Active	18	cattle

20218	Rough Creek C&H	16,568	11,283	Active	196	cattle
20286	Saroni Canal S&G	5,882	6,417	Active	340	sheep
20240	Sierra Blanca C&H	4,105	4,271	Active	152	cattle
20241	Silver Creek S&G	6,778	6,622	Active	426	sheep
20220	Simpson C&H	4,790	4,559	Vacant		
20221	Slinkard C&H	4,356	2,580	Active	265	cattle
20242	South Swauger S&G	8,601	5,700	Active	308	sheep
20287	Sugarloaf S&G	13,810	3,932	Active	420	sheep
20244	Sulphur S&G	48,583	18,629	Active	1,970	sheep
20245	Summers Meadow S&G	909	2,110	Vacant		sheep
20222	Sweetwater C&H	64,860	48,669	Active	4,633	cattle
20246	Tamarack S&G	2,270	700	Active	1,006	sheep
20223	Virginia Creek C&H	914	872	Vacant		
20224	Whiskey Flat C&H	43,338	1,183	Active	1,066	cattle
20290	Wild Oat S&G	2,376	845	Active	260	sheep
20226	Wildhorse C&H	25,584	7,200	Active	395	cattle
Forest Service - Carson Ranger District						
10100	Bagley Valley S&G	2,881	2,754	Active	216	sheep
10103	Bull Canyon C&H	6,384	6,314	Active	471	cattle
10122	Campbell-Loupe S&G	6,955	7,039	Active	608	sheep
10141	Carter Station	3,583	25	Closed		
10105	Cottonwood S&G	17,703	12,617	Active	983	sheep
10149	Double Springs C&H	514	159	Vacant		
10109	Dumont S&G	4,225	2,849	Active	969	sheep
10125	Leviathan S&G	8,800	8,975	Active	1325	sheep
10151	Silver King C&H	1,825	1,863	Closed		
10120	Wolf Creek C&H	9	1	Active	1006	cattle

Table 9. BLM Grazing Allotment Information

Allotment Number	Allotment Name	Allotment Acres within the Planning Area	BSSG Habitat Acres	Status	Permitted AUMs	Kind
BLM - Battle Mountain District						
00099	Magruder Mountain	209,617	25,288	Active	6300	Cattle
00145	Monte Cristo	40,651	174	Active	9352	Cattle
00091	Red Spring	141,675	24,154	Active	2520	Cattle
00097	Silver Peak	253,412	1,591	Active	440	Cattle
00092	White Wolf	58,935	6,251	Active	88	Cattle
BLM - Carson City District						
3504	Bagley Valley	5,340	4,022	Active	132	sheep
3506	Barney Riley	1,359	533	Active	220	cattle
3505	Basalt	27,495	4,920	Vacant		
3509	Buckeye	71,160	32,401	Active	1471	cattle
3510	Butler Mountain	42,951	4,349	Active	3040	sheep
3518	Churchill Canyon	43,489	15,867	Active	1275	cattle
3519	Clifton	15,772	2,208	Vacant		
3531	East Walker	25,189	5,050	Active	1977	cattle
3535	Garfield Flat	26,930	441	Active	3516	cattle
3539	Gray Hills	111,597	3,606	Active	2772	sheep
3543	Harvey Flat	6,929	593	Closed		
3544	Hay Press	1,473	1,032	Active	176	cattle
3555	Lincoln Flat	8,523	1,881	Active	2197	cattle
3557	Lucky Boy	23,142	10,379	Active	835	cattle
3563	Mill Canyon	19,563	13,860	Vacant		
3569	Ninemile	22,491	19,628	Active	2290	cattle
3573	Perry Spring-Deadman	12,751	1,810	Active	2400	cattle
3576	Pine Nut	19,093	17,584	Active	1150	sheep
3580	Rawe Peak	7,870	4,746	Vacant		
3581	Red-Burbank	3,122	2,641	Vacant		
3587	Spring Gulch	51,551	21,870	Active	3925	sheep
3590	Sunrise	17,763	3,812	Active	159	cattle