U.S. Department of the Interior
Bureau of Land Management

Winecup-Gamble Complex

Draft Land Health Assessment

June 2020

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

Cover photo: Burnt Creek Pasture of the HD Allotment by Jeff Moore, Rangeland Management Specialist

DRAFT LAND HEALTH ASSESSMENT DOCUMENT
Winecup-Gamble Complex

Introduction

The Northeastern Great Basin Area Resource Advisory Council (RAC) developed the Standards and Guidelines for Nevada's Northeastern Great Basin Area in 1997. Standards for Land Health are likened to objectives for healthy and functioning watersheds, native plant communities, and rangelands. Standards are expressions of physical and biological conditions required for sustaining rangelands for multiple uses. Guidelines point to management actions related to livestock grazing for achieving the standards. This Draft Land Health Assessment Document evaluates and assesses achievement of the Standards and conformance with the Guidelines for the Nevada's Northeastern Great Basin Area for the Winecup-Gamble Complex, which consists of the HD, Gamble Individual, Dairy Valley, and Pilot Valley Allotments (hereafter referred to as the WGR) in the Elko District.

Table 1. Public and Private acres within each allotment in the Winecup-Gamble Complex

Allotment Name	Public Acres	Private	Total
HD	238,819	147,788	386,607
Gamble Individual	216,939	147,459	364,398
Pilot Valley	43,312	49,909	93,221
Dairy Valley	51,908	38,509	90,417
Totals	550,978	383,665	934,643

The Winecup-Gamble Complex Allotments occupy a vast swath of territory in northeastern Elko County, Nevada (Appendix 1, Figure 1). At its widest points the area included within the four allotments stretches approximately 52 miles from the top of the Snake Range east to the Utah border and 45 miles from the floor of Pilot Valley north to The Baldies. Geography within the complex is typical of the Basin and Range province, with north-south trending fault block mountain ranges separated by long valleys. Elevations range from slightly less than 4,700 feet above sea level in Pilot Valley at the Utah border to several places in the 8,500-9,000 foot range at the top of the mountain ranges. Most of the complex is drained by Thousand Springs Creek, which originates in the Snake Range and flows east through the allotments into Utah. Several tributaries flow into Thousand Springs Creek, primarily Pole, Loomis, Rock Springs, and Crittenden creeks.

The land within the complex supports a diverse range of plant communities. The valley bottoms in the southern parts of the allotments support salt desert shrub communities, especially in the former beds of the Pleistocene era lakes that once filled almost all the valley bottoms but dried up within the past 10,000 years (Appendix 1, Figure 47). The vegetation community transitions to black and Wyoming big sagebrush mixed with perennial bunchgrasses at the middle elevations. The mountainsides are typically vegetated with dense pinyon pine and juniper woodlands. Riparian vegetation, including aspen and willows, are found around streams and springs throughout the allotments.

Wildfire is a common occurrence within the area, especially in the upper elevations in the northwest half of the complex which lies underneath the typical storm track for summer monsoonal thunderstorms that pop up over the East Humboldt range. A total of 361,710 acres within the complex have burned since 1981, but this figure includes several areas that have burned more than once in that time frame.

Wildlife and Habitat

Wildlife species in the allotments include big game, small mammals, birds, reptiles, amphibians and invertebrates. Nevada Department of Wildlife described 22 key habitats within Nevada, several of which occur within the WGR, including the following: Intermountain Cold Desert Shrub, Sagebrush, Lower Montane Woodlands and Chaparral, Grasslands and Meadows, Aspen Woodlands, Intermountain Rivers and Streams, Springs and Springbrooks, Desert Playas and Ephemeral Pools, Cliffs and Canyons, Caves and Mines, and Agricultural Lands. A description of each of the habitat types and associated wildlife species found in those habitats can be found in the Nevada Wildlife Action Plan (Wildlife Action Plan Team 2012).

Special Status Species

All federally designated candidate species, proposed species, and delisted species in the 5 years following their delisting shall be conserved as Bureau Sensitive Species (BLM Manual 6840). There are no species that meet these criteria within the WGR.

Additional species designated as BLM Sensitive must be native species found on BLM-administered lands 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 habitats 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 Elko District contains 97 Special Status Species (Appendix 2, Table 277), several of which may occur on portions of the WGR.

Of specific recent management attention is the Greater Sage-Grouse (*Centrocercus urophasianus*; GRSG), a species that was petitioned for federal designation but found by US Fish and Wildlife Service to be “warranted but precluded” by other priorities in 2010. In 2015, BLM Districts in Nevada and Northeastern California approved a Land Use Plan Amendment (ARMPA) that specifically guided the multiple-use mission of the BLM while emphasizing conservation of sage-grouse seasonal habitats. This amendment was further amended in 2019, but a legal challenge in October, 2019 resulted in at least a temporary reversion to the policies,

conservation strategies and habitat designations approved in the 2015 version of the amendment; the 2015 ARMPA direction and data are therefore what are used throughout this assessment.

The 2015 Greater Sage-Grouse Approved Resource Management Plan Amendment (ARMPA) delineated Habitat Management Areas (HMAs) (Appendix 4, Figure 2). These HMAs are defined as follows (BLM 2015):

- **PHMA** – Priority Habitat Management Areas are BLM-administered lands identified as having the highest value to maintaining sustainable GRSG populations. Areas of PHMA largely coincide with areas identified as priority areas for conservation in the USFWS's Conservation Objectives Team (COT) report USFWS 2013). These areas include breeding, late brood-rearing, winter concentration areas and migration or connectivity corridors.

- **GHMA** – General Habitat Management Areas are BLM-administered lands where some special management will apply to sustain GRSG populations; these are areas of occupied seasonal or year-round habitat outside of PHMA.

- **OHMA** – Other Habitat Management Areas are BLM-administered lands identified as unmapped habitat in the Draft Land Use Plan Amendment (LUPA)/EIS that are within the planning area and contain seasonal or connectivity habitat areas. With the generation of updated modeling data (Coates et al. 2014) the areas containing characteristics of unmapped habitat were identified and are now referred to as OHMAs.

The ARMPA also identified specific Sagebrush Focal Areas (SFA), a subset of PHMAs (Appendix 4, Figure 2). Sagebrush Focal Areas were derived from greater sage-grouse stronghold areas described by the USFWS in a memorandum to the BLM titled Greater Sage-Grouse: Additional Recommendations to Refine Land Use Allocations in Highly Important Landscapes (USFWS 2014). The memorandum and associated maps provided by the USFWS identify areas that represent recognized strongholds for GRSG that have been noted and referenced as having the highest densities of GRSG and other criteria important for the persistence of the species. See Table 2 for a description of HMAs and leks by allotment within the project area.

Table 2. Greater Sage-grouse Priority, General and Other Habitat Management Area acres and active leks on public lands within the Winecup Gamble Ranch (WGR).

Allotment Name	**Total acres**	**SFA[1]**		**PHMA[2]**		**GHMA[3]**		**OHMA[4]**		**Active/Pending Leks[5]**
		Public acres	%	Public acres	%	Public acres	%	Public acres	%	#
Pilot Valley	93,221	0	0	349	<1	5,168	6	4,794	5	0
Dairy Valley	90,417	21,295	24	28,468	31	10,639	12	6,618	7	8
Gamble Individual	364,398	90,892	25	105,264	29	20,761	6	30,242	8	4
HD	386,607	102,589	27	165,580	43	39,161	10	14,143	4	11

[1]SFA: Sagebrush Focal Area (overlaps with other HMAs below).
[2]PHMA: Priority Habitat Management Area.

[3]GHMA: General Habitat Management Area.
[4]OHMA: Other Habitat Management Area.
[5]2018 Nevada Department of Wildlife lek database.

Much of the WGR consists of sagebrush-dominated ecological sites, including black sagebrush, Wyoming big sagebrush, little or low sagebrush and mountain big sagebrush. Given the priority to conserve sagebrush habitats for greater sage-grouse, an important part of the strategy in assessing/evaluating the WGR is to apply a landscape-level approach focused on habitat values required by sage-grouse. Sage-grouse is an umbrella species and managing the landscape to maintain key sage-grouse habitat attributes can help to conserve other species that rely on the same habitats (Rowland et al. 2006, Hanser and Knick 2011, Copeland et al. 2014). Given the high proportion of the WGR that is designated habitat for sage-grouse, using the sage-grouse umbrella approach to evaluate habitat for a host of sagebrush-associated or sagebrush-obligate species is a useful and informative approach for this land health assessment. Other resources fundamental to this assessment/evaluation include the aforementioned ARMPA (BLM 2015), Sage-Grouse Habitat Assessment Framework (Stiver et al. 2015), Proper Functioning Condition Assessment for Lotic Areas (TR 1737-15; Dickard et al. 2015), User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lentic Areas (TR 1737-16; Reference) and the Wells Resource Management Plan (BLM 1985).

Recent conservation attention focused on sage-grouse has led to the incorporation of the concepts of Resilience and Resistance to evaluate, assess and prioritize conservation and restoration of sagebrush habitats. The following definitions are from Chambers et al. (2014):

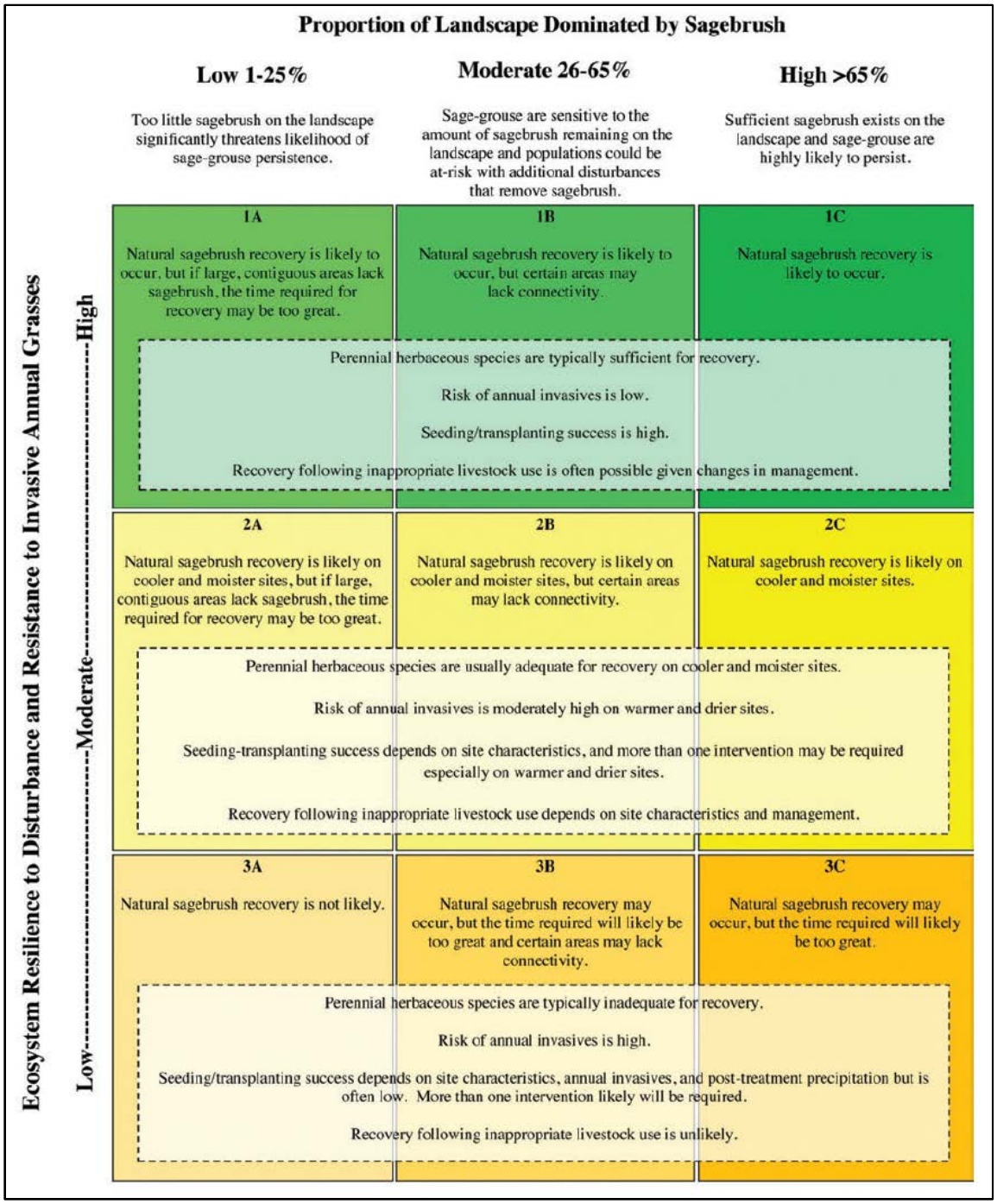
Resilience - Ability of a species and/or its habitat to recover from stresses and disturbances. Resilient ecosystems regain their fundamental structure, processes, and functioning when altered by stresses like increased CO2, nitrogen deposition, and drought and to disturbances like land development and fire (Holling 1973, Allen et al. 2005).

Resistance - Capacity of an ecosystem to retain its fundamental structure, processes and functioning (or remain largely unchanged) despite stresses, disturbances, or invasive species (Folke et al. 2004).

Resistance to Invasion - Abiotic and biotic attributes and ecological processes of an ecosystem that limit the population growth of an invading species (D'Antonio and Thomsen 2004**)**.

Sagebrush-dominated landscapes, such as those found across the majority of the Winecup-Gamble Complex, can be characterized in terms of their relative resilience to disturbance and resistance to invasive annual grasses, according to temperature and moisture regimes (Chambers et al. 2014, Pyke et al. 2015) (Table 3, Figure 1).

Table 3. Sage-grouse habitat matrix based on resilience and resistance concepts (from Chambers et al. 2014), and the proportional cover of the landscape dominated by sagebrush. Rows show the ecosystem's relative resilience to disturbance and resistance to invasive annual grasses derived from the sagebrush ecological types (1 = high resilience and resistance; 2 = moderate resilience and resistance; 3 = low resilience and resistance) in Chambers et al. (2014; Table 1). Columns show the current proportion of the landscape (5km rolling window) dominated by sagebrush (A = 1-25% land cover, B = 26-65% land cover, C = >65% land cover).



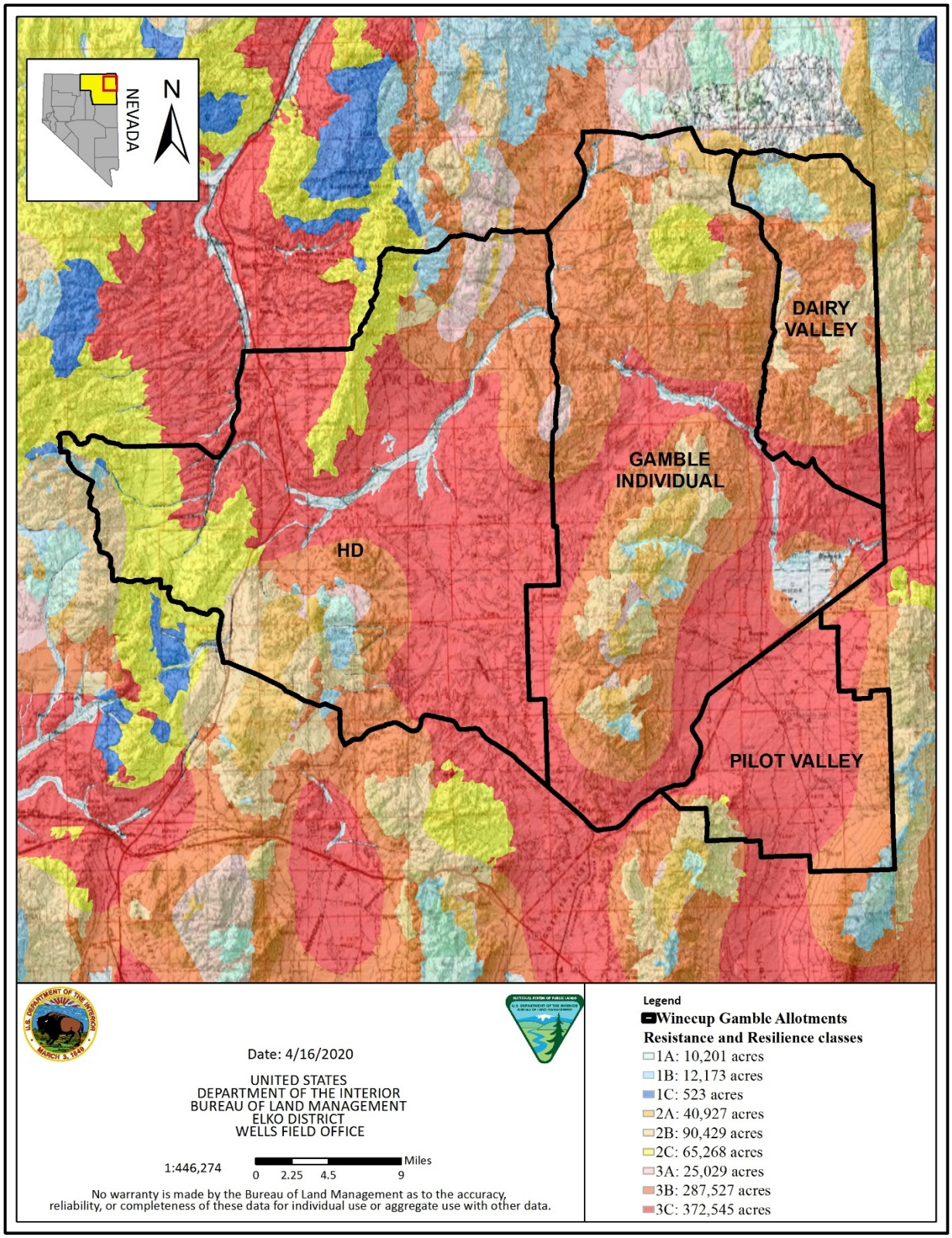


Figure 1. Relative Resilience to disturbance and Resistance to annual invasive grass species within and adjacent to the Winecup-Gamble Ranch. See Table 3 for class definitions.

Riparian corridors primarily along Thousand Springs Creek were not classified in terms of resistance/resilience. However, of 904,622 acres classified within the WGR, 76% were low R&R, 22% moderate R&R and 3% high R&R. The large amount of low R&R classification across the WGR indicates that disturbance within these areas has or is likely to result in sagebrush communities depauperate in sagebrush and perennial herbaceous species, high in prevalence of annual grasses and exhibiting long-lasting impacts of inappropriate historic livestock grazing, including increased shrub dominance and decreased amounts of deep-rooted perennial grasses.

Management History

Much of the early management history of the ranch is adapted from *Cattle in the Cold Desert* by James Young and B. Abbott Sparks (First published by Utah State University in 1985, revised and reprinted by University of Nevada Press in 2002), with supplemental information gleaned from BLM and Winecup-Gamble Ranch documents.

Winecup-Gamble Ranch is one of the older ranching operations in Elko County. The main branch of the California Trail became established along the Rock Springs and Thousand Springs Creeks after news of the discovery of gold in California in 1848 spread to the east and sparked waves of westward migration. The first ranches established in the area in the middle 1850s primarily existed to trade fresh for sore footed oxen with the wagon trains on the California trail. Livestock herds expanded greatly in the late 1860s especially as the Transcontinental Railroad built through the region in the winter of 1868/1869 and ranchers imported large numbers of cattle from various places around the west to feed miners in the mining camps in Nevada and California.

A rancher named Bill Downing set up operations in the upper reaches of the Thousand Springs drainage using the H-D brand. Jasper Harrell bought his first Nevada ranch in the Thousand Springs drainage area around 1870, and by the middle 1870s he controlled almost the entire range from the Transcontinental railroad north to Idaho and from the Snake Range east into Utah. Harrell brought with him the Winecup brand to the region, either from his previous operations in Wyoming or California. Future Nevada governor John Sparks and his business partner John Tinnin bought Downing's H-D Ranch and parts of Harrell's operations in 1881, followed in 1883 by purchasing the rest of Harrell's holdings. The resulting Sparks and Tinnin operation was one of the largest single ranches in the west, running an estimated 70,000-90,000 or more cows. Both Harrell and Sparks-Tinnin owned very little of the land their animals grazed, what land they did own they acquired through a variety of land disposal laws and lay mostly along drainage bottoms and around springs.

The severe winter of 1889-1890 upended the way these operations functioned. Sparks and Tinnin had branded 38,000 calves in 1885, but in 1890 they only branded 68. Livestock death losses bankrupted Tinnin, and John Sparks formed a new partnership with Jasper Harrell to buy out his interests. Rebuilding cattle herds took several years to accomplish, during which time itinerate sheep operators out of Utah and Idaho made increasing use of the range. The winter also proved the need for ranches to start raising and putting up hay for winter feed, and Sparks and Harrell and the other operators in the area started irrigating the bottom lands they owned.

The Utah Construction Company (UC) acquired the Sparks and Harrell operations sometime after 1900 and added several additional ranches to the south of the Transcontinental Railroad. The UC was one of the largest construction firms in the west and was responsible for building many railroads, highways, and large engineering projects. The ranches served a dual purpose for UC, both as pasture land for animals used in construction projects and perhaps more importantly as collateral for performance bonds the company had to place on its many large construction projects. The UC ran large numbers of cows, sheep, and horses, and purchased most of the railroad land grant lands in the Thousand Springs area and leased the rest to keep itinerate sheep operators out of the country. The one exception to this was a designated livestock trail through Pilot Valley over which sheep ranchers moved their sheep each spring and fall between winter range to the south and summer ranges in Utah and Idaho.

The Taylor Grazing Act of 1934 ended the unregulated use of the public range. The newly created United States Grazing Service initially divided the range into Range Units, within which the agency started establishing grazing allotments and issuing permits. The current Winecup-Gamble Ranch fell into parts of three range units. The western part of the ranch is within the HD Unit, the eastern part lies within the Gamble Unit, and the Pilot Valley lies in the Montello Unit. The UC typically had the bulk of the permitted use in each of these units; for example, in 1943 the UC's permitted use the Montello Range Unit, which extended from the Southern Pacific Railroad mainline south as far as the Toano Range and the west slopes of the Pequops, amounted to 26,000 cows, 17,000 sheep, and 1,000 horses. The other six operators in the unit ran a combined total of 385 cows and 95 horses. It is important to note that not all of these animals were always present, as the UC in particular only kept about 800 head in the unit year-round while the rest mostly drifted through the unit on their annual rotation patterns. An additional 65,000 sheep used the designated sheep trail through Pilot Valley.

The UC sold all its Nevada ranch properties in piecemeal fashion in 1945. The ranch has been effectively split into two operational units since, the HD Allotment based out of the Winecup Ranch and the Gamble Individual and Pilot Valley Allotments based out of the Gamble Ranch. The two have passed through a succession of owners in the decades since, sometimes with both ranches under the same owner and sometimes under separate owners. Some owners purchased smaller adjacent permits that added the Dairy Valley Allotment to the Gamble operation, while another owner sold off a lot of the old railroad land grant lands.

The year-round livestock use across most of the ranch in the early decades also resulted in native bunchgrasses being eliminated from many places across the allotments, especially on the benches and foothills along the major drainages and particularly along those drainages adjacent to the California Trail where livestock grazing compounded the decades of heavy use made by the oxen and horses the emigrants used to pull their wagons west. This in turn opened the plant communities to invasion by annual weeds, especially halogeton. BLM starting in the late 1940s planted mostly crested wheatgrass seedings especially in the upper reaches of the Thousand Springs drainage to check and reverse halogeton infestations and to re-introduce perennial bunchgrasses back into the plant communities.

Figures 2 and 3. Figure 2 above shows the edge of a fire scar in the Red Point Pasture of the HD Allotment on 27 August 1950 showing prevalence of halogeton in the burned area. Figure 3 is a repeat of the same view in October 2019 showing the same area seeded to a crested wheatgrass and sagebrush dominated plan community.

Figures 4 and 5. Figures 4 and 5 are another 1950 to 2019 repeat view in the Red Point Pasture of the HD Allotment. Figure 4 above is dated 27 August 1950 and shows absence of halogeton in a drill-width strip seeded to crested wheatgrass in 1947 while the adjacent unseeded areas are infested with halogeton. Figure 5 at right shows a repeat view of the same area in 2019 showing a crested wheatgrass-sagebrush dominated plant community.

Other human uses with present or lasting impacts that have happened on the landscape include the following:

California Trail. As noted above, the California emigrant trail crossed the full width of the present day Winecup-Gamble Allotments from northeast to southwest. An estimated 250,000 people travelled this trail mostly in wagon trains between 1846 and 1869. The vast majority of this use was heavily concentrated along the Rock and Thousand Springs creek drainages.

Railroads, Highways, Pipelines, and Energy Corridors. Construction, maintenance, and operations of the infrastructure associated with these facilities creates intensive impacts along their chosen routes and can cause dispersed impacts in their surrounding environments. The linear corridors and disturbances also fragment plant communities and wildlife habitats and provide openings for the spread of invasive species.

The Central Pacific Railroad built the western end of the Transcontinental Railroad along what is now most of the southern boundary of the HD and Gamble Individual allotments in 1868-1869. The entire boundary between the HD and Pilot Valley allotments follows the railroad. The current town of Montello and the former towns of Toano and Cobre owe their existence to the railroad; Toano served for many years as the principle shipping point for freight transiting to or from a vast swatch of country extending as far south as Pioche, Nevada, and north into southern Idaho. The railroad is today operated by Union Pacific and is one of their principle east-west mainlines across the nation.

In 1926 the Union Pacific Railroad completed a branchline extending from Twin Falls, Idaho, south to Wells, Nevada that passed through the western part of the HD Allotment. The railroad opened several shipping points for livestock, mining, agricultural, and other traffic along this route. Union Pacific ended service over this line in 1973 and removed the tracks around 1980.

Two modern paved highways bisect parts of the Winecup-Gamble Ranch Allotments, U.S. Route 93 through the western part of the HD Allotment and Nevada State Highway 233 that follows the route of the Transcontinental Railroad. Several high voltage power transmission lines pass through the complex, mostly in the vicinity of the Highway 93 corridor. Finally, in 2010 and 2011 El Paso Corporation built the 42-inch Ruby Pipeline to carry natural gas from Opal, Wyoming, to Malin, Oregon; this pipeline passes through the entire width of the Winecup-Gamble Ranch allotments.

Mining. Aside from agriculture, mining has been the other principle economic force in the region's economy. Mining activity in the Winecup-Gamble Complex allotments has occurred in two principle areas. The Delano Mining District on the north side of Delano Mountain in the north end of the Gamble Individual Allotment produced primarily gold, lead, silver, copper, and zinc over a production period lasting from 1872 until 1960. Substantial remnants of these operations still exist. The Snake Range along the western edge of the HD Allotment contains vast barite deposits which were mined through open pits by several concerns primarily in the 1960s through the late 1970s or early 1980s. Jackson Mines, a smaller lead mine towards the south end of the Dairy Valley Allotment, opened in 1907 and was a small producer for several years. Another small concentration of mines lay in the Toano range in the western part of the Pilot Valley Allotment. In more recent years substantial Mining Notice level exploration work has been done primarily in the Loomis Mountain area on the western part of the complex and in the Murdocks towards the south end of the Gamble Individual Allotment.

Towns and Subdivisions. Montello, which lies on the floor of Pilot Valley and reported a population of 84 people in the 2010 census, is the only modern established town within the borders of the Winecup-Gamble Allotments. Several historic townsites associated with the railroad and mining activities are scattered across the landscape.

As briefly mentioned above, one of the past owners of the Winecup-Gamble Ranch sold much of the former railroad land grant lands, which consisted of every other section of land twenty miles out from either side of the Central Pacific Railroad. Many of these sections were later subdivided and broken up into lots. As a result of these actions and other land sales, over five

thousand individual private landowners own approximately 142,800 acres within the Winecup-Gamble Ranch complex boundary. While many of these are absentee owners, a good many more have built trailers, houses, ranchettes, and other dwellings and outbuildings throughout the allotments, with the highest concentrations throughout the entire Pilot Valley Allotment but especially clustered towards the south end, on the Montello Flat along the eastern flank of the Murdocks, in the Loray area off the south side of the Murdocks, and throughout the Black Mountain and Brush Creek pastures of the HD Allotment. Lesser concentrations can be found scattered along the west flank of the Murdocks. Some of these structures have power lines and other utilities running to them, especially in the Pilot Valley area, but a lot of these housing units subsist on generator, solar, or other power sources. There are several private sections within these areas that have been prepared for development, mostly blading roads, but upon which houses have never been built.

Recreation. Recreation has been an important and growing land use within the Winecup-Gamble Complex Allotments. The bulk of this recreational use occurs in the late summer through fall months during the big game hunting seasons. The California Trail is an important tourist draw, and BLM has a designated Back Country Byway that follows the route of the trail through much of the HD Allotment. Rock hounding, back country exploration, photography, and similar outdoor pursuits are also popular activities across the landscape.

Current Grazing Management

BLM completed an allotment evaluation on the Gamble Individual Complex Allotments and signed a Final Multiple Use Decision on 20 September 1989. The grazing systems this FMUD implemented became unworkable by the early 2000s. The ranch grazed mostly pasture cattle scattered throughout the allotment through much of the later 2000s. The current ranch manager implemented many management changes starting in 2011; livestock are now typically grazed in three large herds that rotate through the allotments, with the season of use in all areas except for Pilot Valley Allotment varied across years and long periods of rest from grazing occurring between periods of use.

Table 4. Summary of current livestock permitted use

Allotment Name	Grazing Preference (AUMs)	Season of Use	Percent Public Land	Kind of Livestock
Winecup Gamble Ranch (Authorization #2700347)				
HD	22,747	3/1-2/28	63	Cattle
HD (FFR)	80	3/1-12/31	100	Cattle
Gamble Individual	17,930	3/1-2/28	68	Cattle
Gamble Individual (FFR)	8	4/1-4/30	100	Cattle
Pilot Valley	4,052	11/1-3/31	100	Cattle
Dairy Valley	7,231	4/1-10/31	63	Cattle

Allotment Name	Grazing Preference (AUMs)	Season of Use	Percent Public Land	Kind of Livestock
Winecup Gamble Ranch (Authorization #2700347)				
Flagg Ranch, Inc. (Authorization #2700307)				
Pilot Valley	893	10/1-3/31	100	Cattle
Kenneth F. Larsen (Authorization #2703137)				
Pilot Valley	63	4/1-9/21	100	Cattle

Monitoring

BLM has long used ecological site descriptions (formerly termed range sites) as the basis for understanding and interpreting most upland monitoring data. The Nevada Range Monitoring Handbook's third edition defines ecological sites as "…a conceptual division of the landscape that is defined as a distinctive kind of land based on recurring soil, landform, geological and climate characteristics that differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and in its ability to respond similarly to management actions and natural disturbances".

The United States Department of Agriculture- Natural Resources Conservation Service (NRCS) develops and classifies Ecological sites within Major Land Resource Areas (MLRAs) that cover specific geographic areas. It's important to note that MLRAs cross state boundaries but the identified ecological sites within the MLRAs do not, and as such ecological site identifiers end with the two letter state code in which the site has been identified (NV for Nevada, ID for Idaho, etc.). NRCS also will re-use ecological sites from adjacent MLRAs where the same plant community spreads across the MLRA boundaries. Thus the Winecup-Gamble Complex lies within the MLRA 25 geographic area, but also contains Ecological Sites from the adjacent MLRAs 24 and 28. There are 18 mapped ecological sites within the Pilot Valley Allotment; 16 mapped ecological sites in the Dairy Valley Allotment; 25 mapped ecological sites within the Gamble Individual Allotment; and 26 mapped ecological sites within the HD allotment.

One important note is that Ecological Site mapping is based on Soil Map Units, which are themselves groupings of different soil types, and each soil type within a soil map unit can support different ecological sites. Ecological site maps depict an entire soil map unit as being whatever ecological site the dominant soil type supports. As an example, one of the most predominate soil map units within the Winecup-Gamble Allotments is Soil Map Unit 3012, the Tecomar-Kram-Amtoft association, which are the names of the dominant soil types within this map unit. The Tecomar soil type is found on convex shaped backslopes in mountain landform types, supports the R024XY031NV (Shallow Calcareous Loam, 10-14" precipitation zone, Black sagebrush- bluebunch wheatgrass- Thurber's needlegrass) ecological site, and occupies 40% of the surface area of the Soil Map Unit. The Kram soil type occupies the same geography and landform as the Tecomar soil but is shallower to bedrock and contains less calcium carbonate,

supports the F025XY060NV ecological site (Utah Juniper-Black sagebrush- Thurber's Needlegrass- bluebunch wheatgrass- Indian Ricegrass), and occupies 30% of the Soil Map Unit. The Amtoft soil type is found on convex shaped mountain summits, supports the R025XY057NV ecological site (Black sagebrush-Thurber's needlegrass), and occupies 20% of the Soil Map Unit. Four additional soil types supporting another three ecological sites occupy the remaining ten percent of the Soil Map Unit. An ecological site map will show the entirety of Soil Map Unit 3012 to be Ecological Site R024XY031NV, though that site only occurs on 40% of the surface area within the map unit.

Pellant, et al (2000) and Whisenant (1999) identified the three most important primary ecological processes that define the natural range of variability within any ecological site as (1) hydrology (the capture, storage, and redistribution of precipitation); (2) energy capture (conversion of sunlight to plant and animal matter); and (3) nutrient cycling (the cycle of nutrients through the physical and biotic components of the environment. Range management as a discipline traditionally treated the plant communities associated with range/ecological sites as equilibrium systems in which the vegetation would inexorably evolve towards a defined "climax" plant community, with the progression towards that "climax" proceeding through a series of predictable seral steps following any disturbance. These theories worked well in eastern deciduous forests and the great plains but were an imperfect fit in the more arid regions west of the Rocky Mountains, especially if any of the ecological processes were disrupted.

Range management and plant ecology disciplines in recent years have transitioned to a disequilibrium model of plant community dynamics based on the premise that a community can exist in one of several stable states depending on past management history and disturbance events. See Stringham, et al (2003) for a discussion of the underlying concepts. The NRCS and University of Nevada-Reno have developed state and transition models depicting and describing the various stable states in which each ecological site can exist and identifying the management actions or events that cause transitions between states. These models are developed for Disturbance Response Groups, which are clusters of similar ecological sites that respond to disturbances and management in similar ways. Disturbance Response Group maps are available but are based on the same premises as the Ecological Site Maps discussed above and therefore have the same limitations.

Figure 6 depicts the state and transition model developed for the 025XY019NV ecological site, which is one of the most common mapped ecological sites lying within the Winecup-Gamble Complex. The dominant states are shown, as are phases within each state. The arrows show possible transitional or restoration pathways between phases and states. "Reference State" is the best current understanding of the normal range of variability in ecosystem processes and functions in the 1,000 years immediately preceding European contact. "Current Potential" is similar to the Reference State except invasive/non-native species are also found on the site. Once these species are present on site there are presently no known or identified pathways to restore the plant community back to the Reference State. Similarly there are no known or identified restoration pathways back to Current Potential or Shrub states once a plant community has crossed the threshold into an Annual State; once it has transitioned there the community either remains in the Annual State, can transition to a Tree State if invaded by Junipers or Pinyon

Pine, or can through direct management be transitioned to the Seeded State as illustrated in Figures 2-5 above.

Information on Soil Maps, Available Ecological Site Descriptions, and State and Transition Models are freely available on the internet at the following websites, all verified as of February 2020.

Web Soil Survey: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

The Natural Resource Conservation Service has posted all available soil survey information to the above site.

NRCS Ecosystem Dynamics Interpretive Tool website: https://edit.jornada.nmsu.edu/

This will be the home for all approved Ecological Site Descriptions and State and Transition Models. As of February 2020 the only MLRAs covering the Winecup-Gamble area that have been loaded onto this site are 28A and 28B. A small handful of Oregon and Utah Ecological Site Descriptions in MLRA 24 and 25 have been loaded, but so far none of the Nevada sites within these MLRAs are available through this resource as they are still in various stages of development and/or provisional status.

University of Nevada-Reno Rangeland Ecology Lab: https://naes.unr.edu/rangeland_ecology/

Current drafts of the State and Transition Models and Ecological Site Descriptions for MLRAs 24, 25, and 28 are available under various tabs on this site.

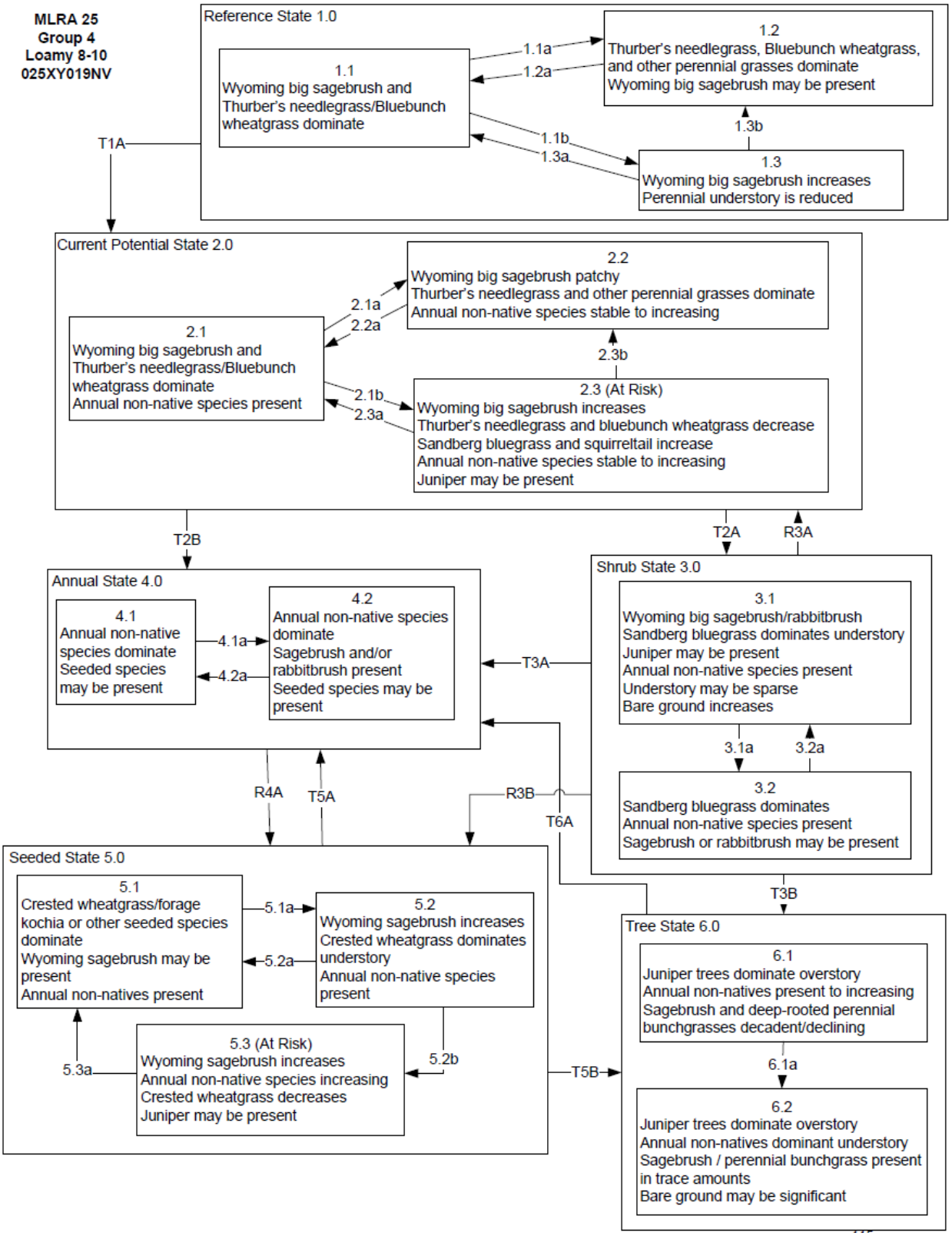


Figure 6. State and Transition Model developed for the 025XY019NV Ecological Site.

BLM has available several different types of monitoring data. The agency established 22 key areas across all four of the allotments starting in the early 1980s. Plant community trend data has been collected at most of these plots in the past, but none recently enough to be useful for this assessment. This assessment does use annual utilization data collected at some of these key areas along with other areas within the allotments.

The principle data included in this assessment has been collected through the Assessment, Inventory, and Monitoring (AIM) framework, under which points are randomly generated in targeted ecological sites, wildlife habitat types, or other designated criteria. These points are then assigned a random weight rank and screened in that order to determine if the plot should be eliminated due to a pre-defined list of rejection criteria, with monitoring studies established at the highest ranked surviving plot. Studies established include digging a soil pit to verify ecological site and collection of vegetation species inventory, line-point intercept, soil stability, vegetation height, and canopy gap along three transects radiating from a central point. Data collected is used to determine where a site sits within the state and transition models developed for the appropriate disturbance response group and is compared to the expected range of metrics as defined by comparison to reference areas or established by reference sheets.

There are 125 plots established under AIM and similar protocols across the Winecup Gamble Complex. These are a combination of plots established by Y2 Consultants under a Cooperative Monitoring Agreement BLM has in place with the ranch; points collected by BLM either under its landscape monitoring program or targeted to collect Greater Sage-Grouse seasonal habitat data; and Landscape Management Framework (LMF) plots. The NRCS collected the LMF data for the BLM following the National Resource Inventory (NRI) protocols in 2014 – 2016, which involves collecting data on two intersecting transects. One final note on these plots is that most have been established to collect data at the landscape level and are not necessarily intended or placed to measure or monitor impacts and effects of any specific management actions occurring at the local management unit level. Data collected at these sites is summarized in Appendix 2 and includes the following:

- Acres of mapped Ecological Sites and Disturbance Response Groups within each allotment.
- Plot locations and details, organized by pasture.
- Ground cover data for each plot.
- Foliar cover by species for most plots. The LMF protocol does not collect this data, and it is also not recorded as being available at some other plots. The developed reference sheets and Ecological Site Descriptions do not contain any values for plant community composition or other metrics derived from cover values, so this information cannot be used to draw any meaningful comparisons from expected or reference conditions.
- Determinations on current state within state and transition models for those plots where data is available or useable.
- Interpreting Indicators of Rangeland Health evaluations for most plots. This protocol uses existing data and observations as compared to reference sheets to measure departure of an area from Reference State conditions in the areas of Soil/Site Stability, Hydrologic Function, and Biotic Integrity.

- Gap Occurrence, which reports on the percentage of the transects at each plot occurring in gaps larger than 20 centimeters in size between vegetation canopies. As with Foliar Cover the available reference sheets do not contain any values against which this metric can be compared, but generally speaking higher gap occurrences tend to indicate sparser vegetation, which could result in more erosion potential.

- Soil stability tests resistance to erosion and soil structural development.

- Plot photos, if available.

- Reported livestock actual use and collected utilization data covering the years 2010 to 2018.

Riparian data BLM and others have collected include some stream survey data on the stretches of stream on public land and both lentic (stream) and lotic (seep and spring) Proper Functioning Condition (PFC) assessments.

DRAFT DETERMINATIONS

PART 1. Standard Achievement Review

Standard 1. Upland Sites

Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate and land form.

As indicated by:

-Indicators are canopy and ground cover, including litter, live vegetation and rock, appropriate to the potential of the site.

Guidelines:

1.1 Management practices will maintain or promote upland vegetation and other organisms and provide for infiltration and permeability rates, soil moisture storage, and soil stability appropriate to the ecological site within management units.
1.2 When grazing practices alone are not likely to restore areas of low infiltration or permeability, land management treatments should be designed and implemented where appropriate.
1.3 Management practices are adequate when significant progress is being made toward this Standard.

Draft Determination

BLM Handbook H-4180-1, "Rangeland Health Standards", defines Potential as "The highest ecological status a site can attain given no social or economic constraints". On the other hand, Version 4 of the Interpreting Indicators for Rangeland Health Technical Reference, citing to U.S. Department of Agriculture-NRCS National Range and Pasture Handbook (1997), defines "Potential Natural Community" as "The biotic community that would become established on an

ecological site if all successional sequences were completed without inferences by man under the present environmental conditions. Natural disturbances are inherent in its development. This PNC may include acclimated or naturalized nonnative species."

The best tool available to BLM considering the above definitions in reaching draft determinations on this standard is the "Current State" ratings within the State and Transition models. As noted, and discussed above, State and Transition Models identify the various stable states in which a plant community can exist given the variables in a wide range of factors including such things as past management, disturbance regimes, climate, and topography. The models also outline how a plant community can transition between phases within states and across threshold boundaries to other states. While each State and Transition model is different, they generally contain some combination of the same states, as follows.

Reference State is considered to be the range of variability that would have been observed in the plant communities in the 1,000 years immediately prior to European contact. Natural disturbances would have been primarily fire, drought, and insects, and the vegetation composition would have vacillated between shrub and grass dominated phases based on the period of elapsed time since the last disturbance event.

Current Potential is similar to the Reference State except that non-native species are present in trace to incidental amounts within the site.

Shrub States typically occur when some combination of fire exclusion, abusive grazing, and/or climatic variability cause the elimination of most of the herbaceous component from a site, which allows shrubs to expand and become dominant on the site. The amount of bare ground tends to decrease in the Shrub State as compared to the Reference or Current Potential states as shrub canopies expand.

Annual States occur in cases where invasive annual grass and/or forb species become dominant on a site. These can occur in phases where shrubs dominate the overstory while invasives dominate the understory to monocultures of cheatgrass or similar species. Bare ground especially can become sparse to non-existent in the Annual state due to the tendency for cheatgrass and/or other invasive annuals to completely fill in the large interspaces between plants typically found in most Great Basin plant communities.

Tree States occur on selected ecological sites where soils and precipitation conditions allow tree species, mostly juniper and Pinyon pine, to encroach into what had previously been non-forested plant communities.

Seeded States can occur on most (but not all) ecological sites in places that have been seeded to non-native perennial bunchgrasses, typically crested wheatgrass or similar species.

State and Transition Models also identify known restoration pathways from lower to higher states. There are no identified restoration pathways from Current Potential back to Reference State in any model, so this is typically the highest state most sites can attain. Shrub States in some ecological sites can be restored to Current Potential through active brush removal and

seeding on some ecological sites, though this is costly and seeding treatments are highly prone to failure especially in lower precipitation zones. The only identified restoration pathways out of Annual States are typically to Seeded States. Identified restoration pathways play directly into the conflicting definitions of Potential and Potential Natural Community discussed at the top of this section. Restoration pathways require active human intervention into natural processes, which can be *possible* given the "no social or economic constraints" definition in the Rangeland Health Standards handbook, but the Interpreting Indicators of Rangeland Health definition of Potential Natural Community as "*The biotic community that would become established on an ecological site if all successional sequences were completed* ***without interferences by man***" (emphasis added) would indicate that any manipulation would result in something other than a Potential natural community. This assessment will generally use the Rangeland Health Standards handbook definition as the benchmark for "Potential", i.e. that a site will be rated as met if it is in the highest potential in which it can be but not met if a restoration pathway has been identified to a higher state. The reader should be aware of other possible conflicting definitions, and the "no social or economic constraints" does not reflect realities on the ground, especially in the ability to implement treatments and the low probabilities of success for some treatments.

The NRCS has produced other references that speak directly to the metrics identified in this standard. That agency has long included on most Ecological Site Descriptions the approximate range of combined basal and crown vegetative ground cover expected at each site. That agency has also drafted reference sheets for most ecological sites that provide the range of expected values for such metrics as bare ground, rock, and litter cover. However, the cover values on the Ecological Site Descriptions and reference sheets are reflective of the Reference State only, no such references exist for the other states within the State and Transition models, and as such they are of somewhat limited use in this effort.

Appendix 2 displays and summarizes the monitoring data collected across these allotments that are the basis for the draft findings presented in this document. The discussions section for each allotment references specific parts of that appendix to support or explain conclusions as needed.

Pilot Valley Allotment: **Met in some parts of the allotment, Not Met in others. Current livestock grazing management is not contributing to the lack of attainment, and grazing is in conformance with the guidelines.**

The Pilot Valley Allotment consists of a single large pasture supporting a diverse range of plant communities. Due to the wintertime season of use most of the livestock grazing on this allotment occurs on the valley floors, the soils of which are largely old lakebed sediments and support mostly salt desert shrub plant communities. This allotment is also the part of the Winecup-Gamble Complex that contains the highest concentration of subdivisions, and ranchettes and houses are scattered throughout most of the allotment.

BLM has available data collected at three monitoring plots within this allotment. Of those, plot WG_PV_UV02 is typical of the parts of the allotment not meeting this standard that lie in the ecological sites occupying the middle elevation zones of the allotment at or above the maximum extent of the Pleistocene era lake shorelines and below the forested ecological sites at the higher

elevations in the Pilot and Toano mountain ranges. This site is also closest to the heaviest subdivided area of the allotment. The high prevalence of cheatgrass and Moderate departure from expected conditions for Biotic Integrity in the Interpreting Indicators of Rangeland Health caused this plot to be placed into the Annual State. The State and Transition Model for this ecological site does support a possible restoration pathway to a Seeded State, which contributes to the Not Met draft determination.

Plots WG_PV_UV04 and ELKO-Shade-422 are typical of the salt desert community ecological sites common to the lakebed sediment soils in the valley bottom where this standard is for the most part being met. Both of these sites are rated at their highest potential, the former site as being in Current Potential and the latter in the Shrub State. There are no identified restoration pathways out of the Shrub State for the ecological site in which the ELKO-Shade-422 plot is placed.

Data for the allotment is detailed in Appendix 2, Pages 1-9.

All three plots contain substantially less bare ground and more litter and vegetative cover than reference conditions, which is expected in annual and shrub states.

BLM has not identified current livestock grazing management as a factor for the partial non-attainment of this standard. The parts of the allotment not attaining the standard are not normally grazed by livestock during the season of use on this allotment. Contributing factors to the non-attainment are historic grazing pressure, fire exclusion, subdivisions and residential development on the intermingled private lands, the introduction of non-native species, and climatic variabilities, all of which would have combined to reduce large perennial bunchgrasses, increase shrubs, and promote the establishment and subsequent dominance of cheatgrass.

Unfortunately, these plots do not paint a complete picture of the allotment. BLM staff have anecdotally noticed a substantial increase in annual forb species, especially tumble mustard, encroaching into salt desert shrub communities throughout the eastern parts of Elko County in 2017 through 2019. This is likely due to the exceptionally wet winters and springs experienced across these years, which may have also substantially increased the amount of cheatgrass and other annual species recorded at plots throughout the allotments in 2017 and 2018 that form most of the basis for the conclusions in this document. The data collected at the two plots on the valley floors did not capture the spread of these invasive species, which is heaviest in the areas surrounding the subdivision in the southern part of the allotment and spread out from there. Similarly, no plots exist in the higher elevation range or forested ecological sites, most of which appear to be in Current Potential states.

Figure 7. Photo in the Pilot Valley Allotment showing intact White Sage communities in the foreground intermingled with areas dominated by annual invasives such as cheatgrass, tumble mustard, and halogeton in the background. 3 October 2019.

Figure 8. Intact sagebrush-bunchgrass communities typical of the highest elevations in the Pilot Valley Allotment. Photo taken from Patterson Pass looking west into Pilot Valley on 3 October 2019.

Dairy Valley Allotment

Dairy Valley Allotment is fenced into two separate pastures, South Dairy Valley/Crittenden covering most of the allotment and North Dairy Valley consisting of a small area at the north end of the allotment. Most of this allotment has burned in recent years, the North Dairy Valley pasture in the 2007 West Fork Fire and a good part of the overall allotment in the 2018 Goose Creek Fire.

Lower (South) Dairy Valley Pasture: Not Met. Current livestock grazing management is not a contributing factor to the non-attainment and is in conformance with the Guidelines.

BLM has data from four AIM plots in this pasture; however, the transects on one plot (Elko-MtnSage-230) obviously cross at least two ecological sites, and that plot also burned approximately one month prior to data collection. The other three plots all burned a year or more after data collection, but as no data has been collected post-fire this determination must rest upon and reflect the pre-burn conditions.

Field crews determined two of these plots (including the burned plot) to be in the Shrub State, one other plot in the Annual State, and did not make any state determinations on the fourth plot. All these states have identified restoration pathways to higher states, the Annual State to a Seeded State and the Shrub States to either the Current Potential or Seeded states. Reported vegetation and litter cover values are generally within or above reference condition ranges, while bare ground is within or below reference values, which indicates enough cover on site to protect the soil surface. The Interpreting Indicators of Rangeland Health assessments did identify soil compaction due to livestock grazing, which can impair water infiltration into the soil, inhibit plant root growth, and accelerate surface soil erosion, at one monitoring plot, but this location is immediately east of Crittenden Reservoir and would have been subject to heavy historic grazing pressure. Despite this all metrics in the IIRH assessment recorded slight to moderate departures from reference except for Moderate to Extreme ratings for Hydrologic Function and Biotic Integrity at the site that both crosses several ecological sites and burned a month prior to data collection. The burned site also has much larger than normal canopy gaps, which would be expected given that most of the plot burned.

Data for this pasture is displayed in Appendix 2, Pages 10-18.

BLM has identified historic grazing, fire suppression, and invasive annuals as the causal factors for not meeting the standard, though as noted these plots have all been affected by fire since data collection or burned immediately prior to it. These actions combined would have significantly reduced large stature perennial bunchgrasses, increased shrub cover, and promoted the invasion of cheatgrass.

Upper (North) Dairy Valley Pasture: Partially Met. Significant Progress is being made towards meeting this standard. Current livestock grazing is not a factor in standard non-attainment and is in conformance with the Guidelines.

A total of seven plots are in this pasture, five AIM and two LMF points. Almost all these plots burned in the 2007 West Fork Fire, and three of the four (Plots 2014327103102B1, 2014327103102B2, and WG_DV_UPDV_UV02) reburned in the 2018 Goose Creek Fire. As with the Lower Dairy Valley pasture no data has been collected since the fire, so reported data and conditions reflect the pre-fire condition.

Field crews determined that four of these plots are in Current Potential while the remaining three are in Annual States; however, the state and transition models for two of those three plots do not identify restoration pathways out of the annual state, meaning that all plots are at their highest potential state except for Plot UPDV_UV03, which could be restored to a Seeded State.

Vegetation and litter cover are all within or well above reference conditions, while bare ground is within or well below reference conditions. The Interpreting Indicators for Rangeland Health assessment resulted in only two Moderate departure from reference ratings, both in Biotic Integrity in annual state plots. The only plot with unusually large canopy gaps lay in what had been a burned juniper forest.

Data for this pasture is displayed in Appendix 2, Pages 18-30.

Gamble Individual Allotment

The Gamble Individual Allotment is divided by fences or natural boundaries into ten pastures. The allotment contains a wide variety of ecological sites, ranging from salt desert shrub communities in the Pilot Valley through sagebrush as the middle elevations to forested sites at the top of the mountain ranges. This allotment contains the largest concentration of historic mining activity in the Delano Mountain area, and numerous subdivisions exist primarily around the south end of the Murdocks and the fringe of Pilot Valley. Fire has been a common occurrence in the northern half of this allotment.

West Delano Mountain Pasture: Partially Met. Significant Progress is being made. Current livestock grazing is in conformance with the guidelines.

Eight plots have been established in this pasture, two AIM and six LMF. Only one of these has a state and transition model determination, plot Gamble Delano 14, which is in current potential. The other AIM plot crosses multiple ecological sites and appears to be in Current Potential/Shrub and Tree states. No determinations have been made for any of the LMF plots.

Vegetation cover on all plots was well above reference values while recorded bare ground fell well within or well below reference values for all plots. Interpreting Indicators of Rangeland Health assessments all fell in the non to slight or slight to moderate departure ratings except for LMF plot 2014327100214B2, which had Moderate to Extreme departure ratings for all three categories. However, no photos or notes explaining the rating are available. Data for this pasture is displayed in Appendix 2, Pages 33-42.

Causal factors for any non-attainment are historical livestock grazing, fire exclusion coupled with recent catastrophic fire, and invasive species.

East Delano Pasture: Partially Met. Significant Progress in Being Made towards attainment. Current livestock grazing is not a factor in non-attainment and is in conformance with the guidelines.

Five plots have been established in this pasture, three AIM and two LMF. Field crews determined one plot (WG_GI_EADE_UV02) to be in Current Potential and the other two AIM plots to be in the Shrub State. The Current Potential plot burned twice before establishment, in the 1996 Division and 1999 No School 2 fires, then burned again in the 2017 Delano fire about two months after data collection. Plots EADE_UV01 and Gamble Delano 1 are in Shrub State; however, the state and transition models for the ecological site in which plot Gamble Delano 1 resides does not support any restoration pathways out of the Shrub State. The only plot with potential to be restored to a higher state is WG_GI_EADE_UV01, which has identified restoration pathways into either Current Potential or Seeded states.

Vegetation and Litter cover are generally within or above reference values while bare ground is generally within or below reference values. All five sites have significant rock ground cover. The Interpreting Indicators of Rangeland Health assessment rated departures from reference as Non to Slight or Slight to Moderate across all measured plots except for WG_GI_EADE_UV02, which had a Moderate departure rating for Biotic Integrity. Both LMF plots had a relative high percentage of larger canopy gaps, but the photos show both of these plots to be in mixed sage and juniper woodlands. Data collected in this pasture can be found in Appendix 2, Pages 43-50.

Granite Creek Pasture: Not Met. Current livestock grazing management is not a contributing factor to non-attainment and is in conformance with the Guidelines.

Almost this entire pasture burned in the 1996 Division Fire. Two AIM plots have been established in this pasture. Field crews placed one plot (Gamble Granite 3) in a Seeded State and the other plot (Gamble Granite 15) in the Current Potential state. There are problems with both ratings, however. The monitoring notes for Gamble Granite 3 list the "seeded species" as Saskatoon serviceberry, roundleaf snowberry, and thickspike wheatgrass, none of which with the occasional exception of thickspike wheatgrass are typically seeded following wildland fire. This plot also does not lie within any of the areas recorded to have been seeded following the Division Fire. The high prevalence of cheatgrass on this site and lack of actually seeded species have caused BLM to change this to an Annual state after the fact. The Gamble Granite 15 plot received a Current Potential rating only because it and Reference State are at present the only two states within the State and Transition Model for this ecological site. Stringham et al. (2015) noted in the narrative discussion for this model that "*This is a one state model, consisting of the reference state and three community phases. This site was not seen on the site visits and has the potential for invasion by non-native species.*" The observed 68% cheatgrass foliar cover suggests this site would have been rated as an Annual State if it existed in the State and Transition model. The photos and other observations on the ground suggest a good part of this allotment was in a Tree State before the fire.

Vegetation and Litter cover are well above reference conditions and bare ground well below reference, which is to be expected in annual dominated sites. All the attributes of the

Interpreting Indicators of Rangeland Health assessment received Non-Slight or Slight-Moderate ratings. Data collected in this pasture can be found in Appendix 2, Pages 51-55.

Causal factors for non-attainment of this standard is a combination of historic grazing, extensive disturbance caused by historic mining activities especially in the southern part of the pasture, long-term fire suppression followed by catastrophic fire, and annual species invasions. These activities in aggregate would have resulted in the reduction of large statured perennial bunchgrasses, increase in brush cover, and increasing invasive annual plant occurrence.

Signboard Pasture: Undetermined. Current livestock grazing management is not a factor in non-attainment and is within the Guidelines.

This pasture has an extensive recent fire history. A portion of the western part burned in the Delano Fire in 1981. That entire fire burned again along with the entire rest of the western half of the pasture in the 2001 Delano Fire. The entire pasture burned in the 2007 West Fork fire. Most of the eastern half of the pasture burned in the 2011 Signboard fire, then the entire pasture burned again in the 2017 Dry Gulch fire.

There are two AIM plots located within this pasture, both established in August 2017 about a month after the Dry Gulch Fire. As a result, none of the data collected is terribly informative or useful is speaking to resource conditions in this pasture beyond what it looks like a couple weeks after the flames are extinguished. Both plots lie in parts of the allotment seeded following the various fires and are today likely in the seeded state. Data collected in the pasture can be found in Appendix 2, Pages 56-60.

Figure 9. Signboard Pasture on 20 November 2018 showing a mixture of seeded species planted along the road, cheatgrass, rabbitbrush re-sprouting after the fire, and native perennial bunchgrasses.

Rocky Butte/Gamble Spring Pasture: Partially Met. Significant Progress in Being Made. Current livestock grazing management is not contributing to the non-attainment of this standard and is in conformance with the Guidelines.

This is a large and predominately mountainous pasture. Vegetation ranges from winterfat and black sagebrush communities in the drainage bottom between the two principle ranges through largely intact sagebrush communities to dense juniper woodlands at the higher elevations.

Five AIM and one LMF plots have been established throughout this pasture. Field crews determined ratings for all five of the AIM plots, one of which is in Current Potential, two of which are in Annual State, and two of which are in the Shrub State. Three of these are at their highest potential, as there are no identified restoration pathways out of the Shrub State (plot Gamble Rocky 2) or the Annual State (plot Gamble Rocky 16) in the State and Transition models developed for the applicable Ecological Sites. Two plots have identified restoration pathway to higher states, Gamble Rocky 3, which has the potential to be transitioned to a Seeded State, and WG_GI_ROBU_UV03, which has the potential to be transitioned to Current Potential or Seeded states.

Vegetation cover is at or above reference values and bare ground is within or well below reference values for all plots. Interpreting Indicators for Rangeland Health ratings show only two Moderate departures from reference conditions, both in Biotic Integrity at one of the Annual State sites (Gamble Rocky 16) and the Shrub State site (Elko-BlackLowSage-043). These also happen to be the only two of the six plots affected by recent wildland fire, as the Gamble Rocky 16 plot burned in the 2012 20-Mile Fire and the Elko-BlackLowSage-043 plot location burned in the 1985 21-Mile Road fire. All other attributes have been rated at none to slight or slight to moderate departures from reference. Data collected in this pasture is displayed in Appendix 2, Pages 60-70.

BLM has identified historic grazing, long term fire suppression followed in some places by catastrophic fire, and annual grass invasion as the causal factors for non-attainment. In aggregate these would have over time decreased perennial large stature grasses and increased brush cover while also allowing for invasive annuals to become established and then attain dominance, especially after fire.

Murdock Pasture: Not Met. Significant Progress in Being Made. Current livestock grazing management is not contributing to the non-attainment of this standard and is in conformance with the Guidelines.

This pasture lies almost entirely in the Murdock mountain range and adjacent benches above the valley floor on the west side of the range. Two AIM and four LMF plots have been established in this pasture. Both AIM plots are in the Shrub State. There are identified restoration pathways in the State and Transition models developed for the Ecological Sites associated with both plots, to Current Potential or Seeded States for Elko-BlackLowSage-034 and to the seeded state for Gamble Montello 9. No ratings are available for the LMF plots.

Vegetation cover is at or above reference values and bare ground is below reference values for all plots for which this data is available. Only one Interpreting Indicators for Rangeland Health assessment resulted in a departure rating above the Slight to Moderate range, specifically a Moderate to Extreme rating for Biotic Integrity for plot Elko-BlackLowSage-043. One LMF plot had a higher than usual percentage of large canopy gaps, but photos show it to be in a thick Juniper stand with no brush or herbaceous understory. Data collected in this pasture is displayed in Appendix 2, Pages 71-79.

BLM has identified historic grazing and fire suppression as the causal factors for non-attainment of this standard, both of which would have reduced perennial large stature grass cover and increased both brush and tree occurrence.

Montello Flat: Partially Met. Current livestock grazing management is not contributing to the non-attainment of this standard and is in conformance with the Guidelines.

This pasture lies predominately on the floor of Pilot Valley and the lower foothills of the eastern flank of the Murdock range. The town of Montello and many scattered homesites lie throughout this pasture. Two AIM and two LMF plots have been established within this pasture. Field crews have only identified a current state rating for one plot, Gamble Montello 31, which is in the Shrub State. The State and Transition Model developed for that Ecological Site does contain a restoration pathway from Shrub State to Seeded State only.

All four plots have vegetation cover well above and bare ground far below reference values for each ecological site. All Interpreting Indicators for Rangeland Health assessment determinations fell in the None to Slight or Slight to Moderate ratings except for a Moderate departure rating for Hydrologic Function on plot Gamble Montello 2 (2-1) due to observed pedestaling. The same plot had a higher than usual occurrence of canopy gaps. Photos show the plot lies in a sagebrush site with encroaching junipers. Data collected in this pasture is displayed in Appendix 2, Pages 79-85.

BLM has identified historic grazing and fire suppression as the causal factors for non-attainment of this standard, both of which would have reduced perennial large stature grasses and increased shrubs and trees.

Loray Pasture: Partially Met. Current livestock grazing management is not contributing to the non-attainment of this standard and is in conformance with the Guidelines.

This pasture lies in and around the southern end of the Murdock Mountains. Two AIM and two LMF plots have been established within this pasture. Field crews determined one of the AIM plots to be in Current Potential state and the other to be in a Shrub state. The ecological site upon which the Shrub State plot lies does have an identified restoration pathway to either Current Potential or Seeded states.

All plots had None to Slight or Slight to Moderate ratings for Interpreting Indicators of Rangeland Health except for a Moderate departure rating for the Biotic Integrity of the plot determined to be in the Shrub State**.** Vegetative cover values are well above and bare ground at

or below reference values except for one of the LMF plots, which also vastly larger than usual canopy gaps. This plot lies on a side slope in the middle of a thick Juniper forest with no shrub or herbaceous understory, which explains the observed conditions. Data collected in this pasture is displayed in Appendix 2, Pages 85-92.

BLM has identified historic grazing and fire suppression as the causal factors for non-attainment of this standard, which would have decreased large stature perennial grasses and increased shrubs and trees.

Jackson Seeding: Met. Current livestock grazing management is in conformance with the Guidelines.

Most of the lower elevations of this pasture were seeded to crested wheatgrass in the early 1970s. The one AIM plot established in this pasture is on the edge of one of these old seedings, and field crews rated it as being in Current Potential.

Vegetation and litter are well above and bare ground is below reference conditions. All attributes in the Interpreting Indicators of Rangeland Health assessment received None to Slight or Slight to Moderate ratings. Data collected in this pasture can be found in Appendix 2, Pages 92-95.

HD Allotment

This is the largest of the four allotments within this complex. The allotment is fenced into fifteen primary pastures. Vegetation communities range from salt desert shrub in the southeastern part of the allotment through black and Wyoming big sagebrush communities in the benches to juniper and other montane woodlands in the higher elevations. This allotment also has an extensive fire history especially on a path from the southwest to northeastern corners, which roughly lies in the typical track of summertime thunderstorms that pop up over the East Humboldt range and move northeast. A lot of fires also originate off Highway 93, which passes through the western part of the allotment.

This allotment also has the longest grazing history of any part of this complex, as the California trail passed through the entirety of the allotment, from the northeast to the southwest. Oxen and horses associated with emigrant wagon trains subjected the drainage bottoms and adjacent benches of the Rock Springs and Thousand Spring creeks to intensive grazing and trampling pressure long before the modern ranching era commenced.

Upper Loomis Pasture: Met. Current livestock grazing is in conformance with the Guidelines.

This pasture is on the extreme western edge of the allotment, lying on the eastern face of the Snake Mountain range. Plant communities range from juniper and mahogany woodlands on or near the top of the Snake Range to black and Wyoming big sagebrush on the eastern part. Two fires, the 2001 Tabor Creek and 2007 Hepworth fires, have burned into the western parts of this pasture. Two AIM plots have been established in this pasture. Data collected resulted in one

plot (UPLO_UV03) being placed in the Shrub State, but there are no identified restoration pathways out of that state in the State and Transition model developed for that ecological site. Unfortunately the randomized plot location of the AIM protocol resulted in the other plot being located on the very top of the Snake Range in what field crews identified as a Snow Pocket ecological site for which no state and transition models have yet been developed. Patti Novak-Echenique identified the plot as being in a different ecological site after reviewing the data, but no state determinations have been made.

Vegetation canopy cover values are well above and bare ground values are well below reference ranges. No attributes rated above a None to Slight departure in the completed Interpreting Indicators for Rangeland Health assessment. Data collected in this pasture is displayed in Appendix 2, Pages 98-102.

Pole Creek Pasture: Partially Met. Significant Progress in being made towards attainment. Current livestock grazing management is not resulting in non-attainment and is in conformance with the Guidelines.

This pasture lies on the same landforms and has similar characteristics as the Upper Loomis pasture. The 2007 Hepworth Fire burned along the entire western edge of this pasture and fingered into it in a few places, otherwise this pasture has no other recent fire history. Four AIM plots have been established in this pasture. Field crews rated two of these plots as being in Current Potential, one plot as being in the Annual State, and did not arrive at a rating for the fourth plot. The State and Transition model drafted for this site does support a restoration pathway from the Annual to Seeded state, which justifies the determination.

Vegetation cover lay well above and bare ground well below reference values. No attributes in the Interpreting Indicators of Rangeland Health assessment rated above a None to Slight or Slight to Moderate departures from reference. Data collected in this pasture is displayed in Appendix 2, Pages 103-111.

BLM attributes non-attainment of this standard to historic livestock grazing, long term fire suppression, and invasion of non-native species, which together would have reduced tall stature perennial grasses, increased shrubs, and promoted occurrence of invasive annuals.

Lower Loomis Pasture: Partially Met. Current livestock grazing management is not a contributing factor to the non-attainment of this standard and is in conformance with the Guidelines.

This pasture covers the lower slopes of the Snake Range down to the Thousand Spring Creek drainage. Four AIM and two LMF plots have been established in this pasture. Field monitoring crews determined one plot to be in the Annual State, one to be in the Shrub State, and one plot to be at Current Potential. The applicable State and Transition models support a potential restoration pathway from Annual to Seeded State and from Shrub to Current Potential or Seeded states, which justifies the determination.

Vegetation cover is above, and bare ground are within or below reference conditions for all plots. All measured attributes in the Interpreting Indicators for Rangeland Health Assessment resulted in None to Slight or Slight to Moderate departures from reference conditions except for Biotic Integrity on two plots, one of which was rated Moderate departure and the other Moderate to Extreme. Data collected in this pasture is displayed in Appendix 2, Pages 111-121.

BLM attributes non-attainment of this standard to historic livestock grazing, long term fire suppression, and invasion of non-native species, which taken together would reduce tall statured perennial bunchgrasses, increase brush cover, and promote invasive annual plant establishment.

Red Point Pasture: Partially Met, Significant Progress is being made. Current livestock grazing management is not a contributing factor to non-attainment and within the Guidelines.

The Red Point pasture occupies the northern part of Summer Camp Ridge and the surrounding alluvial fans and flatlands. Six AIM and four LMF plots have been established in this pasture. Field crews determined two of the AIM plots to be in Current Potential, two plots to be in Seeded state, and two plots to be in the shrub state. The applicable state and transition models support potential restoration of one of the shrub state plots to either Current Potential or Seeded states. No state determinations have been made for the LMF plots. Only one small fire from 1988 has recently burned in this pasture, but large parts of especially the east side of Red Point burned in the late 1940s and came back to heavy halogeton, which prompted BLM to plant extensive crested wheatgrass seedings in this area to control the spread of that plant. This is previously discussed in early parts of this document.

Vegetation cover is within or above reference conditions on all plots. Bare ground with one exception is within or below reference conditions. The one exception is an LMF site that photos show to be sagebrush with little to no herbaceous component in the understory. Most of the attributes in the Interpreting Indicators of Rangeland Health assessment were rated as None to Slight or Slight to Moderate departures from reference except for three plots, one that had Moderate departure in all attributes while the other two had Moderate departures for Biotic Integrity. Data collected in this pasture is displayed in Appendix 2, Pages 121-135.

BLM attributes non-attainment of this standard to historic livestock grazing, long term fire suppression, and invasion of non-native species, which together would have decreased tall statured perennial grass species, increased shrubs, and promoted invasion by invasive annuals.

Summer Camp Pasture: Partially Met. Current livestock grazing management is not a contributing factor to non-attainment and within the Guidelines.

The Summer Camp Pasture lies on the southern part of Summer Camp Ridge. This pasture is almost entirely on the upper parts of the slopes and summits of this geographic feature. The pasture is bordered on the south and west by the former Oregon Short Line/Union Pacific railroad grade and on the east by Highway 93. Only one recent fire has burned in this pasture, though it has a similar past fire history as the Red Point pasture.

Five AIM plots have been established within this pasture. Field crews placed two plots in the shrub state and the remaining three in the annual state. The developed state and transition models support potential restoration pathways for one of the shrub state plots back to current potential and for one of the Annual states (Plot HD Summer 10) to a seeded state but does not support any restoration pathways out of the annual or shrub state for the other three plots. Data collected in this pasture is displayed in Appendix 2, Pages 135-145.

Vegetation cover fell well above and bare ground below reference conditions for all plots. All attributes in the Interpreting Indicators of Rangeland Health assessment fell into the None to Slight or Slight to Moderate departures from reference.

BLM attributes non-attainment of this standard to historic livestock grazing, long term fire suppression, and invasion of non-native species, which together would have decreased tall statured perennial grass species, increased shrubs, and promoted invasion by invasive annuals.

Primrose Pasture: Partially Met. Current livestock grazing management is not a contributing factor to non-attainment and within the Guidelines.

This pasture lies on the southern end of the Knoll Mountain range and surrounding valley bottoms. It is bordered on the west by Highway 93 and the south by Thousand Springs Creek and would have experienced some of the heaviest livestock use history in this complex. Five AIM and two LMF plots have been established in this pasture. Field crews determined one of the AIM plots to be in Current Potential state, three to be in a Shrub state, and one to be in an Annual State. No determinations have been made for the LMF plots. The Annual state plot does lie within the one large recorded fire in this pasture, the 1985 Black Rock fire. The State and Transition models support potential restoration pathways to the Current Potential or Seeded states for the two Shrub States and to a Seeded state for the Annual State plot.

Vegetation cover are within or well above and bare ground well below reference conditions. Interpreting Indicators of Rangeland Health assessments yielded two plots with departure ratings above the Slight to Moderate range, the Annual State plot (which had Moderate to Extreme departures for Hydrologic Function and Biotic Integrity) and one of the Shrub States (which had a Moderate departure rating for Biotic Integrity). Data collected in this pasture is displayed in Appendix 2, Pages 145-156.

BLM attributes non-attainment of this standard to historic livestock grazing, long term fire suppression, and invasion of non-native species, which together would have decreased tall statured perennial grass species, increased shrubs, and promoted invasion by invasive annuals.

Brush Creek Seeding Pasture: Met. Current livestock grazing management is within the Guidelines.

This is a smaller pasture located east of Highway 93 and south of Thousand Springs drainage and would have a similar management history as the Primrose pasture. The private land in this pasture has been partially subdivided, and several fenced private sections partially fragment this pasture. BLM and the ranch drill seeded almost the entire pasture with crested wheatgrass in

1953. One AIM plot has been established in this pasture, and field crews placed it in the Seeded state. Several native shrub and grass species have become established in the old seeding.

Vegetation cover is above, and bare ground cover is below reference conditions. No attributes in the Interpreting Indicators of Rangeland Health assessment rated above a Slight to Moderate departure from reference. Data collected in this pasture is displayed in Appendix 2, Pages 157-159.

Black Mountain Pasture: Not Met. Current livestock grazing management is not a contributing factor to non-attainment and within the Guidelines.

This is a large and mostly mountainous pasture with a complicated management history. Almost the entire pasture has burned since 2000, some parts several times. Substantial parts of the private land in this pasture have been subdivided and developed into dispersed residents or homesteads, and at least one third party livestock operation runs on fenced private in this pasture. This pasture also receives a high level of dispersed recreation use. Three AIM and two LMF plots have been established in this pasture. Field crews placed one plot in the Shrub State, one in the Annual State, and one in the Seeded State; however, the species recorded as being the basis for the Seeded State determination have either not been seeded or are naturally occurring species on the site, and as such BLM has reclassified the plot to an Annual State. The State and Transition models support a potential restoration pathway to a Seeded State. No ratings are available for the two LMF plots.

Vegetative cover is above and bare ground within or substantially below reference values. No attributes in the Interpreting Indicators of Rangeland Health assessment rated above Slight to Moderate departures from reference. One of the LMF plots had a higher than normal occurrence of large canopy gaps, the photos show it to be in a rabbitbrush dominated site with large interspaces. This plot burned twice, in 1998 and again in 2000. Data collected in this pasture is displayed in Appendix 2, Pages 159-167.

BLM attributes the non-attainment of this standard to historic livestock grazing pressure, long term fire suppression followed by catastrophic fire, and introduction of invasive species, which together would have decreased tall statured perennial grass species, increased shrubs, and promoted invasion by invasive annuals.

HD Pasture: Met. Current livestock grazing management is within the Guidelines.

This pasture lies on the valley bottom and Black Mountain foothills immediately south of the Winecup Ranch headquarters. Two AIM and two LMF plots have been established in this pasture. Field crews rated one AIM plot in the Shrub state and the other in the Annual State; however, there are no identified restoration pathways out of the Annual or Shrub States in the State and Transition models, and as such both plots are in their highest potential state. The Annual State plot burned in 2000 and then again in 2017 several months after data collection. No data has been collected after the 2017 fire, so the values reported here reflect pre-burn conditions. No state determinations have been reached for the LMF plots.

Vegetation cover is above and bare ground well below reference conditions. No attributes rated above a Slight to Moderate departure from reference in the Interpreting Indicators of Rangeland Health assessment. Data collected in this pasture is displayed in Appendix 2, Pages 168-173.

Toano Draw Pasture: Met. Current livestock grazing management is within the Guidelines.

This is a large pasture lying almost entirely on the valley floor of Toano Draw. Fire has not been a widespread occurrence in this pasture, and BLM seeded two large blocks of land within this pasture to crested wheatgrass in the middle 1960s. Two AIM and ten LMF plots have been established in this pasture. Field crews placed one of the AIM plots that lies in one of the crested wheatgrass seedings in the Seeded state and the other in the Shrub State. The State and Transition models do not support any potential restoration pathways out of the Shrub state for that ecological site, and as such both sites are at their highest potential. No ratings have been made for any LMF plots.

With a few exceptions vegetation cover is within or above and bare ground within or below reference conditions. Photos of the LMF plots show much of the benches above the drainage bottoms outside of the seeded areas to be mostly sagebrush with little to no herbaceous understory. Very little cheatgrass or other annual plants occur within this pasture, which results in higher amounts of bare ground and a higher occurrence of large canopy gaps as compared to other parts of the allotments. This pasture does contain large amounts of white sage/winterfat along the drainage bottoms, but none of the plots ended up in that plant community. No attributes in the Interpreting Indicators of Rangeland Health assessment rated above a Slight to Moderate departure from reference except for a Moderate departure for Biotic Integrity on one LMF plot. Data collected in this pasture is displayed in Appendix 2, Pages 173-187.

9 Mile Mountain Pasture: Partially Met. Current livestock grazing is not contributing to non-attainment of this standard and is within the Guidelines.

This pasture contains the mountain peaks of the Tony Mountain range/Ninemile Mountain and the surrounding alluvial fans and drainage bottoms on the north and west sides. Five AIM plots have been established in this pasture. Field crews rated three plots as being in the Shrub State; however, the State and Transition modeling supports a potential restoration pathway out of the Shrub state for two of the plots. No determinations have been made for the other two plots.

Vegetation cover is above and bare ground within or below expected conditions. No attributes of the Interpreting Indicators of Rangeland Health assessment rated above the Slight to Moderate departure from reference except for Biotic Integrity on one plot. Data collected in this pasture is displayed in Appendix 2, Pages 187-196.

BLM attributes the non-attainment of this standard to historic grazing, fire suppression, and annual invasives, which together would have decreased tall statured perennial grass species, increased shrubs, and promoted invasion by invasive annuals.

Wilkins Seeding Pasture: Met. Livestock grazing is in conformance with the Guidelines.

This is a smaller pasture lying on the valley floor and lower alluvial fans on the north side of Thousand Springs Creek. The location and landform would have resulted in an intensive grazing use history, and BLM seeded most of this pasture to crested wheatgrass in 1955. About half of this pasture burned in 1985. One AIM plot has been established in this pasture in the seeding, and as a result the field crews placed it in the Seeded State.

Vegetative cover is above and bare ground below reference values. No attributes in the Interpreting Indicators of Rangeland Health assessment rated above a Slight to Moderate departure rating. Data collected in this pasture is displayed in Appendix 2, Pages 197-199.

Burnt Creek Pasture: Partially Met. Current livestock grazing is not contributing to non-attainment of this standard and is within the Guidelines.

This is a large and diverse pasture lying in the foothills and mountain spurs on the east side of the Knoll Mountain range. This pasture is divided into north and south use areas by a temporary fence constructed in 2016 to protect a reseeding of some of the burned areas in the southern part of the pasture where previous restoration efforts had failed. Almost all of the southern and eastern parts of this pasture have burned between 1985 and 2007, some places multiple times. Two AIM and three LMF points have been established in this pasture. Field crews placed both the AIM plots in the Annual State. State and Transition modeling supports a potential restoration pathway out of the Annual State for only one of the two plots, HD Burnt 6.

Vegetation cover is generally above and bare ground within or below expected reference ranges. The Interpreting Indicators of Rangeland Health assessment did result in Moderate to Extreme departure ratings for one of the LMF plots, but no field notes or photographs of that plot are available. This same plot also had substantially higher than normal occurrence of large canopy gaps. Otherwise the assessment recorded a Moderate departure from reference for Biotic Integrity at one plot and no ratings above a Slight to Moderate departure for the other plots. Data collected in this pasture is displayed in Appendix 2, Pages 200-206.

BLM attributes the non-attainment of this standard to historic grazing, fire suppression followed by catastrophic fire, and annual invasives, which together would have decreased tall statured perennial grass species, increased shrubs, and promoted invasion by invasive annuals.

Knoll Mountain Pasture: Met. Current livestock is within the Guidelines.

This pasture encompasses the mountainous areas along the east side of the upper elevations of the Knoll Mountain range. Most of this pasture burned in several fires in the 1980s, though only one small area has burned more than once. Two AIM plots have been established in this pasture. Field crews placed the plot that burned into the Annual state and the other plot that lies in one of the few unburned parts of the pasture in the Shrub state. State and transition modeling do not support any restoration pathways out of the either state for the ecological sites upon which these plots lie, which supports the attainment of this standard.

Vegetation cover is well above and bare ground well below reference conditions. The burned site did have a Moderate departure from reference for Hydrologic Function and a Moderate to Extreme departure from reference for Biotic Integrity in the Interpreting Indicators of Rangeland Health assessment. Data collected in this pasture is displayed in Appendix 2, Pages 207-212.

Bell Canyon Pasture: Met. Current livestock is within the Guidelines.

This pasture lies in the foothills interspersed with ephemeral drainage bottoms between the eastern flank of the Knoll Mountain range and the Thousand Springs and Rock Springs creeks drainage bottoms, which respectively form the southern and eastern boundaries of this pasture. Degradation resulting from intensive historical grazing pressure caused BLM to seed all of the drainage bottoms to crested wheatgrass in 1953. Most of the pasture burned in 1985, and then almost all of that pasture burned again in 2006 and 2007. Two AIM and two LMF plots have been established in this pasture, all of them in the southern and eastern parts of the pasture and all outside the parts of the pasture that have burned. Field crews placed one of the AIM plots in the Shrub State, but the State and Transition models do not support any potential restoration pathways out of the shrub state for that ecological site. No state determinations have been made for the other AIM plot or the LMF plots.

Vegetation cover was above and bare ground within or below reference conditions for the two AIM plots. Vegetation cover was within reference but bare ground substantially above reference for the two LMF plots. Photos of the two LMF plots shows substantial sagebrush die off in that area in 2014, the year of data collection. Probable causal factors are some combination of effects from the extreme drought conditions experienced in the region in the previous several years compounded by aroga moth infestation. No similar sagebrush di-offs are observed in the photos from the two AIM plots collected in 2017. All attributes in the Interpreting Indicators of Rangeland Health had None to Slight or Slight to Moderate departures from reference except for a Moderate departure rating for Biotic Integrity on one of the LMF plots. Data collected in this pasture is displayed in Appendix 2, Pages 212-218.

Standard 2. Riparian and Wetland Sites

Riparian and wetland areas exhibit a properly functioning condition and achieve state water quality criteria.

As indicated by:

- Streamside riparian areas are functioning properly when adequate vegetation, large woody debris, or rock is present to dissipate stream energy associated with high water flows. Elements indicating proper functioning condition such as avoiding accelerating erosion, capturing sediment, and providing for groundwater recharge and release are determined by the following measurements as appropriate to the site characteristics:

    Width/Depth ratio; Channel roughness; Sinuosity of stream channel; Bank stability; Vegetative cover (amount, spacing, life form); and Other cover (large woody debris, rock).

- Natural springs, seeps, and marsh areas are functioning properly when adequate vegetation is present to facilitate water retention, filtering, and release as indicated by plant species and cover appropriate to the site characteristics.
- Chemical, physical and biological water constituents are not exceeding the state water quality standards.

Guidelines:

2.1 Management practices will maintain or promote sufficient vegetation cover, large woody debris, or rock to achieve proper functioning condition in riparian and wetland areas. Supporting the processes of energy dissipation, sediment capture, groundwater recharge, and stream bank stability will thus promote stream channel morphology (e.g., width/depth ratio, channel roughness, and sinuosity) appropriate to climate, landform, gradient, and erosional history.
2.2 Where grazing management practices are not likely to restore riparian and wetland sites, land management treatments should be designed and implemented where appropriate to the site.
2.3 Management practices are adequate when significant progress is being made toward this Standard.
2.4 Grazing management practices will maintain, restore or enhance water quality and ensure the attainment of water quality that meets or exceeds state standards.

Riparian communities are areas directly influenced by permanent or seasonal water availability. These areas typically have visible vegetation and physical characteristics that demonstrate the presence of that water. Vegetation components found in riparian zones in the Great Basin can include both woody and herbaceous species such as willow (*Salix spp.)*, aspen (*Populus tremuloides*), sedges (*Carex spp.),* and rushes (*Juncus spp.).* Riparian areas adjacent to surface waters are the most productive and vital ecosystems in the Elko District Office but represent less than 1% of available habitat. Riparian habitat provides a transition zone between aquatic and upland areas, as well as cover and food for wildlife and fish. Healthy riparian systems also filter and purify water, reduce sediment loads, enhance soil stability, provide micro-climatic moderation, and contribute to groundwater recharge and base flow. Riparian areas provide economic benefits to local communities and often have historic or cultural significance. Benefits include acting as natural fire barriers, providing increased water supply, and supporting recreational activity like fisheries. Riparian habitat plays an integral role in restoring and maintaining the chemical, physical and biological integrity of water resources across the landscape.

Proper Functioning Condition (PFC) Assessment

PFC is a qualitative assessment of riparian areas based on quantitative science. The methodology evaluates the functionality of riparian areas based on hydrological, vegetation, and soils/erosional factors, within the context of the geologic setting and the potential of the area. Methodologies exist for both lotic and lentic systems.

For lotic systems, Dickard et al. 2015 presented the following definition: "A riparian-wetland area is considered to be in proper functioning condition when adequate vegetation, landform, or large woody debris is present to: dissipate stream energy associated with high waterflow, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve flood-water retention and ground-water recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics *to provide* the habitat and water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity."

For lentic systems, Prichard et al. (2003) suggests the following definition: "Lentic riparian-wetland areas are functioning properly when adequate vegetation, landform, or debris is present to: dissipate energies associated with wind action, wave action, and overland flow from adjacent sites, thereby reducing erosion and improving water quality; filter sediment and aid floodplain development; improve flood-water retention and ground-water recharge; develop root masses that stabilize islands and shoreline features against cutting action; restrict water percolation; develop diverse ponding characteristics to provide the habitat and water depth, duration, and temperature necessary for fish production, water-bird breeding, and other uses; and support greater biodiversity".

PFC assessments result in ratings of riparian area functionality on a continuum from Non Functional (NF) through Functioning At Risk (FAR) to Proper Functioning Condition (PFC). Ratings of Functioning At Risk are further classified into downward trend (FARD), no apparent trend (FARN), or upward trend (FARU).

Stream Survey

Stream survey uses techniques described in BLM Manuals 6671 and 6720-1. These studies measure specific site characteristics which are then used to calculate values or Riparian Condition Indices (RCI). This survey methodology is one way of attaining quantitative results along stream areas where PFC has been used as an assessment tool. Stream survey looks at width to depth ratio of streams, floodplain connectivity, substrate present within a stream channel, and riparian plant composition along with multiple other habitat indicators that establish stream condition. Results are reported as a percentage of optimum conditions. The indices provide a way to evaluate streambank stability and streambank cover in a simplified manner:

> Index scores >80% indicate excellent riparian condition.
> Scores between 60-80% indicate good riparian condition
> Scores between 40-60% indicate fair riparian condition.
> Scores < 40% indicates poor riparian condition.

Stream survey has been used by the Elko District BLM and other offices since 1979 to collect riparian habitat data across the landscape. Within the Winecup Gamble Allotment complex there are two streams that have established Stream Survey points, Pole Creek in the HD Allotment and Death Creek in the Dairy Valley Allotment.

Pilot Valley

Draft Determination

Standard 2 is partially met in the Pilot Valley Allotment for lentic habitat. No assessment was made on any lotic habitat in Pilot Valley. No water quality data was collected by the BLM, Y-2 Consultants (contractor), or by the Nevada Department of Environmental Protection (NDEP) and therefore the standards for water quality are not analyzed in this document. Current livestock grazing is not contributing to non-attainment of this standard and is within the Guidelines.

Rationale

Water resources on public land in the Pilot Valley Allotment are very limited, with only one perennial stream which flows for less than half a mile on public land (Table 5). Most streams in the allotment are ephemeral, so no PFC assessments were completed on lotic systems. There are very few springs, ponds, or other lentic habitats found throughout the allotment. These perennial resources have been evaluated using Proper Functioning Condition Assessment described in Prichard *et al*. 2003. Of the four lentic riparian areas assessed, one was in proper functioning condition, one was rated FARN, and two were non-functional. A detailed record of data used to make this determination is included in Appendix 3.

Lotic Assessment

Pilot Valley does not have an abundance of lotic resources present within the allotment (Table 5). Grazing relies on water developments found on both private and public land scattered throughout the allotment for livestock use. No prior assessments had been completed on lotic water sources in the Pilot Valley allotment. There is approximately 0.4 miles of perennial flow on McDonald Creek, split between two reaches and located on public land. Debbs Creek typically has seasonal water flow while cattle are present in the allotment but there is no evidence of cattle use, likely due to high elevation and lack of accessibility to livestock. All other streams are intermittent or ephemeral.

Table 5: Pilot Valley Streams and Most Recent PFC Assessments

Stream Name	Length of Stream within the Allotment			Stream Type	Most Recent PFC assessment (year)	Most recent PFC ratings by stream reach*
	Total (miles)	Public land (miles)	Private land (miles)			
McDonald Creek	1.7	0.4 (24%)	1.3 (76%)	Perennial and Intermittent	No PFC data	No Stations
Debbs Creek	4.8	2 (42%)	2.8 (58%)	Intermittent	No PFC data	No Stations

Loray Wash	16.1	7.6 (47%)	8.5 (53%)	Intermittent and Ephemeral	No PFC data	No Stations
Pilot Creek	7.7	4 (52%)	3.7 (48%)	Intermittent and Ephemeral	No PFC data	No Stations

* Proper Functioning Condition (PFC) Assessment ratings are Non-Functioning (NF), Functioning At Risk No Trend (FARN), Functioning At Risk Upward Trend (FARU), Functioning At Risk Downward Trend (FARD), and Proper Functioning Condition (PFC).

Lentic Assessments

Lentic PFC assessments were completed at all known perennial lentic riparian areas within the Pilot Valley allotment (Table 6). Areas were identified using topographical maps, water resource inventory records, and aerial photography. These riparian areas exist primarily at higher elevations along steep hillslopes. Acreage recorded is an approximation made by field staff to provide the relative functionality of riparian areas in the allotment by acres assessed and not just number of sites.

The BLM assessed 4 lentic riparian areas in the Pilot Valley allotment in 2019. No previous assessments were available for these sites. Altogether the areas assessed total less than one acre, illustrating the lack of riparian resources available throughout the allotment. PFC assessments indicate the condition of lentic riparian areas within the Pilot Valley allotment range from NF to PFC. The condition of these areas is largely influenced by human activity, with two springs rated as NF due to human alteration of the spring, capturing all spring flow for municipal consumption. Neither spring had an associated riparian habitat value, as all water is captured by spring boxes and piped off site for human use. This severely limits the potential of these springs. Site PV 03 was rated FARN, primarily due to wildlife use and historic alteration of the system. This spring was dug out to be a small pond at some point in time and received a large amount of use by elk that was visible during the assessment. The elk caused damage through hoof action and alteration of surrounding riparian vegetation. PV 04 was rated PFC during the assessment. None of lentic systems in the Pilot Valley allotment had evidence of use by current livestock grazing. More detailed results including tables and photos can be found in Appendix 3, maps are in Appendix 1.

Table 6: Pilot Valley Lentic Habitat and PFC Assessments

Site Name	Type of Lentic Habitat	Size (Acres)	2019 Condition*
PV 01	Spring	.01	NF
PV 02	Spring	.01	NF
PV 03	Spring	.22	FARN
PV 04	Spring	.48	PFC

*Condition was determined using Proper Functioning Condition Assessment protocol for Lentic Systems (Prichard et. al. 2003). Proper Functioning Condition (PFC) Assessment ratings are Non-Functioning (NF), Functioning At

Risk No Trend (FARN), Functioning At Risk Upward Trend (FARU), Functioning At Risk Downward Trend (FARD), and Proper Functioning Condition (PFC).

Water Quality

The Nevada 2016-2018 Water Quality Integrated Report from the Nevada Division of Environmental Protection (NDEP) indicated that no water quality monitoring data or assessments had been conducted within the Pilot Valley allotment (NDEP 2020). Due to lack of data, there are no 303(d) listed streams within the Pilot Valley allotment. The Nevada Administrative Code (NAC) 445A.11704 through 445A.2234 places the Pilot Valley allotment within the Great Salt Lake Region. Designated beneficial uses for this region include irrigation, watering of livestock, recreation involving contact with water, recreation not involving contact with water, industrial supply, municipal or domestic supply, propagation of wildlife, and propagation of aquatic life (NDEP 2018).

Dairy Valley

Draft Determination

Standard 2 is partially met in the Dairy Valley Allotment for lotic and lentic riparian habitat. No water quality data was collected by the BLM, contractor Y-2 Consultants, or by the Nevada Department of Environmental Protection (NDEP) and therefore the standards for water quality are not analyzed in this document. Current livestock grazing is not contributing to non-attainment of this standard for lotic habitat and is within the Guidelines. However, current livestock grazing is contributing to non-attainment of this standard for lentic habitat and is not within the Guidelines.

Rationale

Water resources on public land in the Dairy Valley Allotment include perennial streams, intermittent streams, springs, seeps, small ponds, and numerous ephemeral streams. Perennial resources were evaluated using techniques described in Dickard *et al*. 2015 and Prichard *et al*. 2003. Guidelines are partially met for the assessed lotic riparian areas, with 3 total reaches assessed. Mill Creek had two reaches assessed with 1 rated at PFC and 1 rated FARN. Death Creek had 1 reach assessed as FARN. Of the nine lentic riparian areas assessed, two rated PFC, three rated FARN, one rated FARD, and one rated NF. Proper functioning condition assessments were used to determine the achievement of the standard and guideline above, except the water quality standard which is not included due to a lack of data. A detailed record of data used to make this determination is included in Appendix 3.

Lotic Assessment

Monitoring lotic systems within the Dairy Valley allotment is difficult, as there is a great deal of intersection between public and private land resources where all water resources are located (Table 7). As a result, there is limited data available to evaluate long-term trends in riparian area condition. PFC assessments were completed in 2019 by a BLM interdisciplinary team across four perennial stream reaches, covering a representative portion of the public land in the

allotment. These assessments took place on Mill Creek (no prior data) and Death Creek (one prior survey in 2007). During the 2019 assessment one reach rated PFC, two rated FARN, and one that was not rated at the time of assessment (Table 7).

As part of the assessment process the team identified factors that were causing reduced riparian functionality and/or risk or future loss of functionality on functional at risk (FAR) and nonfunctional (NF) riparian areas. There were several of these causal factors in the allotment, including historic livestock grazing, limited site capability, and catastrophic fire.

The two streams assessed have very different potential owing to their location on the landscape and historic uses. Death Creek was rated FARN, with the causal factor being historic grazing and limited site potential. The riparian area around Death Creek is minimal, due to its location on the landscape and incisement from historic use. Given the steep slopes of the hills surrounding the stream and adjacent road, it does not have much potential for reestablishing a connected floodplain or increasing its riparian extent. The first reach for Mill Creek was assessed at PFC. The second reach on Mill Creek was rated FARN due to catastrophic fire occurring the year before. Given the elevation and stability of surrounding intact vegetation, this site could recover with the appropriate support. Mill Creek had one dry reach which the team did not rate.

Table 7: Dairy Valley Streams and Most Recent PFC Assessments

Stream Name	Length of Stream in Allotment			Stream Type	Most Recent PFC assessment (year)	Most recent PFC ratings by stream reach*
	Total (miles)	Public Land (miles)	Private Land (miles)			
Mill Creek	6.5	4.9 (75%)	1.6(25%)	Perennial and Intermittent	2019	R1 – FARN R2 – PFC R3 – Dry
Death Creek	6.4	1.2 (19%)	5.2(81%)	Perennial and Intermittent	2019 2007	S-01 – FARN S-02 – NF
Bluff Creek	1.25	0.02 (2%)	1.23 (98%)	Perennial and Intermittent	No PFC data	No Stations
Crittenden Creek	2.7	0.9 (33%)	1.8 (67%)	Intermittent	No PFC data	No Stations
Dairy Valley Creek	1.0	0.3 (30%)	0.7 (70%)	Intermittent	No PFC data	No Stations
Granite Creek	9.8	3.2 (33%)	6.6 (67%)	Intermittent	No PFC data	No Stations

Silver Creek	7.6	3.6 (47%)	4 (53%)	Intermittent	No PFC data	No Stations
Willow Creek	3.9	1.6 (41%)	2.3 (59%)	Intermittent	No PFC data	No Stations

* Proper Functioning Condition (PFC) Assessment ratings are Non-Functioning (NF), Functioning At Risk, No Trend (FARN), Functioning At Risk, Upward Trend (FARU), Functioning At Risk, Downward Trend (FARD), and Proper Functioning Condition (PFC).

Lentic Assessment

Lentic PFC assessments were completed at nine sites located throughout the Dairy Valley allotment (Table 8). Areas were identified using prior PFC assessments as well as topographical maps, water resource inventory records, and aerial photography. These riparian areas exist on a variety of landscapes and elevations including steep hill slopes, deep canyons, and broad valleys. Acreage recorded is an approximation made by field staff to provide the relative functionality of riparian areas in the allotment by acres assessed and not just number of sites.

Y2 Consultants assessed nine lentic sites on public land between 2013-2014. Altogether the riparian areas assessed totaled just over 6 acres. Lentic assessments indicate the lentic riparian areas assessed in Dairy Valley are in better condition than they were during prior assessments, with two springs rated PFC, three rated FARN, two rated FARD, and two rated NF. Although only 2 out of 9 springs are functioning properly, none of these springs were rated at PFC in 2005 so overall improvement was seen. One of the springs that was NF in 2005 is still rated NF. A second spring that was FARN in 2005 is now rated NF.

As part of the assessment process the team identified factors that were causing reduced riparian functionality and/or risk or future loss of functionality on FAR and NF riparian areas. There were several causal factors in the Allotment, including livestock grazing, drought, limited site capability, and presence of invasive species. The prolonged drought conditions present in 2013/2014, when most assessments were conducted, likely had an impact on the findings by interdisciplinary teams assessing riparian sites.

The most common causal factor that led to sites being rated as FAR or NF was current livestock use. Hoof action and over utilization on riparian vegetation was observed at these springs. This can result in alteration of surface flow patterns by causing channelization, head-cuts, pedestals, hummocks, and ultimately resulting in lowered water tables and shrinkage of riparian area at many sites. One of the sites already had hummocks formed. Livestock grazing appears to have altered vegetative communities resulting in decreased site stability in some areas. Livestock was identified as at least one of the causal factors on 4 (44%) of the 9 FAR or NF areas. The two springs rated NF did not have significant cattle impacts leading to an NF rating, although both did have some cattle use. Instead, these sites displayed characteristics such as upland vegetation encroachment, indicating that riparian area was no longer thriving due to a lack of water presence. Physical impairment of a site, like the presence of a deeply incised channel contributing to the lowering of the water table was also present at one of these sites. Multiple years around the time these assessments were made saw considerable drought. Reduced flows or

a lack of flow during drought results in a riparian area that often shows little or no perennial riparian vegetation. This adds additional complexity to doing PFC assessments, and it is likely there are some areas rated as FARD and FARN that would have been rated higher if the assessment had been done during normal (non-drought) conditions. Canada thistle and other invasive species were also found at several of the spring sites.

Table 8: Dairy Valley Lentic Habitat and PFC Assessments

Site Name	Type of Lentic Habitat	Size (Acres)	2005 Condition*	2014 Condition*
DV 01	Spring	.11	FARN	NF
DV 02	Spring/Reservoir	0.26	NF	NF
DV 03a	Spring Complex	.56	FARD	FARD
DV 03b	Spring Complex	.30	FARD	FARD
DV 07	Spring	.66	FARD	PFC
DV 08	Spring	.20	FARD	FARN
DV 10	Spring	3.06	FARU	PFC
DV 17	Spring	.25	FARN	FARN
DV 34	Spring	.73	FARD	FARN

*Condition was determined using Proper Functioning Condition Assessment protocol for Lentic Systems (Prichard et. al. 2003). Proper Functioning Condition (PFC) Assessment ratings are Non-Functioning (NF), Functioning At Risk No Trend (FARN), Functioning At Risk Upward Trend (FARU), Functioning At Risk Downward Trend (FARD), and Proper Functioning Condition (PFC).

Water Quality

The Nevada 2016-2018 Water Quality Integrated Report from the Nevada Division of Environmental Protection (NDEP) indicated that no water quality monitoring data or assessments had been conducted within the Dairy Valley allotment (NDEP 2020). Due to that lack of data, there are no 303(d) listed streams within the Dairy Valley allotment. The Nevada Administrative Code (NAC) 445A.11704 through 445A.2234 places the Dairy Valley allotment within the Great Salt Lake Region. Designated beneficial uses for this region include irrigation, watering of livestock, recreation involving contact with water, recreation not involving contact with water, industrial supply, municipal or domestic supply, propagation of wildlife, and propagation of aquatic life (NDEP 2018).

Gamble Individual

Draft Determination

Standard 2 is not met in the Gamble Individual Allotment for lotic and lentic riparian habitat. No water quality data was collected by the BLM, contractor Y-2 Consultants, or by the Nevada Department of Environmental Protection (NDEP) and therefore the standards for water quality are not analyzed in this document. Current livestock grazing is not contributing to non-attainment of this standard for lotic habitat and is within the Guidelines. However, current

livestock grazing is contributing to non-attainment of this standard for lentic habitat and is not within the Guidelines.

Rationale

Water resources on public land in the Gamble Individual Allotment include two perennial streams, intermittent streams, a few springs, seeps, small ponds, reservoirs, and numerous ephemeral streams. Perennial water resources are water resources capable of supporting riparian areas. However, perennial water sources are not abundant in either lentic or lotic form, with little riparian habitat found throughout this allotment. These perennial resources have been evaluated using techniques described in Dickard *et al*. 2015 and Prichard *et al*. 2003. Riparian condition assessments are used to determine the achievement of the stand and guideline above, except the water quality standard which is not included due to a lack of data. A detailed record of data used to make this determination is included in Appendix 3.

Lotic Assessment

Lotic resources found in the Gamble Individual allotment are illustrated in Table 9.
Grazing relies on water developments found on both private and public land scattered throughout the allotment for livestock use. Rock Springs Creek is the only perennial stream present in this allotment on public lands. It totals 13.5 miles, with 10.3 miles on public lands. PFC assessments were completed in 2019 by a BLM interdisciplinary team across the perennial stream covering three reaches. Two reaches were assessed as NF and the third documented reach was not assessed because it is a lentic system.
Lotic habitat assessed within Gamble Individual did not meet Standard 2 guidelines. The most common causal factor for a site to not be rated as PFC was historic livestock management.

Rock Springs Creek was dry throughout the entire length of the stream in September 2019. The stream has entrenchment along almost its entire length, ranging from a foot or less to over 10 feet deep. It is likely that historic livestock management contributed to this entrenchment and subsequent drop in the water table, turning what was classified as a perennial stream into an intermittent stream that is non-functional.

Table 9: Gamble Individual Streams and Most Recent PFC Assessments

Stream Name	Length of Stream in Allotment			Stream Type	Most Recent PFC assessment (year)	Most recent PFC ratings by stream reach*
	Total (miles)	Public Land (miles)	Private Land (miles)			
Rock Springs Creek	13.5	10.3 (76%)	3.2 (24%)	Perennial, Intermittent and Ephemeral	2019	Lentic System, not rated NF NF

Stream Name	Length of Stream in Allotment			Stream Type	Most Recent PFC assessment (year)	Most recent PFC ratings by stream reach*
	Total (miles)	Public Land (miles)	Private Land (miles)			
Badger Creek	1.2	0.9 (75%0	0.3 (25%)	Intermittent	No PFC data	No Stations
Boulder Creek	2.4	1.2 (50%)	1.2 (50%)	Intermittent	No PFC data	No Stations
Charley Creek	9.9	4.3 (43%)	5.6 (57)	Intermittent	No PFC data	No Stations
Crittenden Creek	2.8	1 (36%)	1.8 (64%)	Intermittent	No PFC data	No Stations
Devil's Creek	2.0	1.9 (95%)	0.1 (5%)	Intermittent	No PFC data	No Stations
Gamble Creek	10.2	3.7 (36%)	6.5 (64%)	Intermittent	No PFC data	No Stations
Granite Creek	5.8	4.2 (79%)	1.6 (21%)	Intermittent	No PFC data	No Stations
Hoppie Creek	9.8	4.6 (46%)	5.3 (54%)	Intermittent	No PFC data	No Stations
Immigrant Creek	9.1	4.2 (46%)	4.9 (54%)	Intermittent	No PFC data	No Stations
Loray Wash	5.7	3 (53%)	2.7 (47%)	Intermittent	No PFC data	No Stations
Montello Creek	9.2	3.8 (41%)	5.4 (59%)	Intermittent	No PFC data	No Stations
Thousand Springs Creek	32	0	32 (100%)	Perennial and Intermittent	No PFC data	No Stations

* Proper Functioning Condition (PFC) Assessment ratings are Non-Functioning (NF), Functioning At Risk No Trend (FARN), Functioning At Risk Upward Trend (FARU), Functioning At Risk Downward Trend (FARD), and Proper Functioning Condition (PFC).

Lentic Assessment

Lentic PFC assessments were completed by Y2 Consultants on two of the known perennial lentic riparian areas on public land within the Gamble Individual allotment between 2011 and 2014 (Table 10). Areas were identified using past PFC assessment data as well as topographical maps, water resource inventory records and aerial photography. Acreage recorded is an approximation made by field staff to provide the relative functionality of riparian areas in the allotment by acres assessed and not just number of sites.

The riparian areas assessed total less than one acre. Neither spring assessed was functioning properly, with GI-03 rated at FARD and GI-02 rated NF. These ratings are the same as the 2005 PFC assessment completed by BLM, indicating that conditions have not changed.

As part of the assessment process the team identified factors that were causing reduced riparian functionality and/or risk or future loss of functionality on functional at risk (FAR) and nonfunctional (NF) riparian areas. There were several of these causal factors in the allotment, including livestock grazing, drought, limited site capability, and historic site uses.

The most common causal factor that led to sites being rated as FAR or NF was a lack of appropriate hydrology due to historic site uses. GI-02, which was rated NF in 2005 and 2014, was re-graded as a stock tank in the past and still has heavy livestock use today. This site does not support any riparian vegetation and has no barriers to water flow that protects the natural spring that supplies the tank. The potential of this site has been severely limited due to human alteration. GI-03 is near some historic mine sites that appear to be potentially impacting the wetland areas. Livestock activity around the stock tanks that were developed from a natural spring that supplies water to this riparian area is also contributing to its FARD rating. Some of the livestock activity and lack of vegetation on these sites can result in alteration of surface flow patterns by causing channelization, head-cuts, pedestals, hummocks, and ultimately resulting in lowered water tables and shrinkage of riparian area at many sites. Both sites also displayed characteristics indicating that riparian vegetation was no longer thriving due to a lack of water presence. Without protecting the water sources that feed the riparian areas for these two sites, neither will recover. Multiple years around these assessments saw considerable drought. Reduced flows or a lack of flow during drought results in a riparian area that often shows little or no perennial riparian vegetation. This adds additional complexity to doing PFC assessments, and it is possible there are some areas rated as FARD and FARN that would have been rated higher if the assessment had been done during normal (non-drought) conditions. Canada thistle and other invasive species were also found at the second spring site.

Table 10: Gamble Individual Lentic Habitat and PFC Assessments

Site Name	Lentic Habitat Type	Size (Acres)	2005 Condition*	2011/2014 Condition*
GI 02	Spring	0.03	NF	NF
GI 03	Spring	0.77	FARD	FARD

*Condition was determined using Proper Functioning Condition Assessment protocol for Lentic Systems (Prichard et. al. 2003). Proper Functioning Condition (PFC) Assessment ratings are Non-Functioning (NF), Functioning At

Risk No Trend (FARN), Functioning At Risk Upward Trend (FARU), Functioning At Risk Downward Trend (FARD), and Proper Functioning Condition (PFC).

Water Quality

The Nevada 2016-2018 Water Quality Integrated Report from the Nevada Division of Environmental Protection (NDEP) indicated that no water quality monitoring data or assessments had been conducted within the Gamble Individual allotment (NDEP 2020). Due to that lack of data, there are no 303(d) listed streams within the Gamble Individual allotment. The Nevada Administrative Code (NAC) 445A.11704 through 4-45A.2234 places the Gamble Individual allotment within parts of the Great Salt Lake Region and in parts of the Snake River Basin Region. Designated beneficial uses for this region include irrigation, watering of livestock, recreation involving contact with water, recreation not involving contact with water, industrial supply, municipal or domestic supply, propagation of wildlife, and propagation of aquatic life (NDEP 2018).

HD Allotment

Draft Determination

Standard 2 is partially met in the HD Allotment for lotic riparian habitat and was not met for lentic riparian habitat. No water quality data was collected by the BLM, contractor Y-2 Consultants, or by the Nevada Department of Environmental Protection (NDEP) and therefore the standards for water quality are not analyzed in this document. Current livestock grazing is contributing to the non-attainment of this standard for lotic and lentic riparian habitat and is not within the Guidelines.

Rationale

Water resources on public land in the HD Allotment include perennial streams, intermittent streams, springs, seeps, small ponds, and numerous ephemeral streams. Perennial water resources are water resources capable of supporting riparian areas. These perennial resources have been evaluated using techniques described in Dickard *et al*. 2015, Prichard *et al*. 2003, and Prichard *et al*. 1994. Riparian condition assessments are used to determine the achievement of the stand and guideline above, except the water quality standard which is not included due to a lack of data. A detailed record of data used to make this determination is included in Appendix 3, Maps are in Appendix 1.

Lotic Assessments

Riparian monitoring within the HD Allotment indicates that riparian habitat along lotic systems are improving from past conditions but still need more work to meet all the Guidelines. PFC assessments were done on a representative portion of perennial lotic systems on public land (Table 11). Pole Creek and Loomis Creek were assessed, with 3 reaches assessed on Loomis Creek and 1 reach assessed on Pole Creek. Y2 Consultants assessed three reaches on Loomis Creek in 2014 and the BLM assessed one reach on Pole Creek in 2019. Loomis Creek has two reaches that were rated PFC and one that was rated FARN. Pole Creek had one reach that was

dry and one that was rated FARN. Prior assessments were completed on Pole Creek in 2000 and 2008.

As part of the assessment process the team identified factors that were causing reduced riparian functionality and/or risk or future loss of functionality on functional at risk (FAR) and nonfunctional (NF) riparian areas. There were several of these causal factors in the allotment, but the main two factors were historic livestock grazing and current livestock grazing.

Loomis Creek and Pole Creek are located parallel to one another in a similar land setting but have different habitat potential based on impacts from historic uses. Pole Creek has significant entrenchment from historic livestock grazing which limits potential of the system. Loomis Creek also has similar historic impacts but not to the same extent. Pole Creek was rated FARN along a reach located between stream survey stations S-06 and S-07 in 2019. Despite obvious historic grazing impacts, the system has some established, mature willows and herbaceous riparian understory. This lifts the assessment up from the one made in 2000 which called the system NF. There were also significant impacts from current livestock grazing that contributes to a rating of FARD rather than FARN. Shearing, trampling, and trailing were prevalent throughout the system, along with over utilization of riparian vegetation. Loomis Creek displayed mature riparian habitat and appropriate lotic channel characteristics throughout reaches LC-01 and LC-02, which led to a PFC rating. The third reach assessed was along a tributary of Loomis Creek. This reach had an incised channel, with a cut bank 5 feet high. Upland vegetation dominated the bank which is disconnected from the stream flow. The road running parallel to Loomis Creek is within the riparian zone for Reach 3 and there was evidence of current cattle grazing having negative impacts at the stream crossing near the reach. The PFC team from Y2 rated this reach FARD based on historic livestock use, proximity to the road, and current livestock grazing impacts.

Table 11: HD Allotment Streams and Most Recent PFC Assessments

Stream Name	**Length of Stream within Allotment**			**Stream Type**	**Most Recent PFC assessment (year)**	**Most recent PFC ratings by stream reach***
	Total (miles)	**Public Land (miles)**	**Private Land (miles)**			
Pole Creek	9.2	3.3 (36%)	5.9 (64%)	Perennial and Intermittent	2008 2019 No PFC Data	S-05 – FARU S-06-S-07 – FARN S-01-S-04 – (Private)

Stream Name	Length of Stream within Allotment			Stream Type	Most Recent PFC assessment (year)	Most recent PFC ratings by stream reach*
	Total (miles)	Public Land (miles)	Private Land (miles)			
Loomis Creek	11.5	2.4 (21%)	9.1 (79%)	Perennial and Intermittent	2014	LC 1 – PFC LC 2 – PFC LC 3 – FARN LC 4-6 - (Private)
Thousand Springs Creek	46.5	0.9 (2%)	45.6 (98%)	Perennial and Intermittent	2006	NF
Bishop Creek	5.7	3.1 (54%)	2.6 (46%)	Intermittent	No PFC data	No Stations
Brush Creek	5.2	0.7 (13%)	4.5 (87%)	Intermittent	No PFC data	No Stations
West Brush Creek	4.9	0.1 (1%)	4.8 (99%)	Intermittent	No PFC data	No Stations
Burnt Creek	8.9	5.3 (60%)	3.6 (40%)	Perennial and Intermittent	2000	PFC
Cold Springs Creek	2.3	0.4 (17%)	1.9 (83%)	Perennial and Intermittent	2000	PFC
Cricket Creek	3.2	1.4 (44%)	1.8 (56%)	Intermittent	No PFC data	No Stations
Deadman Creek	14.3	5.1 (36%)	9.2 (64%)	Intermittent	No PFC data	No Stations
Medicine Creek	10.7	4 (37%)	6.7 (63%)	Intermittent	No PFC data	No Stations
Spring Creek	12.5	7.3 (58%)	5.2 (42%)	Intermittent	No PFC data	No Stations
Sulphur Creek	6.2	6.2 (100%)	0	Intermittent	No PFC data	No Stations

Stream Name	Length of Stream within Allotment			Stream Type	Most Recent PFC assessment (year)	Most recent PFC ratings by stream reach*
	Total (miles)	Public Land (miles)	Private Land (miles)			
Van Eaton Creek	2.9	1.3 (45%)	1.6 (55%)	Intermittent	No PFC data	No Stations
Willow Creek	7.8	2.7 (35%)	5.1 (65%)	Perennial and Intermittent	No PFC data	No Stations
North Fork Willow Creek	2.6	1.5 (58%)	1.1 (42%)	Intermittent	No PFC data	No Stations
South Fork Willow Creek	4.3	1.7 (39%)	2.6 (61%)	Intermittent	No PFC data	No Stations

* Proper Functioning Condition (PFC) Assessment ratings are Non-Functioning (NF), Functioning At Risk, No Trend (FARN), Functioning At Risk, Upward Trend (FARU), Functioning At Risk, Downward Trend (FARD), and Proper Functioning Condition (PFC).

Stream Survey

There are nine stream habitat survey stations on Pole Creek, four of which exist on public land. They are labeled S-1 to S-8 and SA-1. Overall data indicates that riparian habitat has improved slightly were survey was done in 2019, with the largest improvements seen between 1994 and 2008 surveys. One example of improvement occurred at S-07 which showed an increase in riparian condition class (RCC) from 50% to 77.5% of optimum. Pole Creek has maintained fair to good riparian habitat condition over the past decade.

Table 12: Pole Creek – Stream Survey Results Riparian Condition Class

Station	2019	2008	1994
S-05	Dry	47.5%*	35%*
S-06	-	82.5%	51.25%*
S-07	77.5%	50%*	71.25%
SA-01	-	51.25%	40%

*Limited data by BLM

Index scores >80% indicate excellent riparian condition.
Scores between 60-80% indicate good riparian condition
Scores between 40-60% indicate fair riparian condition.
Scores < 40% indicates poor riparian condition.

Lentic Assessment

Lentic PFC assessments were completed at twelve sites located throughout the HD allotment (Table 13). Areas were identified using prior PFC assessments as well as topographical maps, water resource inventory records, and aerial photography. These riparian areas exist on a variety of landscapes and elevations including steep hill slopes, deep canyons, and broad valleys. Acreage recorded is an approximation made by field staff to provide the relative functionality of riparian areas in the allotment by acres assessed and not just number of sites.

Y2 Consultants assessed twelve lentic sites on public land between 2011-2014. Riparian areas assessed totaled just over 14 acres. Lentic assessments indicated the condition of lentic riparian areas in HD are trending downwards, with zero of twelve areas assessed meeting proper functioning condition. Out of the 12 areas, eight were rated NF, two are FARN, and two are FARD. In comparison, PFC assessments from 2005 indicated that only two of the springs were non-functional and two of the springs were at PFC. More detailed results from PFC assessments including tables and photos can be found in Appendix 3.

As part of the assessment process the team identified factors that were causing reduced riparian functionality and/or risk or future loss of functionality on functional at risk (FAR) and nonfunctional (NF) riparian areas. There were several of these causal factors in the allotment, including livestock grazing, drought, limited site capability, and presence of invasive species.

The most common causal factor that led to sites being rated as FAR or NF was livestock use. Hoof action and over utilization on riparian vegetation was observed at these areas. This can result in alteration of surface flow patterns by causing channelization, head-cuts, pedestals, hummocks, and ultimately resulting in lowered water tables and shrinkage of riparian area at many sites. Many sites already had hummocks formed. Livestock grazing appears to have altered vegetative communities resulting in decreased site stability in some areas. Livestock was identified as at least one of the causal factors on 9 (75%) of the twelve FAR or NF areas. Several sites also displayed characteristics indicating riparian vegetation was no longer thriving due to a lack of water presence. The years 2012 and 2013 saw considerable drought. Reduced flows or a lack of flow during drought results in a riparian area that often shows little or no perennial riparian vegetation. This adds additional complexity to doing PFC assessments, and it is likely there are some areas rated as FARD and FARN that would have been rated higher if the assessment had been done during normal (non-drought) conditions. Canada thistle and other invasive species were also found at several of the spring sites.

Table 13: HD Allotment Lentic Habitat and PFC Assessments

Site Name	Type	Size (Acres)	2005 PFC*	2013 /2014 PFC*
HD 02	Spring	4.14	NF	FARD

Site Name	Type	Size (Acres)	2005 PFC*	2013 /2014 PFC*
HD 03	Spring	.89	FARD	FARN
HD 04	Spring	.16	FARD	NF
HD 05	Spring	1.05	FARD	FARNA
HD 06	Spring	0.02	NF	NF
HD 11	Spring	0.46	PFC	NF
HD 13	Spring	2.89	FARD	NF
HD 14	Spring	2.94	FARD	NF
HD 15	Spring	0.49	NF	NF
HD 16	Spring	0.30	FARD	NF
HD 20	Spring	0.94	PFC	NF
HD 21	Spring	0.06	FARU	FARD

*Condition was determined using Proper Functioning Condition Assessment protocol for Lentic Systems (Prichard et. al. 2003). Proper Functioning Condition (PFC) Assessment ratings are Non-Functioning (NF), Functioning At Risk No Trend (FARN), Functioning At Risk Upward Trend (FARU), Functioning At Risk Downward Trend (FARD), and Proper Functioning Condition (PFC).

Water Quality

The Nevada 2016-2018 Water Quality Integrated Report from the Nevada Division of Environmental Protection (NDEP) indicated that no water quality monitoring data or assessments had been conducted within the HD allotment (NDEP 2020). Due to that lack of data, there are no 303(d) listed streams within the HD allotment. The Nevada Administrative Code (NAC) 445A.11704 through 445A.2234 places the HD allotment within parts of the Snake River Basin and parts of the Humboldt River Basin. Designated beneficial uses for this region include irrigation, watering of livestock, recreation involving contact with water, recreation not involving contact with water, industrial supply, municipal or domestic supply, propagation of wildlife, and propagation of aquatic life (NDEP 2018).

Standard 3. Habitat

Habitats exhibit a healthy, productive, and diverse population of native and/or desirable plant species, appropriate to the site characteristics, to provide suitable feed, water, cover and living space for animal species and maintain ecological processes. Habitat conditions meet the life cycle requirements of threatened and endangered species.

As indicated by:

- Vegetation composition (relative abundance of species);
- Vegetation structure (life forms, cover, heights, or age classes);
- Vegetation distribution (patchiness, corridors);
- Vegetation productivity; and -Vegetation nutritional value.

Guidelines:

3.1 Management practices will promote the conservation, restoration and maintenance of habitat

for threatened and endangered species, and other special status species as may be appropriate.

3.2 Intensity, frequency, season of use and distribution of grazing should provide for growth and reproduction of those plant species needed to reach long-term land use plan objectives. Measurements of ecological condition and trend/utilization will be in accordance with techniques identified in the *Nevada Rangeland Monitoring Handbook.*

3.3 Grazing management practices should be planned and implemented to allow for integrated use by domestic livestock, wildlife, and wild horses consistent with land use plan objectives.

3.4 Where grazing practices alone are not likely to achieve habitat objectives, land treatments may be designed and implemented as appropriate.

3.5 When native plant species adapted to the site are available in sufficient quantities, and it is economically and biologically feasible to establish or increase them to meet management objectives, they will be emphasized over non-native species.

3.6 Management practices are adequate when significant progress is being made toward this Standard.

Pilot Valley Allotment

The standard determination for this allotment was based on a combination of quantitative data collected at three upland plots using AIM methodology (Appendix 1: Figure 3), qualitative data collected at two lentic riparian plots using PFC assessment procedures, consideration of the Biotic Integrity component of the Interpreting Indicators of Rangeland Health assessment (TR 1734-6), remotely sensed data depicting percent cover of cheatgrass and woodlands (Appendix 1: Figure 30, Figure 31) and professional observations throughout the allotment.

Draft Determination: Partially Met, Current livestock grazing in conformance with guidelines

Foliar cover of cheatgrass was extremely high (59%) at plot WG_PV_UV02 (Appendix 2: Table 5). This site was determined to be in the Annual State 4.2, dominated by a mature Wyoming sagebrush overstory and a cheatgrass understory depauperate of desirable deep-rooted perennial grasses and perennial forbs (Appendix 2: Figure 2). The absence of these critical components of wildlife habitat indicates that this vegetation community no longer provides suitable feed, cover or living space for most wildlife species.

The Biotic Integrity (*the capacity of the biotic community to support ecological processes within the normal range of variability expected for the site, to resist a loss in the capacity to support these processes, and to recover this capacity when losses do occur. The biotic community includes plants, animals, and microorganisms occurring both above and below ground*) rating described in Technical Reference 1734-6 considers several indicators that are the same or similar to those used to evaluate Standard 3 (see above) including the following:

- Soil surface resistance to erosion
- Soil surface loss or degradation in water
- Compaction layer
- Functional/structural groups
- Plant mortality/decadence

- Litter amount
- Annual production
- Invasive plants
- Reproductive capability of perennial plants

The Biotic Integrity rating at this site was estimated as Moderate departure from expected, indicating that ecological processes have been compromised and are at further risk of alteration or loss. The DRG represented by this monitoring site (28 3B) occurs over approximately 11% of the allotment (Appendix 2, Table 2).

Cheatgrass cover, although present in lesser quantities than recorded at the plot above, was ubiquitous throughout the remainder of the allotment (Appendix 1: Figure 30), including within the salt desert shrub community represented by plot WG_PV_UV04 (Appendix 2: Figure 3). The DRG represented by this monitoring site (28_18AB) occurs over 22% of the allotment (Appendix 2: Table 2). The vegetation community at this site was determined to be in Current Potential 2.1a, an at-risk state (Appendix 2: Table 7). Although this is a winterfat-Indian ricegrass ecological site that should be heavily dominated by winterfat, shadscale (6.7%) was at least as common as winterfat (5.3%) when comparing foliar cover, and budsage, which should be a minor component of the community, was not present. As described in the State and Transition Model for this DRG, inappropriate grazing will favor unpalatable shrubs such as shadscale, and cause a decline in winterfat and budsage which is what the data indicate at this site (Stringham et al. 2015). Perennial forbs were notably lacking, possibly a result of the late summer date of data collection when forbs have desiccated and therefore are often not accurately recorded by the line-point intercept monitoring technique. The vegetation at this plot is providing some value for wildlife but its benefits have been reduced due to a change in functional group composition and the introduction of invasive annuals.

At plot ELKO-Shade-422, a winterfat-Indian ricegrass ecological site, shadscale saltbush was the dominant plant, indicating skewed vegetation community composition (Appendix 2: Figure 4). The vegetation community at this site was estimated to be in the shrub state, lacking desirable perennial grasses and forbs and containing the annual invasive species halogeton (Appendix 2: Table 7). Biotic Integrity was estimated to be Moderately departed from normal, indicating that ecological processes have been compromised and are at further risk of alteration or loss. This combination of factors indicates that this site is not providing suitable habitat for the expected composition of wildlife, plants and other biotic components of the ecosystem. The lack of perennial bunchgrasses indicates the site is at elevated risk of cheatgrass invasion (Reisner et al. 2013).

Any amount of cheatgrass is undesirable and reduces resilience of the state (Stringham et al. 2015), degrades habitat quality for most wildlife species through changes in native vegetation composition, altered nutrient cycles and increased risk of fire disturbance and potential conversion to a less desirable, altered state. The widespread presence of cheatgrass throughout a majority of the allotment indicates that ecological processes are either not being maintained, especially where annual species cover is dense, or that they are at risk of alteration as cheatgrass

and other annual invasive species continue to increase and/or disturbance such as fire inevitably impacts these at-risk habitats (Balch et al. 2003).

Big Game

A majority of this allotment is year-round habitat for pronghorn (Appendix 1, Figure 32). The salt desert shrub and sagebrush vegetation communities in the lower elevation valley bottom and sideslopes comprise habitat for this species. Key habitat factors include open or rolling terrain comprised of vegetation cover no more than 25" tall (15" preferred), a variety of woody browse (favored during fall-winter), perennial forbs (favored during spring-fall) and perennial grasses (favored prior to curing).

The salt desert shrub habitats throughout the central portion of the allotment are comprised of suitably tall (<25") shrubs (Figure 6) while the mean height of Wyoming big sagebrush plants measured on the eastern bench of the allotment was slightly taller (31") than desired (25"). The key habitat factor missing for pronghorn was a perennial forb component; none of the sites where data were collected contained any more than a trace of desirable forbs, indicating that an important seasonal diet component may be a limiting factor for pronghorn using this allotment.

Mule deer habitat within the allotment consists of designated winter range in the northeastern terminus of the Toano Range in the southwestern portion of the allotment (Appendix 1: Figure 33). This habitat coincides with pinyon-juniper woodlands containing sometimes dense canopy cover at higher elevations, with stringers and less dense areas of trees fingering out into sagebrush habitats on the mid-slopes of the Toanos (Appendix 1: Figure 31). A key factor of winter habitat for mule deer is accessible browse, especially black sagebrush in this area. A primary threat to intact black sagebrush in this area is conifer encroachment into these ecological sites (Appendix 1: Figure 34), resulting in decreased black sagebrush canopy cover, vigor and age class diversity.

Elk habitat within the allotment consists of crucial winter habitat in the aforementioned northeastern terminus of the Toano Range (Appendix 1: Figure 35). Additional designated habitat on the eastern side of the allotment is comprised of year-round habitat on the wooded slopes of the Pilot Range. Key components of elk habitat include thermal and hiding cover during both summer and winter, suitable forage primarily in the form of perennial bunchgrasses, and available water during all seasons. The two areas containing designated elk habitat are wooded and logically contain suitable hiding and thermal cover. Perennial bunchgrasses associated with thermal and hiding cover would be expected to be most abundant at the ecotone between shrubland and woodland, however these are also the areas at risk of immediate conifer expansion and subsequent reduction of the perennial herbaceous community (Appendix 1: Figure 34). Of the four potential water sources evaluated in this allotment, two were noted to be Nonfunctional due to alteration of the spring habitat for municipal water consumption and therefore rendered unavailable to wildlife. In summary, some components of elk habitat are suboptimal (water) or at risk (perennial grass component), but overall adequate habitat is presently available.

Designated bighorn sheep habitat is limited to approximately 160 acres of crucial summer habitat in the southeastern portion of the allotment. However, this area is quite steep, higher in elevation and not accessed by cattle during the authorized use periods and therefore is not further evaluated either here or in the Special Status Species discussion below.

Special Status Species (SSS)

Greater Sage-grouse (and associated sagebrush obligate or associated species)

Although designated HMAs and Seasonal Use Areas (SUAs) exist within the allotment, use by greater sage-grouse is likely rare and has not been recently documented. The HAF assessment (Appendix 4) indicated that the single site (WG_PV_UV02) where data were collected and evaluated for sage-grouse winter habitat suitability was rated as suitable. However, the indicators for winter habitat are sagebrush cover and height above mean winter snowpack; had the sagebrush community at this monitoring site been evaluated as nesting/early brood-rearing habitat it certainly would have been rated as unsuitable given that suitable indicators for these habitats reflect robust perennial grass and forb components that are an integral part of healthy sagebrush communities and the wildlife habitat values they provide. This allotment was rated as marginal for riparian summer/late brood-rearing habitat as a result of two of four riparian sites being altered for municipal water consumption (See Standard 2). Overall, for sage-grouse, the Pilot Valley allotment provides limited value in the form of some winter habitat, but it does not provide the other seasonal habitat components that are required for a successful annual life cycle.

As an umbrella species for other sagebrush obligate or associated species (Rowland et al. 2006), the cover and structural components of sagebrush that make this community suitable winter habitat for sage-grouse are also valuable as cover and forage for other wildlife species such as pygmy rabbit and antelope. However, the lack of native herbaceous structural and forage components and dominance of annual invasive species, especially cheatgrass, in the understory result in marginal to unsuitable habitat for a majority of wildlife, including SSS such as Brewer's sparrow, lagomorphs and fossorial rodents. Small mammal population diversity and abundance decrease with increasing cover of cheatgrass, resulting in impacts at both lower and higher trophic levels in the ecosystem (Freeman et al. 2014), including for raptor species, several of which are designated BLM Sensitive.

Mattoni's blue butterfly

Mattoni's blue (*Euphilotes pallescens*) has one historical (1948) record within the allotment. The Nevada Natural Heritage Database (accessed 2/2020) contains a fairly vague description of the location as "between Montello Well #1 and Montello Well #2 south of Montello in the northern end of Pilot Creek Valley".

The known host plant of Mattoni's is the subshrub *Eriogomun microthecum* (slender buckwheat). There are two varieties of *Eriogonum microthecum* which may occur in Elko County; var. *laxiflorum* and var. *effusum*. *E.m.* var. *laxiflorum* is widespread throughout Nevada, occurring in areas of flat plains to mountain slopes and is the variety known to host the Mattoni's blue.

Little is known regarding the ecology of the host plant. Slender buckwheat is known to grow throughout Nevada on mountains, hills, and flat plains with no specific soil preferences. *E. microthecum* is not a species seeded after fire, however it has been found in high quantities in many burned areas in the Elko district. In the general vicinity of the historic Mattoni's site in the allotment there are soil map units with soil and vegetation properties similar to known Mattoni's sites in the Pequop Range. These areas have the potential to support slender buckwheat, and by logical extension Mattoni's blue, but as discussed above, the health and vigor of these vegetation communities have been compromised by invasive species.

Special Status Species – Raptors

Several historic raptor nest sites occur within and near the Pilot Valley Allotment, nearly all of which were identified as ferruginous hawk* (*Buteo regalis*) nests. Several additional raptor species have distribution ranges within the Pilot Valley Allotment and within a four-mile buffer of the allotment. These include prairie falcon (*Falco mexicanus*), American kestrel (*F. sparverius*), burrowing owl* (*Athene cunicularia*), great horned owl (*Bubo virginianus*) long-eared owl (*Asio otus*), red-tailed hawk (*B. jamaicensis*), rough-legged hawk (*B. lagopus*), Swainson's hawk* (*B. swainsoni*), bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*). While not all these species breed in the allotment, most or all of them pass through and use portions of the allotment as foraging habitat during annual migration stopovers, or as winter habitat.

As higher trophic level predators, raptors are dependent upon an abundant and diverse prey base to sustain their populations. Raptor prey includes small mammals (e.g. rabbits and rodents), birds, reptiles, amphibians and invertebrates. Small mammals are especially important to many raptor species, comprising much of their diets (Fitch et al. 1946, Blair and Shitoskey 1982). Most small mammals are primarily granivorous, feeding on seeds or herbaceous material, and prefer seeds and foliage of native grasses and forbs over cheatgrass and other non-native species (Kelrick et al. 1986). Increased cheatgrass cover is correlated with decreased small mammal diversity and abundance in the Great Basin (Ostoja and Schupp 2009, Freeman et al. 2014).

Conifer woodlands, composed primarily of singleleaf pinyon and Utah juniper, were not sampled nor quantitatively evaluated because these areas typically are not grazed during the winter season of authorized use. Pinyon-juniper woodlands, generally being found on steep and unproductive soils, are usually in good condition because access is difficult and water is limited for livestock (Wildlife Action Plan Team 2012). Indeed, casual observations of the woodlands within the allotment indicate that they are providing the expected wildlife habitat values for pinyon-juniper associated species such as pinyon jay, Merriam's shrew and tree-associated bat species such as long-eared myotis, western small-footed myotis, fringed myotis and little brown bat. Like shrub-dominated habitats, these woodlands are generally composed of low resilience and resistance sites (Figure 1) and are at risk of annual species invasion and the related consequences of altered fire regime, increased runoff and accelerated soil erosion.

Although no quantitative monitoring data were collected in the shrub-conifer interface, qualitative observations and examination of remotely-sensed spatial data revealed conifer encroachment into sagebrush and salt-desert scrub ecological sites on the eastern side of the

allotment and the northern terminus of the Toano Range in the southwestern corner of the allotment (Appendix 1: Figure 31, Figure 34). While not as extensive in the Pilot Valley Allotment as in other WGR allotments, conifer encroachment is occurring, concomitantly degrading habitat for wildlife associated with shrub-steppe habitat types. As conifers encroach and eventually infill within formerly shrub-dominated habitats, ecosystem services are degraded or lost, including suitable wildlife habitat, forage for livestock, and erosion control (Weltz et al. 2014).

Observations throughout shrub-dominated habitats in the rest of the allotment bolster the interpretation of monitoring data; invasive species, particularly cheatgrass and annual mustards are present throughout the allotment, and dominate in certain areas where disturbance has been especially intense or chronic, including along roads, in the vicinity of range improvements such as wells and pipelines, and near human habitations. Desirable native vegetation components exist in a mosaic with areas dominated by undesirable annual species, but because the majority of ecosites within the allotment are composed of low resistance and resilience sites, the likelihood of further degradation is high given the widespread distribution of annual species, specifically cheatgrass and mustards.

In conclusion, the shrub or shrub-steppe dominated vegetation communities of Pilot Valley allotment are generally not providing suitable feed, cover or living space for wildlife species, including Sensitive Species such as Brewer's sparrow, greater sage-grouse and pygmy rabbit. The significant presence of invasive plant species throughout these communities does not allow for long-term maintenance of ecological processes, leading to degraded and/or altered stable states or at-risk vegetation states. Biotic Integrity, an indicator of the relative robustness of the animal, plant and microorganisms both above and below ground, was determined to be compromised in the salt desert and sagebrush vegetation communities, further resulting in loss of capacity to support healthy native wildlife and plant populations. Woodland encroachment into shrub-dominated habitats has degraded shrubland ecosystem services, including wildlife habitat for species such as pronghorn, sage-grouse and other sagebrush-obligates. Existing woodland habitat is generally in good condition and providing suitable feed and cover for woodland-associated species.

Dairy Valley Allotment

The standard determination for this allotment was based on a combination of quantitative data collected at ten upland plots using AIM methodology, qualitative data collected at seven lentic riparian sites and two lotic riparian reaches using PFC assessment procedures, consideration of the Biotic Integrity component of the Interpreting Indicators of Rangeland Health assessment (TR 1734-6), remotely sensed data depicting cover of cheatgrass and woodlands and professional observations throughout the allotment.

Draft Determination: Not Met, making significant progress toward meeting. Current livestock grazing not in conformance with guidelines specifically at lentic riparian areas.

Since 1981, 66% of the allotment has burned, including some areas more than once (Appendix 1: Figure 29). All plots within the allotment were located within areas that burned in 2007 and/or

2018; three of these plots burned in both years. Six of these plots were within the 2018 Goose Creek Fire perimeter, although examination of remotely-sensed data collected immediately following the burn indicated that one of these sites (Dairy Dairy 2) was located within an unburned island and another (Elko-MtnSage-230) was only partially burned.

Characterization of the state of the vegetation communities at nine data collection plots indicated that 44% were in the Annual State, 11% in the Shrub State, 22% in Current Potential (At Risk) and 22% in Current Potential (Appendix 2: Table 18, Table 30). The Biotic Integrity departure ratings at 10 plots included 40% rated as Moderate or Moderate-Extreme departure from what would be expected in the reference condition, indicating that a significant proportion of sampled sites had ecological processes that have been compromised and are at further risk of alteration or loss. The remainder of the sites rated as Slight to Moderate (40%) or None to Slight (20%) (Appendix 2: Table 19, Table 31).

Of seven evaluated lentic riparian areas, five (71%) were not meeting Standard 2. Mill Creek was assessed using lotic PFC and one reach was determined not to be meeting Standard 2 as a result of the impacts of recent wildfire. The value of riparian areas to wildlife cannot be overstated; in the western US, riparian areas comprise less than one percent of the land area yet are used by terrestrial wildlife more than any other habitat type (Thomas et al. 1979 *in* Rich 2002). Two-thirds to three-quarters of non-game landbird species in the Great Basin region are associated primarily with riparian areas (reviewed in Saab et al. 1995). Migratory bird assemblages inhabiting wet meadow riparian areas were reported to be particularly impacted by habitat degradation (when compared to willow, birch and aspen-dominated forest stands; Warkentin and Reed 1999). Lentic riparian areas throughout the allotment were generally found to be heavily impacted as a result of livestock overutilization. The result was decreased cover for wildlife while watering, degraded riparian condition for riparian obligates or associates, and other potentially deleterious effects on wildlife habitat for a majority of their life cycle.

Big Game

Impacts of recent wildfire to big game habitat have been especially significant given that 47% of the allotment burned in 2018 and 66% of the allotment has burned since 1981.

The allotment contains mule deer winter habitat throughout much of the southern half, a small portion of crucial winter habitat in the extreme north and limited use habitat throughout the remainder of the allotment (Appendix 1, Figure 33). Approximately half of the designated winter habitat and all the crucial winter habitat within the allotment burned in 2018, resulting in the loss of sagebrush, bitterbrush and mahogany stands important to the local deer herd (K. Huebner, personal communication, 2019). The deer that winter here migrate from summer range in Idaho. It is expected that the recent fire will reduce the long-term carrying capacity of the mule deer herd until shrubs are re-established (K. Huebner, personal communication, 2019). It was observed in the winter of 2018-2019 that some of the wintering herd had migrated farther south than normal, near the Jackson Mine toward Pilot Valley (K. Huebner, personal communication, 2019).

Elk habitat is located throughout the allotment and is characterized by a relatively small amount of crucial summer habitat in the north and crucial winter habitat in the south, with year-round habitat comprising much of the remainder of the allotment (Appendix 1, Figure 35). Because elk are primarily grazers as opposed to browsers, wildfires that result in a net increase in perennial bunchgrasses while still retaining thermal and escape cover in the form of conifer or mountain shrub habitat will tend to benefit elk populations. The recent fires in this allotment and the surrounding area have generally benefitted the elk population in this area because unburned islands of conifer remained following fire and perennial bunchgrasses appear to have undergone a net increase in terms of annual production.

A relatively small area of year-round and winter habitats for pronghorn exist in the southeastern corner of the allotment with a narrow sliver of summer range along the western edge of the allotment (Appendix 1, Figure 32). Pronghorn habitat suitability has improved due to the increased herbaceous component and decreased conifer cover following the 2018 Goose Creek Fire (K. Huebner, personal communication, 2019).

Special Status Species (SSS)

The following SSS have been documented within the Dairy Valley Allotment (NNHP 2019, personal observation):

Greater Sage-grouse and associated sagebrush obligate or associated species

The HAF report (Appendix 4: Table 6) indicated that the impacts of recent fire have resulted in most plots in SUAs being rated as marginal (35%) or unsuitable (41%) for sage-grouse. The impact of fire was especially prevalent on sagebrush cover, an important indicator for most SUAs. Other commonly missing structural components of sagebrush communities were perennial forb cover, while undesirable attributes that were often present included invasive annual grasses and conifer encroachment.

Seven lentic riparian sites were evaluated for Proper Functioning Condition. Of these, two were Suitable (Proper functioning condition, PFC), four were marginal (Functional-at risk, FAR) and one was rated unsuitable (Nonfunctional, NF). Sites not at PFC were determined to be a result of current livestock grazing. In addition, a portion of Mill Creek was assessed using the lotic riparian PFC protocol and it was determined to be in PFC except for one reach that was Functional-at risk due to recent fire impacts. Using only the PFC indicator of habitat suitability, the Dairy Valley Allotment was found to be marginal as riparian summer/late brood-rearing habitat.

As an umbrella species for other sagebrush-obligate or sagebrush-associated species (Rowland et al. 2006, Hanser and Knick 2011, Copeland et al. 2014), the determination that most SUAs were less than suitable indicates that most of the Dairy Valley allotment is not providing suitable seasonal habitat for numerous wildlife species associated with sagebrush-steppe habitats, including Brewer’s sparrow, sage thrasher, pygmy rabbit, mule deer and others.

Northern rubber boa

One record (7/1983) of this species comes from the northern end of the allotment in the upper reaches of Death Creek. Rubber boa habitat includes woodlands, forest clearings, patchy chaparral, meadows, and grassy savannas, generally not far from water; also riparian zones in arid canyons and sagebrush in some areas (NatureServe 2019). Generally found in or under rotting logs or stumps, under rocks or in crevices, or under the bark of dead fallen trees. They are known to emerge early in the season when there is still snow on the ground.

As a carnivore near the top of the food chain, this species is dependent upon a healthy vegetation community to provide a robust prey base, including mice, shrews, lizards, lizard eggs, other snakes and small birds (NatureServe 2019). Given the recent, widespread fire occurrence in woodland habitat and this species' apparent affinity for decaying logs and loose bark found on dead fallen trees, these structural habitat components should be abundant over the next several decades in the Dairy Valley allotment. Given the wide range of prey items eaten by this species, it is expected that the allotment is providing suitable feed, water, cover and living space.

Townsend's big eared bat

In Nevada, found primarily in pinyon-juniper, mahogany, white fir, blackbrush, sagebrush, salt desert scrub, agricultural, and occasionally in urban habitats (Bradley et al. 2006). A mine or cave obligate in terms of its roosting requirements, three individuals of this species were documented within half mile of each other near the southern end of the allotment in 3/2012. In this area, it would be expected to forage within edge habitat along streams, adjacent to and within pinyon-juniper woodlands and sagebrush-steppe where moths comprise over 90% of its diet (Wildlife Action Plan Team 2012).

Threats to this species include incompatible timber harvest practices and loss of riparian areas (Wildlife Action Plan Team 2012). The determination that lentic riparian areas were only partially meeting the riparian standard is an indication that this habitat component may be less than suitable. However, general foraging habitat is widespread and although specific habitat components were lacking for sagebrush-obligates such as sage-grouse, there is no reason to suspect the habitat is not adequate to provide suitable food and water for this species.

Bald and golden eagles

In Nevada, the bald eagle is a spring/fall migrant and winter resident. Suitable winter habitat is widely dispersed on uplands, irrigated lands and riparian areas throughout the WGR. This species has been observed during January at Crittenden Reservoir (Dairy Valley allotment) and along Thousand Springs Creek (HD allotment) within the WGR (personal observation). Winter populations are stable to increasing (Buehler 2000 and Sauer et al. 2008 *in* GBBO 2010, Wildlife Action Plan Team 2012). No known breeding habitat occurs within the WGR.

The golden eagle is a yearlong resident and common breeder throughout Nevada; however, eagle densities and nesting activity are greatest in the northern third of Nevada (Floyd et al. 2007; Herron et al. 1985). Nesting golden eagles prefer cliffs overlooking sagebrush flats, pinyon-juniper forests, salt desert shrub, or other habitat capable of supporting a suitable prey base. The

highest densities of nesting eagles are found along river systems where cliffs border the entire length of the river; lower densities are found in pinyon-juniper and salt desert shrub communities. Recent data suggest golden eagle populations are generally stable throughout the western US and in the Great Basin Bird Conservation Region (Millsap et al. 2013). The recent widespread fire occurrence within conifer-encroached sagebrush Great Groups (Appendix 1: Figure 31, Figure 34, Figure 36) has resulted in an increased mosaic of habitats that encourages a more diverse prey base that should benefit eagles and other raptors, provided invasive annual species do not increase in abundance and distribution (Ostoja and Schupp 2009).

Monarch butterfly

The western monarch butterfly has declined 74% since the late 1990's, initiating a petition for listing as threatened under the Endangered Species Act in 2014 (WAFWA 2019). Dependent upon native milkweeds (*Asclepias* spp.) for suitable breeding and larval habitat, other important habitat components include other flowers to provide nectar for adult monarchs, trees or shrubs to provide shade and roost sites, and connectivity among these elements. Western monarch populations migrate to overwintering sites primarily in coastal and Baja California in fall, although at least some portion migrate to Mexico where they overwinter sympatrically with eastern monarchs.

A major threat is the loss or degradation of breeding and migratory habitat due to intensive agriculture. Agricultural practices, herbicide applications, mowing, and grazing have created conditions that shifted vegetation towards low structural and floral diversity and reduced milkweed and nectar plants across large landscapes (WAWA 2019). Fire is an additional factor that may impact monarch populations though direct removal of nectar and roosting resources, but some evidence exists demonstrating that depending on the intensity, timing and patchiness of the fire it can have beneficial effects for butterflies and other pollinators (Xerces 2018). As with other wildlife habitats, such potential benefits would be only be realized provided invasive species do not come to dominate post-fire landscapes, a tangible threat in many of the low resilience and resistance sites across the WGR (Figure 1). The paucity of perennial forbs noted at a significant proportion of sage-grouse nesting and brood-rearing sites within the allotment (Appendix 4) may also indicate that this critical breeding habitat component for is marginal or unsuitable for monarch populations.

Nearly all the Dairy Valley allotment consists of disturbance response groups dominated by one of the four common sagebrush types (black, Wyoming, mountain or little/low sagebrush). These disturbance response groups were lumped into "Great Groups" based on dominant vegetation as well as some disturbance responses that could be directly impacted by grazing (Appendix 1: Figure 36) (Stringham 2009, Stringham et al. 2011a, Stringham et al. 2011b). For example, the lahontan sagebrush group is separated from other sagebrush groups because there is evidence that the lahontan subspecies is palatable, particularly during the fall. Sites/polygons were only given "Great Group" identifier if the state-and-transition modeling process determined that the site had potential for an Annual State. It does not mean that everywhere in the polygon has a significant amount of annual grass, only that the Group is known to be susceptible to this issue. It is apparent that many of these sites, especially the black sagebrush Great Groups, have also

become dominated by conifers with varying degrees of canopy cover (Appendix1: Figure 31). Additional sagebrush habitats are at risk of conifer expansion (Appendix 1: Figure 34).

Conifer encroachment into sagebrush-steppe habitats results in numerous impacts, including decreased shrub and herbaceous species diversity and increased bare ground (Knapp and Soule 1996, Miller et al. 2000, Chambers et al. 2007). Predation opportunities also increase especially as elevated perch sites become available for aerial predators. As conifers become codominant with sagebrush, community composition can be altered, sometimes nonlinearly; Tausch and West (1995) documented nonlinear declines in sagebrush canopy cover to approximately 1/4 of its maximum cover when conifers reached approximately 50% of maximum canopy cover. Similarly, Miller et al. (2000) reported non-linear declines in sagebrush to approximately 20% of its maximum cover when conifers reached 50% canopy cover (*in* Baruch-Mordo et al. 2013). Increased hydrologic vulnerability in terms of increased runoff and accelerated soil erosion is also generally correlated with conifer encroachment into shrub-steppe vegetation communities (Pierson et al. 2010). The net effect of conifer encroachment is to degrade ecological processes and habitat of shrub-steppe associated wildlife species.

In conclusion, recent fire (66% of allotment has burned at least once since 1980), juniper encroachment into sagebrush and mountain shrub communities, and the widespread, sometimes dense cover of invasive species, particularly cheatgrass, were reasons identified for not meeting this Standard. Due to the combination of these impacts, vegetation composition, structure and distribution have been negatively impacted for most wildlife species associated with shrub-steppe vegetation communities, which comprise most of the ecological sites and habitat found on the allotment. A relatively small portion of the plant community within the northern portion of the allotment is categorized as high resilience to disturbance and high resistance to invasive annual grasses (Figure 1). The native perennial vegetation community in this area has a relative competitive advantage against cheatgrass compared to the low and moderate resistance and resilience sites typically found at lower elevations throughout much of the remainder of the allotment.

Gamble Individual Allotment

Draft Determination: Not Met, making significant progress toward meeting. Current livestock grazing not in conformance with guidelines specifically at lentic riparian areas.

The standard determination for this allotment was based on a combination of quantitative data collected at 38 upland plots using AIM methodology, qualitative data collected at two lentic riparian sites and one lotic riparian reach using PFC assessment procedures, remotely sensed data depicting cover of cheatgrass and woodlands and professional observations throughout the allotment.

Since 1981, 22% of the allotment has burned, including some areas more than once (Appendix 1: Figure 29). Of 38 data collection plots, 26% had burned during this same timeframe. Characterization of 18 plots where vegetation state was determined indicated the following distribution: two (11%) at Current Potential; three (17%) at Current Potential, at risk; seven (39%) in the Shrub State; one (6%) in the Shrub State, at risk; one (6%) in the Seeded State; and

4 (22%) in the Annual State (Table 14). Given the relatively high proportion of altered vegetation states (72% in a state other than Current Potential), it is reasonable to conclude that habitat suitability has been degraded for a significant portion of associated wildlife species. In addition, three at-risk sites in the Current Potential state indicates that 17% of the sites are at further immediate risk of transition to a lower, less desirable stable state unlikely to support the previous wildlife community assemblage. While vegetation state was not determined at 20 of 38 data collection sites, examination of monitoring photos and observations in the general areas of many of these sites suggest a similar proportion are likely in a state other than Current Potential, with similar consequences for wildlife habitat condition.

Table 14. State and Transition modeling characterization of current vegetation state at 18 plots in the Gamble Individual Allotment.

Plot Name	Current Potential	Shrub State	Seeded State	Annual State
Gamble Delano 14	Current Potential 2.2			
Gamble Delano 1		Shrub State 3.1		
WG_GI_EADE_UV01		Shrub State 3.1		
WG_GI_EADE_UV02	Current Potential 2.2			
Gamble Granite 3				Annual state 4.1
Gamble Granite 15	(Current Potential 2.2*)			Annual State
ELKO-WySage2-571			Seeded State 5.1	
Gamble Rocky 2		Shrub State 3.2 (at risk)		
Gamble Rocky 3				Annual State 4.2
Gamble Rocky 16				Annual State 4.1
Elko-BlackLowSage-043	Current Potential 2.3 (at risk)			
WG_GI_ROBU_UV03		Shrub State 3.1		
Gamble Montello 9		Shrub State 3.1		
Elko-BlackLowSage-034		Shrub State 3.1		
Gamble Montello 31		Shrub State 3.1		
Gamble Montello 2 (1-1)	Current Potential 2.3 (at risk)			
Gamble Montello 4		Shrub State 3.1		
Gamble Jackson 1	Current Potential 2.4 (at risk)			

*This plot was dominated by cheatgrass (68% foliar cover) but the State and Transition model does not provide for an Annual State. As noted by Stringham et al. (2015), “This is a one state model, consisting of the reference state and three community phases. This site was not seen on the site visits and has the potential for invasion by non-native species.” It appears that this model should contain a provision for an annual state and this plot location is likely

representative of that state and should be categorized as such even though the Annual State is not currently provided for in the State and Transition model.

Biotic Integrity departure ratings were available for 31 plots (Table 15). Approximately 23% of these departure ratings were moderate or higher, indicating that the capacity of the biotic community to support ecological processes within the normal range of variability expected for the site, to resist a loss in the capacity to support these processes, and to recover this capacity when losses do occur has been degraded and/or compromised at about a quarter of the sampled plots.

Table 15. Summary of Biotic Integrity departure ratings in the Gamble Individual Allotment.

Plot Name	Departure Rating	Notes from monitoring data
Gamble Delano 14	SM	Due to recent fire most of the plants on the site are burnt, however new plants are growing back and site appeared to be very diverse and healthy. Potential for invasive to be introduced has increased.
Gamble Delano 22	NS	None
2014327100214B2	**ME**	Not Available
2014327103117B3	SM	Not Available
2016327103112B1	NS	Not Available
2016327103112B2	NS	Not Available
Gamble Delano 1	SM	Invasives fairly dominant and functional structural groups were somewhat changed. Soil surface resistance to erosion was slight to moderate as well.
2015327103101B1	NS	Not Available
2015327103101B2	NS	Not Available
WG_GI_EADE_UV02	**M**	Site has burned and is dominated by herbaceous species and lacks shrub cover. BRTE is subdominant and sagebrush is missing.
Gamble Granite 3	SM	Deep rooted bunchgrasses are lacking on site and invasive (BRTE) are present indicating reduced biotic integrity of the site.
Gamble Granite 15	SM	While deep rooted bunchgrasses are present BRTE may start outcompeting them. BRTE is dominant on site along with deep rooted bunchgrass and shrubs.
Gamble Signboard 23	SM	Site has been burned increasing possibility for invasive to dominate. BRTE and SIAL2 already significant on site. Shrubs and shallow rooted grasses resprouting, however deep rooted grasses do not appear to be dominant (may come back after more time).
ELKO-WySage2-571	**M**	Biotic integrity is lost because of recent fire. Seed bed has potential to contain invasives which will dominate as site recovers.
Gamble Rocky 2	SM	Invasive were rated slight to moderate, and functional structural groups decreased indicating biotic integrity of the site has been reduced.
Gamble Rocky 3	SM	BRTE and ALDE covered the site between sagebrush and shrubs and functional structural groups were decreased (less bunchgrasses then in reference sheet), indicating biotic integrity was reduced.
Gamble Rocky 16	**M**	Site dominated by BRTE with bunchgrasses and shrubs very minor reducing the overall biotic integrity of the site.
Elko-BlackLowSage-043	**M**	Changes in functional/structural groups along with presence of invasive species and dramatic reduction in annual production warrant a moderate rating.
Gamble Montello 9	NS	None
Elko-BlackLowSage-034	**ME**	Presence of annual invasives as a dominant functional/structural group, reduction in deep rooted perennial bunchgrasses on site, and

Plot Name	Departure Rating	Notes from monitoring data
		dramatically increased litter amount warrant a moderate to extreme rating.
2016327107009B1	NS	Not available
2016327107009B2	SM	Not available
Gamble Montello 2 (2-1)	NS	Minimal deviation from reference observed.
Gamble Montello 31	NS	None
2014327107010B1	SM	Not available
2014327107010B2	SM	Not available
Gamble Montello 2 (1-1)	NS	None
Gamble Montello 4	**M**	Functional and structural groups and reproductive capability significantly reduced and plant decadence significant indicating reduced biotic integrity.
2014327107203B1	SM	Not Available
2014327107203B2	NS	Not Available
Gamble Jackson 1	SM	Invasives present, perennial reproductive capability significantly reduced and functional structural groups reduced lowering the biotic integrity of the site.

Big Game

Elk

Crucial winter habitat for elk is scattered across the allotment with higher concentrations in the Delano Mountains and west of the Murdock Mountains (Appendix 1: Figure 35). Elk populations have met NDOW-designated objectives in recent years and are at the designated carrying capacity. Portions of crucial winter habitat in the Delano Mountains in the northern portion of the allotment have burned multiple times over the last 30 years. The conversion of these areas to an herbaceous understory has benefitted elk and it is expected that elk numbers will continue to rise despite NDOW's efforts to maintain designated population objectives (K. Huebner, personal communication, 2019).

Deer

The Gamble Individual allotment provides a variety of habitats for mule deer including winter range, limited use, transition range, and movement corridors (Appendix 1: Figure 33). Most of the allotment is mapped as limited use habitat. Winter range exists in the center of the allotment, with a relatively small area of transitional range along the Murdock Range. In years with deeper snow, deer are pushed out of the Gamble Individual allotment and into Pilot Valley. Mule deer are struggling in this area due to the loss of shrub habitat to fire. Much of the northern Delano area contained important shrubs such as bitterbrush, serviceberry, and sagebrush that has recently been lost to fire (K. Huebner, personal communication, 2019).

Pronghorn antelope

Summer range for pronghorn exists throughout the northern portion of the allotment and extends along the western edge all the way to the southern perimeter (Appendix 1: Figure 32). The eastern edge of the allotment is year-round habitat with a couple areas of winter range. Pronghorn populations have remained robust in this area due to the increase in herbaceous forage from recent wildfires (K. Huebner, personal communication, 2019).

Special Status Species

The following Special Status Species have been documented the Allotment (NNHP 2018):

Greater Sage-grouse and other sagebrush-associated or obligate species

The HAF report (Appendix 4) indicated that a majority (78%) of plots in Seasonal Use Areas were marginal (40%) or unsuitable (38%) for the associated SUA. Especially striking was the determination that no nesting or brood-rearing plots were rated as suitable; the common factor resulting in degraded nesting habitat was a lack of perennial forbs, which in concert with other factors such as conifer encroachment (Appendix 1: Figure 31, Figure 34) and significant annual grass cover (Appendix 1: Figure 30) led to seven of eight sites in nesting habitat being rated as marginal. Common factors resulting in unsuitable upland brood-rearing habitat included fire impacts on sagebrush foliar cover and conifer encroachment, which also resulted in reduced sagebrush foliar cover. Lack of perennial herbaceous cover followed by lack of sagebrush foliar cover due to fire were primary factors resulting in marginal upland brood-rearing ratings. Likewise, riparian summer/late brood-rearing habitat was determined to be marginally suitable and had been impacted by current livestock grazing. Winter habitat was generally found to be suitable if it had not recently burned.

As with Dairy Valley allotment, much of the Gamble Individual allotment has recently burned, is experiencing conifer encroachment, contains pervasive, sometimes dense cheatgrass/annual invasive cover, or often a combination of these factors. In the northern Great Basin, fire and associated annual invasive species along with conifer encroachment are often identified as the top threats to sage-grouse among myriad potential threats (Garton et al. 2011, USFWS 2013). Because all these threats are present and operating on a relatively large-scale, the allotment is not currently meeting the seasonal habitat needs of sage-grouse. Unfortunately, because most of the Gamble Individual allotment consists of low resistance and resilience sites (Figure 1), it is at high risk of increased annual invasive species with continued disturbance, and sagebrush/perennial bunchgrass recovery may be problematic or take an excessive amount of time.

As an umbrella species for other sagebrush-obligate or sagebrush-associated species (Rowland et al. 2006, Hanser and Knick 2011, Copeland et al. 2014), the determination that most SUAs were less than suitable indicates that most of the Gamble Individual allotment is not providing suitable seasonal habitat for numerous wildlife species associated with sagebrush-steppe habitats, including Brewer’s sparrow, sage thrasher, pygmy rabbit, mule deer and others.

Townsends big eared bat

Three individuals of this species were documented within 0.8 mile of each other in the vicinity of Mine Mountain/southern Dry Canyon in 2015 in the northern end of the allotment. In this area, this species would be expected to forage within edge habitat along streams, adjacent to and within pinyon-juniper woodlands and sagebrush-steppe where moths comprise over 90% of its diet (Wildlife Action Plan Team 2012).

Threats to this species include inappropriate timber harvest practices and loss of riparian areas (Wildlife Action Plan Team 2012). The determination that no lentic riparian areas were properly functioning is an indication that this habitat component is less than suitable. However, general foraging habitat is widespread and although specific habitat components were lacking for sagebrush-obligates such as sage-grouse, there is no reason to suspect this allotment is not adequate to provide suitable food and water for this species.

Western small-footed myotis

A single deceased individual was documented in a water trough at Delano Well in 1978 in the northern part of the allotment. This bat is a crevice rooster, using mines, caves, buildings, rock crevices, hollow trees, and exfoliating bark on trees. It is found in a variety of habitats including desert scrub, grasslands, sagebrush steppe, blackbrush, greasewood, pinyon-juniper woodlands, pine-fir forests, agriculture, and urban areas. The western small-footed myotis hibernates individually or in large colonies, and in some areas may tolerate drier and colder hibernacula than some other species (Wildlife Action Plan Team 2012). Threats include loss of roosting habitat, permanent mine closures, recreational caving, contaminant poisoning, and disturbance during winter hibernation. Additionally, due to its habit of hibernating underground in larger groups, this species could be particularly vulnerable to white nose syndrome (Wildlife Action Plan Team 2012). Although apparently fairly common and widespread throughout most of Nevada, very little is known about foraging behavior, reproductive biology, roosting requirements, acceptance of bat gates, and population dynamics. Because of the wide variety of occupied habitat, suitable hibernacula are likely a limiting factor and important point of conservation emphasis. Other than the number of altered vegetation states and the consequent influence on overall ecosystem health, no specific habitat concerns related to this species were identified.

Long-eared myotis

Usually associated with coniferous forests, individuals roost under exfoliating tree bark, in hollow trees, and occasionally in caves, mines, cliff crevices, sink-holes, and rocky outcrops on the ground. The reproductive rate is low with individuals producing zero to only a single pup per year. This species hibernates in Nevada although winter habits of long-eared myotis are unknown. Long-eared myotis generally form small maternity colonies of 12-30 individuals (Wildlife Action Plan Team 2012). Given this species' association with coniferous forests, the relatively large amount of Pinon-Juniper habitat that has burned within the allotment in recent years, and the number of altered vegetation states and the consequent influence on overall ecosystem health it is likely that this species has suffered loss of suitable habitat or the quality of suitable habitat has been degraded.

Pallid bat

This species is a year-round resident in Nevada between 420-2,580 m (1,378-8,465 feet) in pinyon-juniper, blackbrush, creosote, sagebrush, and salt desert scrub habitats (Bradley et al. 2006). Selects a variety of day roosts including rock outcrops, mines, caves, hollow trees, buildings, and bridges. Night roosts very commonly under bridges, but also caves and mines. Food items are primarily large ground-dwelling arthropods but also include large moths. Foraging occurs in and among vegetation as well on the ground surface. Pallid bats may land and take prey. Like other bats, suitable hibernacula may be a limiting factor and pallid bats are susceptible to disturbance at these sites (Bradley et al. 2006). Aside from this, the fact that the pallid bat occupies varied habitat types indicates that no specific habitat concerns are present for this species within the allotment.

Special Status Species - Raptors

Bald and Golden Eagles

In Nevada, the bald eagle is a spring/fall migrant and winter resident. Suitable winter habitat is widely dispersed on uplands, irrigated lands and riparian areas throughout the WGR. This species has been observed during January at Crittenden Reservoir and along Thousand Springs Creek within the WGR (personal observation). Winter populations are stable to increasing (Buehler 2000 and Sauer et al. 2008 in GBBO 2010, WAP 2012). No known breeding habitat occurs within the WGR.

The golden eagle is a yearlong resident and common breeder throughout Nevada; however, eagle densities and nesting activity are greatest in the northern third of Nevada (Floyd et al. 2007; Herron et al. 1985). Nesting golden eagles prefer cliffs overlooking sagebrush flats, pinyon-juniper forests, salt desert shrub, or other habitat capable of supporting a suitable prey base. The highest densities of nesting eagles are found along river systems where cliffs border the entire length of the river; lower densities are found in pinyon-juniper and salt desert shrub communities. Recent data suggest golden eagle populations are generally stable throughout the western US and in the Great Basin Bird Conservation Region (Millsap et al. 2013).

Prairie Falcon

Preferred landscapes are cliffs adjacent to arid valleys with low vegetation. Often observed foraging over a variety of sagebrush, salt desert, and Mojave scrub shrublands throughout the year, and they also occur in agricultural lands, especially during the winter months (GBBO 2010). Typically nests in pot hole or well-sheltered ledge on rocky, vertical cliff or steep earth embankment, 10 to more than 100 meters above base. May nest in man-made excavations on otherwise unsuitable cliffs. Nests typically are placed on south-facing aspects, with overhangs offering some protection from solar radiation. May use old nest of raven, hawk, eagle, etc. Commonly changes nest site within territory in successive years. Generally prefer to forage over open areas of early successional stages, low vegetation height, and bare ground. Primarily feeds opportunistically on mammals (especially ground squirrels), lizards, snakes, and birds, generally up to size of quail and rabbits (Wildlife Action Plan Team 2012).

Ferruginous and Swainson's Hawks

These species often occur sympatrically during the breeding season. In Nevada, ferruginous hawks prefer open, rolling sagebrush near the pinyon-juniper interface (GBBO 2010). Their favored prey is rabbits (*Lepus* spp.), but they are also known to take other small rodents and occasionally birds and reptiles. The species has probably undergone recent population declines within Nevada (GBBO 2010). The Swainson's hawk is a summer resident in Nevada (Herron et al. 1985). Often associated with agricultural and riparian areas, it will also use sagebrush steppe, nesting in scattered junipers, cliffs or other trees (GBBO 2010). Favored prey on breeding territories includes rabbits and ground squirrels. Local populations have likely been in recent decline (GBBO 2010), however, recent restrictions on pesticide use on their wintering grounds in South America appear to have resulted in positive population trends. Ferruginous hawks occasionally overwinter in northern Nevada while Swainson's hawks leave the area entirely.

Burrowing Owl

Abandoned mammal burrows, such as those created by badgers and coyotes provide nesting habitat for burrowing owls. Habitat requirements include low vegetation and suitable prey including a variety of arthropod, small mammalian and reptilian species. Burrowing owls typically breed or loaf in sparsely vegetated areas which may include disturbed or open sites, such as recent burns, degraded areas near troughs, corrals, or livestock mineral licks. While this species has undergone large historical declines in Nevada, recent trends are uncertain (GBBO 2010).

The general impacts of vegetation state conversion from Current Potential to less desirable states such as the Shrub State or Annual State has likely resulted in a less robust and diverse prey base for most raptor species (Freeman et al. 2014). In contrast, in areas where fire has occurred within conifer-encroached sagebrush Great Groups (Appendix 1: Figure 31, Figure 34, Figure 36) this may have resulted in an increased mosaic of habitats that encourages a more diverse prey base that should benefit eagles and other raptors, provided invasive annual species do not increase in abundance and distribution in post-burn habitats (Ostoja and Schupp 2009).

Special Status Species Plants

Goose Creek Milkvetch

The species is historically known from the Goose Creek drainage in Cassia County, Idaho; Elko County, Nevada; and Box Elder County, Utah (Baird and Tuhy 1991, Mancuso and Moseley 1991, Smith 2007). Goose Creek milkvetch occurs at elevations ranging between 4,900–5,885 ft (1,494-1,790 m).

In response to a 2004 petition to emergency list Goose Creek Milkvetch as threatened or endangered, the USFWS's 12-month finding (74 FR 46521, September 10, 2009) concluded that listing Goose Creek milkvetch under the ESA was warranted but precluded by higher priority actions. At that time, USFWS assigned a listing priority number (LPN) of 5 to the species because the threats affecting the species had a high magnitude but were non-imminent. In 2012,

during the Candidate Notice of Review, the USFWS assigned a LPN of 2 to Goose Creek milkvetch because the threats affecting the species were high in magnitude and imminent. The increase in listing priority to LPN 2 was based largely on the imminence of another wildfire within Goose Creek milkvetch habitat and the lack of existing regulatory mechanisms throughout the species' range to protect the species during and after another wildfire from firefighting and emergency stabilization and restoration activities. Additional legacy effects from post-wildfire rehabilitation practices (disking and seeding), competition from invasive non-native plant species introduced via soil stabilization mixtures, habitat alteration from the 2007 wildfires, and livestock trailing in the fragile soils of the tuffaceous outcrops contributed to the magnitude of the threats to the species.

A Conservation Agreement Strategy (CAS) between BLM (Twin Falls District Office, ID, Elko District Office, NV and West Desert District Office, UT) and USFWS was signed in 2015 "to ensure the long-term persistence of Goose Creek milkvetch within its historic range, provide a framework for future conservation efforts, and to reduce or minimize any negative impacts from BLM management activities to the species and its habitat" (USFWS 2015). Primary threats to the species identified and addressed by the CAS include (1) Wildfire; (2) Wildfire Management; (3) Post-Wildfire Emergency Stabilization and Restoration; (4) Nonnative Introduced Species – Unseeded and Seeded; (5) Livestock Use; and (6) Mining.

Goose Creek milkvetch occurs in Dry Canyon, in the north end of Gamble Individual Allotment, where it occupies ~200 acres (Appendix 1: Figure 37). Extant locations include the north side of Dry Canyon, where it occurs on sparsely vegetated outcrops of highly weathered volcanic-ash (tuffaceous) soils from the Salt Lake Formation. These tuffaceous outcrops, also referred to as Salt Lake Formation "ashy" outcrops, appear to constitute the optimal habitat for the species throughout its range. Goose Creek milkvetch also occurs in the sandy loam and gravelly sandy loam soils surrounding some, but not all, of these tuffaceous outcrops. Utah juniper is relatively conspicuous and common on these outcrops in Dry Canyon.

Wildfire burned portions of the Dry Canyon Goose Creek milkvetch population in the 2007 West Fork Fire and the 2017 Dry Gulch Fire (Appendix 1: Figure 37); direct disturbance from burning, suppression actions and rehabilitation actions are all threats to the population in Dry Canyon. However, the conservation actions outlined in the CAS have minimized the impacts of the latter two threats since completion in 2015. Following the 2007 fire, non-native crested wheatgrass and other plants were drill seeded along the flatter, bottom portions of Dry Canyon (Appendix 1: Figure 38); it is unknown if this activity negatively impacted any Goose Creek milkvetch plants in these areas, but they are not currently known to occupy significant areas aside from the steeper, unseeded tuffaceous outcrops. Additional aerial seeding with spacing of approximately every third swath took place in 2007 and included an area of occupied habitat near Delano Well (Appendix 1: Figure 38). Rehabilitation efforts following the 2017 fire in Dry Canyon consisted of aerial seeding using only native species and included areas of occupied habitat near Delano Well and some additional occupied habitat approximately 1.25 miles to the west.

The tuffaceous outcrops where Goose Creek milkvetch primarily occurs are steep and contain relatively sparse vegetation, a combination that tends to limit livestock use within the habitat. However, where the species occurs on flatter slopes with sandy soils below or adjacent to the

outcrops, these areas may receive more livestock use. Goose Creek milkvetch appears to tolerate some trampling and habitat disturbance from livestock use because it is present and sometimes abundant along livestock trail margins and road edges (USFWS 2015). However, Goose Creek milkvetch plants do not occur within heavily used livestock trails (74 FR 46521, September 10, 2009). The tuffaceous outcrops appear to be vulnerable to the establishment of trails because they are comprised of soft and highly erodible soils. Livestock grazing may negatively impact Goose Creek milkvetch because of the direct, physical effects of trampling that can damage or destroy individual plants, and the indirect effects from range improvement projects that concentrate livestock and degrade the habitat. Range improvement projects include water tanks and associated pipelines, and placement of salt licks and fencing.

Range improvements including wells, water tanks and pipelines occur within Dry Canyon. No fences transect or abut occupied habitat and thus do not concentrate livestock use in occupied habitat in a detrimental manner. An area of impact known as a piosphere often develops around water sources and mineral licks where the impact radiates outward from the resource along a utilization gradient (Rigge *et al.* 2013, Shahriary *et al.* 2012). Within the Goose Creek milkvetch range, the center of a piosphere, completely devoid of vegetation, extended approximately 45 meters (150 feet) from one water tank (74 FR 46521, September 10, 2009); however, site-specific topography, distribution of livestock, season and duration of use, number of livestock, and number of water sources will influence this distance. The primary concern from range improvements within Dry Canyon comes from Delano Well, which consists of a well (constructed about 1939), stockwater pond, large (~170 x 100 meters [557 x 328 feet]) associated piosphere, numerous well-established livestock trails extending out to at least a half mile, and a pipeline of approximately five miles to additional livestock water facilities. It is possible that Goose Creek milkvetch once occupied the area now impacted by the piosphere and stockwater ponds. Observations of livestock use within Dry Canyon indicate that cattle primarily utilize the flat bottom of Dry Canyon, however livestock trails are evident within the tuffaceous outcrop habitat of the type occupied by Goose Creek milkvetch within a quarter mile on either side of Delano Well.

Deeth buckwheat (*Eriogonum glabratum* var. *nutans*)

This species was collected ~4 miles northeast of Montello in 1974. Little information is available regarding the ecology, life history or habitat requirements of this species. The collection location was noted as being within a *Sarcobatus/Atriplex* vegetation community in sandy soil, adjacent to Nevada Hwy 30. Additional habitat descriptions include “sandy flats and slopes, saltbush and sagebrush communities” (NatureServe 2019) between 1,500-1,900 meters (4,921-6,233 feet). Given the lack of reliable information regarding this species, it is difficult to assess potential threats to extant populations; the current status of the species within the allotment is not known. The vegetation community where it was collected is relatively scarce within the remainder of the allotment and therefore the species is also likely to be relatively restricted in distribution.

One leaflet Torrey milkvetch (*Astragalus calycosus* var. *monophyllidius*)

This species was documented in 1940 on the northeastern side of the Delano Mountains, in the northeastern portion of the allotment. The site was described as a "volcanic ash hill with juniper". Known from Clark, Elko, Eureka, Lincoln and Nye Counties, NV. Sparse habitat information is described as "open gravelly hillsides, in scattered juniper and pinyon forest, on limestone; lower foothill and valley habitats at 1,600 to 2,000 m (5,249-6,561) (NatureServe 2019). Little additional information is available regarding the ecology, life history or habitat requirements of this species. The vegetation community where it was collected is relatively common throughout the allotment and therefore the species may be more common than a single documentation point, however its current status within the allotment is unknown.

In conclusion, the Gamble Individual allotment is an example of a heterogeneous assembly of high desert vegetation communities that have been significantly impacted by fire, annual invasive species (especially including cheatgrass), juniper encroachment into sagebrush-steppe habitats, inappropriate historic livestock grazing, and inappropriate current livestock grazing in lentic riparian areas. Some wildlife species have benefitted from recent wildfire where recovery has resulted in robust perennial bunchgrass communities (e.g., grazers such as elk) while others have suffered direct habitat loss in the form of reduced sagebrush canopy cover and increases in cheatgrass distribution/abundance in important seasonal use areas (e.g., greater sage-grouse and other sagebrush obligates). Given the high percentage of altered vegetation states and compromised Biotic Integrity ratings, a significant proportion of this allotment is not providing healthy, productive and diverse populations of native species, appropriate to the site characteristics, to provide suitable feed, water, cover and living space for animal species and to maintain ecological processes.

Because the vast majority of this allotment is comprised of low resilience and resistance vegetation communities (Figure 1), habitats that are currently suitable or providing some value to wildlife are at significant risk of degradation or transition to less desired states when inevitable disturbance, particularly wildfire, impacts them. Currently suitable habitats are also of heightened importance when considering the above-mentioned prevalence of degraded vegetation communities.

HD Allotment

Draft Determination: Not Met. Current livestock grazing not in conformance with guidelines specifically at lentic riparian areas.

Since 1981, 27% of the allotment has burned, including some areas more than once. Of 73 data collection sites, 18% had burned during this same timeframe. Characterization of 40 plots where vegetation state was determined indicated the following distribution: 2 (5%) at Current Potential, 3 (7.5%) at Current Potential, at risk, 5 (12.5%) in a Seeded State, 18 (45%) in a Shrub State and 12 (30%) in an Annual State (Table 16). Given the high percentage of altered/less desirable vegetation states, habitat suitability has been degraded for a significant portion of associated wildlife species; transition to lower, less desirable stable states results in ecosystems that cannot support the previously supported wildlife and plant community assemblages.

Table 16. State and Transition modeling characterization of current vegetation state at 40 plots in the HD Allotment.

Plot name	Current Potential State	Seeded State	Shrub State	Annual State
WG_HD_UPLO_UV03			3.1 Shrub State	
HD Pole 9				4.2 Annual State
WG_HD_POCR_UV01	2.1 Current Potential			
WG_HD_POCR_UV02	2.4 Current Potential (At Risk)			
WG_HD_LOLO_UV01				4.2 Annual State
WG_HD_LOLO_UV03	2.3 Current Potential (At Risk)			
WG_HD_LOLO_UV04			3.1 Shrub State	
HD Red 28	2.2 Current Potential			
HD Red 7			3.1 Shrub State	
ELKO-BlackLowSage-036		5.1 Seeded State		
WG_HD_REPO_UV01	2.3 Current Potential (At Risk)			
WG_HD_REPO_UV02		5.1 Seeded State		
WG_HD_REPO_UV03			3.1 Shrub State	
HD Summer 10				4.2 Annual State
HD Summer 21				5.2 Annual State
ELKO-WySage2-575			3.1 Shrub State	
ELKO-BlackLowSage-018				5.2 Annual State
WG_HD_SUCA_UV03			3.1 Shrub State	
HD Primrose 6				4.1 Annual State
HD Primrose 20			3.1 Shrub State	
WG_HD_PRIM_UV01			3.1 Shrub State	
WG_HD_PRIM_UV02			3.1 Shrub State	
WG_HD_PRIM_UV03			3.1 Shrub State	

Plot name	Current Potential State	Seeded State	Shrub State	Annual State
HD Brush 26		5.1 Seeded State		
HD Black 18			3.1 Shrub State	
HD Black 25				4.1 Annual State
HD Black 30				4.1 Annual State
HD HD 5			3.1 Shrub State	
HD HD 27				4.1 Annual State
HD Toano 3			3.1 Shrub State	
HD Toano 7		5.2 Seeded State		
HD 9-Mile 17			3.1 Shrub State	
HD 9-Mile 5			3.1 Shrub State	
WG_HD_NMMO_UV02			3.1 Shrub State	
HD Wilkins 8		5.1 Seeded State		
HD Burnt 4				4.1 Annual State
HD Burnt 6				4.1 Annual State
WG_HD_KNMO_UV01				4.2 Annual State
WG_HD_KNMO_UV02			3.1 Shrub State	
WG_HD_BECA_UV02			3.1 Shrub State	
TOTAL	2 3 (at risk)	5	18	12

Of 63 plots where IIRH data were collected within the allotment, 14 (22%) had Biotic Integrity departure ratings that were estimated to be at least moderately departed from what would be expected at reference condition (Table 17), indicating that the capacity of the biotic community to support ecological processes within the normal range of variability expected for the site, to resist a loss in the capacity to support these processes, and to recover this capacity when losses do occur has been degraded and/or compromised at about a quarter of the sampled plots. In addition, 22 plots exhibited at least Slight to Moderate departure from reference resulting in 57% of plots where IIRH data were collected showing some level of degraded Biotic Integrity.

Table 17. Summary of Biotic Integrity departure ratings in the HD Allotment

Plot Name	Departure Rating	Notes from monitoring data
HD Upper 12	NS	None
HD Pole 9	SM	Presence of invasive species observed
WG_HD_POCR_UV01	SM	Plot is in current potential with increased perennial forbs and BRTE present in trace amounts. Some expected perennial grass species were not observed. Litter is increased due to annual species, POSE, and perennial forbs.
HD Lower 8	NS	None
WG_HD_LOLO_UV01	**M**	All functional groups are present but deep-rooted perennial bunchgrasses are very reduced. Mat-forming PF are increasing. Annual species dominate site and influencing litter and resource availability to desirable species.
2016327105006B1	**ME**	Not available
2016327105006B2	SM	Not available
HD Red 28	SM	Invasive plants substantial, functional structural groups reduced, and plant mortality/decadence increased, reducing overall biotic integrity.
HD Red 7	SM	Invasives present and functional structural groups decreased indicating reduced biotic integrity of the site.
ELKO-BlackLowSage-036	**M**	Invasive species presence, reduction is species numbers in functional/structural groups, and increased decadence justify a moderate rating.
WG_HD_REPO_UV01	**M**	Deep-rooted perennial grasses are reduced and annual grasses are present.
2014327103703B1	SM	Not available
2014327103703B2	SM	Not available
2015327103715B1	**M**	Not available
2015327103715B2	SM	Not available
HD Summer 10	SM	Functional structural groups reduced from deep rooted bunchgrasses to invasive and annuals. Invasives present/dominant on site.
HD Summer 21	SM	Invasive such as BRTE dominate the site. Deep rooted bunchgrasses present but minor.
ELKO-BlackLowSage-018	SM	Biotic integrity is at risk due to the high level of invasive species.
ELKO-WySage2-575	NS	Presence of invasives not concerning compared with health of site.
HD Primrose 6	**ME**	Invasives are dominant and litter increased. Functional structural groups are transitioning to being dominated by invasives.
HD Primrose 20	NS	None
WG_HD_PRIM_UV01	SM	Reduction in deep-rooted perennial grasses with increase in shallow-rooted perennial grasses.
WG_HD_PRIM_UV02	**M**	Community is in shrub state with an understory dominated by shallow-rooted perennial grasses and annual grasses. Deep-rooted perennial grasses are reduced but still present.
2014327103713B1	NS	Not Available
2014327103713B2	NS	Not Available
HD Brush 26	NS	None
HD Black 18	SM	Invasives present and functional structural groups reduced.
HD Black 25	SM	BRTE present on site, functional/structural groups decreased in tall shrubs. No ochric epipedon present, only dark soils.
HD Black 30	NS	None
2014327107801B1	NS	Not Available

Plot Name	Departure Rating	Notes from monitoring data
2014327107801B2	NS	Not Available
HD HD 5	NS	None
HD HD 27	NS	None
2016327105017B1	SM	Not Available
2016327105017B2	SM	Not Available
HD Toano 3	NS	None
HD Toano 7	NS	None
2015327107005B1	NS	Not Available
2015327107005B2	NS	Not Available
2014327105010B1	SM	Not Available
2014327105010B2	SM	Not Available
2015327107006B1	NS	Not Available
2015327107006B2	NS	Not Available
2015327105005B1	NS	Not Available
2015327105005B2	NS	Not Available
2014327105008B1	SM	Not Available
2014327105008B2	**M**	Not Available
HD 9-Mile 17	SM	Shrub dominant site with few deep rooted bunchgrasses. Invasive increasing on site.
HD 9-Mile 5	NS	None
HD 9-Mile 2	NS	None
ELKO-BlackLowSage-024	**M**	Deep rooted bunchgrasses are present (POSE and PSSP6) but declining. Non-native annuals present. JUOS and shrubs dominate.
HD Wilkins 8	NS	None
HD Burnt 4	**M**	Invasives are fairly dominant and functional structural groups are reduced, lowering the overall biotic integrity of the site.
HD Burnt 6	NS	None
2016327103701B1	**ME**	Not Available
2015327103720B1	NS	Not Available
2015327103720B2	NS	Not Available
WG_HD_KNMO_UV01	**ME**	Plot has burned and been replaced by CHVI8 and BRTE. Deep-rooted perennial grass reproduction is limited by annuals. Litter amounts are much higher
WG_HD_KNMO_UV02	**M**	BRTE and POSE increase is filling interspaces, increasing litter, and competing with more desirable species.
WG_HD_BECA_UV02	SM	Plot has transitioned to shrub dominance. DRPG are reduced while POSE is increasing to sub-dominance.
HD Bell 24	NS	None
2014327100217B1	**M**	Not Available
2014327100217B2	SM	Not Available

Big Game

Elk

The entirety of the allotment provides various seasonal habitats for elk, including crucial seasonal habitats which are spatially disjunct (Appendix 1: Figure 35). Elk on the east side of Hwy 93 are managed separately from those on the west side. The east side herd is growing primarily due to increased perennial grass following wildfire. The herd on the west side has been kept near the objective of 100 animals by NDOW but has the potential to grow rapidly due to the

high quality of the habitat, especially in the Loomis area in the extreme western portion of the allotment (K. Huebner, personal communication, 2019).

Deer

Most of the allotment is designated limited use with smaller proportions of summer habitat in the west and winter range in the northeast (Appendix 1: Figure 33). There are two herds that use the HD allotment; one migrates from the Jarbidge area and one migrates on the Knoll Mountain side of WGR. The fawn ratio is low and is thought to result from a combination of droughty summers, a lack of high-quality transitional habitat, and higher snowpack and lower temperatures than average during three of the last five winters (K. Huebner, personal communication, 2019). The Loomis and Summer Camp areas in the west are important to deer populations because of the abundant intact sagebrush, bitterbrush, and mahogany vegetation communities (K. Huebner, personal communication, 2019).

Pronghorn

Most of the allotment is designated summer habitat for pronghorn with a relatively small area on the lower slopes of southern Knoll Mountain designated as crucial winter habitat (Appendix 1: Figure 32). Pronghorn are doing relatively well in the associated Hunt Unit Group due in large part to the perennial grasses and forbs that have increased following large-scale wildfires and favorable precipitation in northeastern Elko County in recent years (NDOW 2019).

Special Status Species

Greater Sage-grouse

The HAF Report indicated that approximately half (48%) of the plots throughout all SUAs were suitable, including a majority of leks (82%) and winter SUAs (68%) (Appendix 4, Table 8). Similar to Dairy Valley and Gamble Individual allotments, the impacts of wildfire on sagebrush presence and canopy cover was a primary factor resulting in unsuitable plot ratings in nesting/early brood-rearing habitat, while a paucity or complete lack of perennial forbs and sometimes perennial grasses was a primary factor in plots rated as marginal.

Late brood-rearing habitat (uplands) had also been impacted by fire; all the plots rated as unsuitable had burned at least once and lacked adequate sagebrush cover for sage-grouse brood security. A common factor at 12 of 14 marginal sites was a lack of perennial grasses, perennial forbs, or both.

Especially conspicuous was the observation that none of the 12 lentic riparian sites were rated suitable as late brood-rearing habitat, and most (66%) were unsuitable (Appendix 4, Table 8). Current livestock grazing and drought were identified as contributing factors to the degraded condition at these sites. Riparian areas have been identified as a potential limiting factor for sage-grouse broods in east-central Nevada given their relative scarcity on the landscape (e.g., 2.8% cover in east-central Nevada; Atamian et al. 2010). The fact that none of these sites within the HD allotment were determined to be suitable for sage-grouse broods indicates that a critical,

potentially population-limiting habitat component, is inadequate for grouse populations that depend on these habitats.

As an umbrella species for other sagebrush-obligate or sagebrush-associated species (Rowland et al. 2006, Hanser and Knick 2011), this indicates that most of the allotment is not providing suitable seasonal habitat for numerous wildlife species that occur within sagebrush-steppe communities, many of which are just as dependent on the limited riparian areas within the larger sagebrush sea. Commonly missing structural components of sagebrush communities were sagebrush canopy cover and perennial forb cover, while undesirable attributes that were often present included invasive annual grasses and conifer encroachment.

Pygmy rabbit

Pygmy rabbits' (*Brachylagus idahoensis*) range includes central and northern Nevada, corresponding to sagebrush distribution (Wildlife Action Plan Team 2012). General habitat for pygmy rabbits is primarily found on big sagebrush-dominated plains and alluvial fans where plants occur in tall, dense clumps. Selected habitat often occurs on deep loamy soils allowing for the excavation of burrows. Dense stands of sagebrush located adjacent to permanent and intermittent streams, fence rows, or near ditches may provide avenues of dispersal. Sagebrush makes up 99% of diet in the winter and 51% in summer with wheatgrasses and bluegrasses being highly preferred (Green and Flinders 1980 *in* Wildlife Action Plan Team 2012). Cheatgrass invasion is detrimental to pygmy rabbit habitat through increased fire frequency and size as well as being a barrier to dispersal once established as a monoculture (Larrucea and Brussard 2008, Wildlife Action Plan Team 2012).

Pygmy rabbit burrow complexes have been documented south of Thousand Springs Creek in the sagebrush flats of the HD and 9-mile Mountain pastures, and this species may occur in appropriate habitat throughout the allotment. As a sagebrush-obligate, the pygmy rabbit has been similarly impacted by the altered habitat indicators discussed above for sage-grouse.

Aquatic Special Status Species

California floater (*Anodonta californiensis*)

The California floater is a freshwater mussel that inhabits shallow areas of clean, clear lakes, ponds and large rivers. They prefer lower elevations and a soft, silty substrate in which to burrow. California Floater burrow into substrates and feed on bacteria, plankton, and detritus, strained through the gills. Their life cycle includes a parasitic stage requiring a host fish, usually native minnows. Although little is known about habitat requirements for floaters, in general, declines in freshwater mussels are thought to be associated with habitat degradation including loss of fish host and declines in water quality. California floaters have been documented in the Thousand Springs Creek and likely could occur elsewhere in streams that are similar within the allotment.

Special Status Plants

Barren Valley collomia (*Collomia renacta*)

An inconspicuous winter annual that produces small blue flowers with white throats in early spring. Shrubland/chaparral habitats on rocky soils on south-facing slopes. These "scabland" soils are subject to greater temperature extremes and soil moisture fluctuations than surrounding areas according to Daubenmire (1970). Elevation ranges from 1,500-2,300 m (4,922-7,546 feet). Associated with *Lomatium* spp., *Arabis* spp., and *Eriogonum* spp. (NatureServe 2019).

There is one documented occurrence of this species in the Pequop Range south of the southern boundary of the allotment in 1942; has not been confirmed to exist within the allotment boundaries.

Elko rockcress (*Boechera falcifructa*)

Habitat is described as dry, densely vegetated, relatively undisturbed, light-colored silty soils with a high cover of moss and other soil crust components on moderate to steep north-facing slopes in the sagebrush zone, dominated by moss, Wyoming sagebrush, rabbitbrush, and Sandberg bluegrass. Also reported but not confirmed from rock crevices (NNHP 2020).
Moss cover may be important for survival of older plants and has been substantially impacted by livestock trampling (Lesica and Shelly 1992). Within the allotment this species was collected along Hwy 93 (35-40 miles south of Jackpot, NV) in 1979. Habitat was described as “In crevices of rocks, sagebrush area on slope of a high ridge”. No further information is known regarding the status of this species within the allotment.

SSS Raptors

Bald and Golden eagles

Several likely golden eagle nests have been documented, particularly in the vicinity of Knoll Mountain in the northern portion of the allotment. Given the recent conifer expansion and fire occurrence within the allotment, the resulting mosaic of habitats encourages a diversity of habitat structure and patchiness that may benefit foraging eagles.

Ferruginous Hawk

Several nests have been documented, primarily in the shrub/juniper ecotone throughout the allotment.

Northern Goshawk

One nest was documented in an aspen stand in 1982 in a “side drainage of Loomis Creek” on the western edge of the allotment. Aspen stands, which are limited in extent and subject to several threats, are the key habitat feature for breeding goshawks in northeastern Nevada (GBBO 2010, Wildlife Action Plan Team 2012), although active breeding territories have been documented in mature pinyon-juniper woodland (personal observation). In Nevada, nests are generally

constructed in the largest trees within dense, large tracts of mature or old growth aspen stands with high canopy closure (60-95%) and sparse ground cover, near the bottom of moderate slopes, and near water or dry openings (Bull and Hohmann 1994, Daw and DeStefano 2001, Hargis et al. 1994, Reynolds et al 1982, Siders and Kennedy 1994, Squires and Ruggiero 1996, Younk and Bechard 1994). NDOW aerial and ground surveys from 2000-2010 (Morrison et al. 2011 *in* GBBO 2010) suggest population declines in eastern and southern Nevada, with more than half of historical nesting sites currently unoccupied (GBBO 2010). The NDOW is currently implementing a multi-year statewide population survey effort to estimate current status and trend at historic and newly documented territories.

The general impacts of vegetation state conversion from Current Potential to less desirable states such as the Shrub State or Annual State has likely resulted in a less robust and diverse prey base for most raptor species (Freeman et al. 2014) as well as less diverse structural habitat components and skewed vegetation composition. In contrast, in areas where fire has occurred within conifer-encroached sagebrush Great Groups (Appendix 1: Figure 31, Figure 34, Figure 36) this may have resulted in an increased mosaic of habitats that encourages a more diverse prey base that should benefit eagles and other raptors, provided invasive annual species do not increase in abundance and distribution in post-burn habitats (Ostoja and Schupp 2009).

In conclusion, examination of extensive monitoring data collected throughout the allotment indicates that the Standard is met for some wildlife species in some locations or during certain seasons (e.g., breeding and winter habitats for sage-grouse) but in general the habitats in the allotment are not providing healthy, productive and diverse populations of native species, appropriate to the site characteristics, to provide suitable feed, water, cover and living space for animal species and to maintain ecological processes. Some of these animal species include Sensitive species such as Brewer's sparrow, greater sage-grouse (e.g., nesting and brood-rearing habitats), ferruginous hawk and pygmy rabbit. Evidence of altered Standard 3 indicators was evident in the significant proportion of altered vegetation states which has resulted in inappropriate vegetation composition, structure, distribution and productivity.

Because riparian habitat has been documented as a potentially population-limiting habitat component for sage-grouse populations in east-central Nevada (Atamian et al. 2010), the determination that this seasonal use area in the HD allotment is not meeting the Standard is concerning for sage-grouse and myriad other species that depend on healthy riparian areas within a larger sagebrush-steppe dominated landscape. The impact of current livestock grazing on the degraded functionality of riparian areas and their unsuitability for wildlife species was a primary factor for not meeting Standard 2 and Standard 3, a circumstance that has been documented elsewhere in the Great Basin (Dobkin et al. 1998, Batchelor et al. 2015).

Given the widespread distribution and abundance of low resilience and resistance sites across the HD Allotment, much of the habitat that is currently suitable or providing some value to wildlife is at risk of degradation or transition to a less desirable state when inevitable disturbance, particularly wildfire, impacts these areas.

Standard 4. Cultural Resources

Land use plans will recognize cultural resources within the context of multiple use.

Guidelines:

4.1 Rangeland management plans will consider listings of known sites that are National Historic Register eligible or considered to be of cultural significance and new eligible sites as they become known.

This standard is being met, and livestock grazing is in conformance with the standards.

PART 2. ARE LIVESTOCK A CONTRIBUTING FACTOR TO NOT MEETING THE STANDARDS?

Yes, specifically for lentic riparian areas (Standard 2) and the disproportionately important habitat values these areas provide for wildlife including Special Status Species (Standard 3).

PART 3. MANAGEMENT PRACTICES TO CONFORM TO GUIDELEINES AND ACHIEVE STANDARDS

LITERATURE CITED

Allen, C. R., L. Gunderson and A.R. Johnson. 2005. The use of discontinuities and functional groups to assess relative resilience in complex systems. *Ecosystems* 8:958-966.

Atamian, M.T., J.S. Sedinger, J.S. Heaton and E.J. Blomberg. 2010. Landscape-Level Assessment of Brood Rearing Habitat for Greater Sage-Grouse in Nevada. *The Journal of Wildlife Management* 74:1533-1543.

Baird, G.I, and J. Tuhy. 1991. Report for 1990 Challenge Cost Share Project, USDI Bureau of Land Management, Target Species: *Astragalus anserinus* Atwood, Goodrich, and Welsh, *Penstemon idahoensis* Atwood and Welsh, *Potentilla cottamii* Holmgren. Utah Natural Heritage Program, Salt Lake City, UT. 16 pp. + appendices.

Balch, J.K., B.A. Bradley, C.M. D'Antonio and J. Gomez-Dans. 2013. Introduced annual grass increases regional fire activity across the arid western USA (1980-2009). *Global Change Biology* 19:173-183.

Baruch-Mordo, S., J.S. Evans, J.P. Severson, D.E. Naugle, J.D. Maestas, J.M. Kiesecker, M.J. Falkowski, C.A. Hagen and K.P. Reese. 2013. Saving sage-grouse from the trees: A proactive solution to reducing a key threat to a candidate species. *Biological Conservation* 167:233-241.

Batchelor, J.L., W.J. Ripple, T.M. Wilson, and L.E. Painter. 2015. Restoration of Riparian Areas Following the Removal of Cattle in the Northwestern Great Basin. *Environmental Management* 55:930-942.

Blair, C.L. and F. Shitoskey, Jr. 1982. Breeding Biology and Diet of the Ferruginous Hawk in South Dakota. *The Wilson Bulletin* 94:46-54.

Bradley, P. V., M. J. O'Farrell, J. A. Williams, and J. E. Newmark. Editors. 2006. The Revised Nevada Bat Conservation Plan. Nevada Bat Working Group. Reno, Nevada.

Buehler. D.A. 2000. Bald Eagle (*Haliaeetus leucocephalus*). *In* The Birds of North America, No. 506 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia.

Bull, E.L. and J.H. Hohmann. 1994. Breeding biology of northern goshawks in northeastern Oregon. *Studies in Avian Biology* 16:103-105.

Bureau of Land Management (BLM). 1985. Wells Resource Management Plan and Environmental Impact Statement. US Department of the Interior, Bureau of Land Management. Elko District Office, Elko, NV.

_____. 2015. Nevada and Northeastern California Approved Resource Management Plan Amendment, US Dept. of the Interior, Bureau of Land Management, Washington DC.

Chambers, J.C., B.A. Roundy, R.R. Blank, S.E. Meyer, and A. Whittaker. 2007. What makes Great Basin sagebrush ecosystems invasible by *Bromus tectorum*? *Ecological Monographs* 77:117-145.

_____, D.A. Pyke, J.D. Maestas, M. Pellant, C.S. Boyd, S.B. Campbell, S. Espinosa, D.W. Havlina, K.E. Mayer, and A. Wuenschel. 2014. Using resistance and resilience concepts to reduce impacts of invasive annual grasses and altered fire regimes on the sagebrush ecosystem and greater sage-grouse: A strategic multi-scale approach. Gen. Tech. Rep. RMRS-GTR-326. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 73 p.

Copeland, H.E., H. Sawyer, K.L. Monteith, D.E. Naugle, A. Pocewicz, N. Graf and M.J. Kaufman. 2014. Conserving migratory mule deer through the umbrella of sage-grouse. *Ecosphere* 5:1-16.

Daubenmire, R. 1970. Steppe vegetation of Washington. Washington Agricultural Experiment Station Technical Bulletin 62.

D'Antonio C.M., and P.M. Vitousek. 1992. Biological invasions by exotic grasses, the grass/fire cycle, and global change. *Annual Review of Ecology and Systematics* 23:63-87.

_____, C.M. and M. Thomsen. 2004. Ecological Resistance in Theory and Practice. *Weed Technology* 18:1572-1577.

Daw, S.K. and S. DeStefano. 2001. Forest Characteristics of Northern Goshawk Nest Stands and Post-Fledging Areas in Oregon. *The Journal of Wildlife Management* 65:59-65.

Dickard, M., M. Gonzales, W. Elmore, S. Leonard, D. Smith, S. Smith, J. Staats, P. Summers, D. Weixelman, and S. Wyman. 2015. Riparian area management: Proper functioning condition assessment for lotic areas (Technical Report No. 1737-15 v.2). Denver, CO, USA: US Department of the Interior, Bureau of Land Management.

Dobkin, D.S., A.C. Rich, and W.H. Pyle. Habitat and Avifaunal Recovery from Livestock Grazing in a Riparian Meadow System of the Northwestern Great Basin. *Conservation Biology* 12:209-221.

Fitch, H.S., F. Swenson, and D.F. Tillotson. 1946. Behavior and Food Habits of the Red-Tailed Hawk. *The Condor* 48:205-237.

Floyd, T., C.S. Elphick, G.Chisholm, K. Mack, R.G. Elston, E.M. Ammon, and J.D. Boone. 2007. Atlas of the Breeding Birds of Nevada. University of Nevada Press, Reno, NV. 581 pp.

Folke C., S. Carpenter, B. Walker, M. Scheffer, T. Elmqvist, L. Gunderson and C.S. Holling. 2004. Regime shifts, resilience, and biodiversity in ecosystem management. *Annual Review of Ecology, Evolution, and Systematics* 35:557-581.

Freeman E.D., T.R. Sharp, R.T. Larsen, R.N. Knight, S.J. Slater and B.R. McMillan. 2014. Negative Effects of an Exotic Grass Invasion on Small-Mammal Communities. PLoS ONE 9(9): e108843. doi:10.1371/journal.pone.0108843

Garton, E.O., J.W. Connelly, J.S. Horne, C.A. Hagen, A. Moser, and M. Schroeder. 2011. Greater sage-grouse population dynamics and probability of persistence. Pp. 293-382 *in* S.T. Knick and J.W. Connelly (eds). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38). University of California Press, Berkeley, CA.

Hanser, S.E. and S.T. Knick. 2011. Greater Sage- Grouse as an umbrella species for shrubland passerine birds: a multiscale assessment. *In* Greater Sage-Grouse: Ecology and conservation of a landscape species and its habitats, edited by S.T. Knick and J.W. Connelly, 475-488. Studies in Avian Biology, vol. 38. University of California Press, Berkeley, CA.

Hargis, C.D., C. McCarthy, and R.D. Perloff. 1994. Home ranges and habitats of northern goshawks in eastern California. *Studies in Avian Biology* 16:66-74.

Herron, G.B., C.A. Mortimore, and M.S. Rawlings. 1985. Nevada raptors: their biology and management. Nevada Department of Wildlife. Biological Bulletin No. 8. Reno. 121pp.

Holling C.S. 1973. Resilience and stability in ecological systems. *Annual Review of Ecology and Systematics* 4:1-23.

Kelrick, M.I., J.A. MacMahon, R.R. Parmenter, and D.V. Sisson. 1986. Native Seed Preferences of Shrub-Steppe Rodents, Birds and Ants: The Relationships of Seed Attributes and Seed Use. *Oecologia* 68:327-337.

Knapp, P.A. and P.T. Soulé. 1996. Vegetation change and the role of atmospheric CO2 enrichment on a relict site in central Oregon: 1960-1994. *Annals of the Association of American Geographers* 86:387-411.

Larrucea, E.S. and P.F. Brussard. 2008. Habitat selection and current distribution of the pygmy rabbit in Nevada and California, USA. *Journal of Mammalogy* 89:691-699.

Lesica, P. and J. Shelly. 1992. Effects of cryptogamic soil crust on the population dynamics of *Arabis fecunda* (Brassicaceae). *American Midland Naturalist* 128: 53-60.

Mancuso, M., and R.K. Moseley. 1991. Report on the Conservation Status of *Astragalus anserinus*, in Idaho and Utah. Idaho Conservation Data Center, Boise, ID. 32 p. + appendices.

Miller, R.F., T.J. Svejcar and J.A. Rose. 2000. Impacts of western juniper on plant community composition and structure. *Journal of Range Management* 53:574–585.

Millsap, B.A., G.S. Zimmerman, J.R. Sauer, R.M. Nielson, M. Otto, E. Bjerre, and R. Murphy. 2013. Golden eagle population trends in the western United States: 1968-2010. The Journal of Wildlife Management 77:1436-1448.

NatureServe. 2019. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed: February 27, 2020).

Nevada Department of Wildlife (NDOW). 2013. Nevada Wildlife Action Plan pygmy rabbit. http://www.ndow.org/uploadedFiles/ndoworg/Content/Nevada_Wildlife/Conservation/2013-NV-WAP-Mammals.pdf

_____ (NDOW). 2019. 2018-2019 Big Game Status Book. Nevada Department of Wildlife, Reno. 203pp.

Ostoja, S.M. and E.W. Schupp. 2009. Conversion of sagebrush shrublands to exotic annual grasslands negatively impacts small mammal communities. *Diversity and Distributions* 15:863-870.

Pellant, M.P., D. Shaver, A. Pyke, and J.E. Herrick. 2000. *Interpreting indicators of rangeland health, ver. 3,* Tech. Reference 1734-6, USDI, BLM, Nat. Sci. and Tech. Center, Denver, Colo.

Pierson, F.B., C.J. Williams, P.R. Kormos, S.P. Hardegree, P.E. Clark and B.M. Rau. 2010. Hydrologic Vulnerability of Sagebrush Steppe Following Pinyon and Juniper Encroachment. *Rangeland Ecology and Management* 63:614-629.

Prichard, D., F. Berg, J. Anderson, C. Correll, J. Fogg, K. Gebhardt, R. Krapf, S. Leonard, B. Mitchell, and J. Staats. 1998. Riparian Area Management- A User Guide to Assessing Proper functioning Condition and the Supporting Science for Lotic Areas. Technical Reference 1737-15.

Prichard, D., F. Berg, W. Hagenbuck, *R. krapf. R. Leinard, S. Leonard, M. Manning, C. Noble, and J, Staats.* 2003. Riparian Area Management- A User Guide to Assessing Proper functioning Condition and the Supporting Science for Lentic Areas. Technical Reference 1737-16.

Pyke, D.A., S.T. Knick, J.C. Chambers, M. Pellant, R.F. Miller, J.L. Beck, P.S. Doescher, E.W. Schupp, B.A. Roundy, M. Brunson and J.D. McIver. 2015. Restoration handbook for sagebrush steppe ecosystems with emphasis on greater sage-grouse habitat - Part 2. Landscape level restoration decisions: U.S. Geological Survey Circular 1418, http://dx.doi.org/10.3133/cir1418.

Reisner, M.D., J.B. Grace, D.A. Pyke and P.S. Doescher. 2013. Conditions favouring *Bromus tectorum* dominance of endangered sagebrush steppe ecosystems. *Journal of Applied Ecology* 50:1039-1049.

Reynolds, R.T., E.C. Meslow, and H.M. Wight. 1982. Nesting habitat of coexisting Accipiter in Oregon. *The Journal of Wildlife Management* 46:124-138.

Rich, T.D. 2002. Using Breeding Land Birds in the Assessment of Western Riparian Systems. *Wildlife Society Bulletin* 30:1128-1139.

Rigge, M., A. Smart, B. Wylie. 2013. Optimal Placement of Off-Stream Water Sources for Ephemeral Stream Recovery. *Rangeland Ecology and Management* 66: 479-486.

Rowland, M.M., M.J. Wisdom, L.H. Suring, and C.W. Meinke. 2006. Greater Sage-Grouse as an umbrella species for sagebrush-associated vertebrates. *Biological Conservation* 129:323-335.

Saab, V.A., C.E, Bock, T.D. Rich, and D.S. Dobkin. 1995. Livestock grazing effects in western North America. Pgs 311-353 *in* T.E. Martin and D.M. Finch, eds, Ecology and management of Neotropical migratory birds. Oxford University Press, New York.

Sauer, J.R., J.E. Hines, and J. Fallon. 2008. The North American Breeding Bird Survey, Results and Analysis 1966 - 2007. Version 5.15.2008. USGS Patuxent Wildlife Research Center, Laurel, MD.

Siders, M.S and P.L. Kennedy. 1994. Nesting habitat of *Accipiter* hawks: is body size a consistent predictor of nest habitat characteristics? *Studies in Avian Biology* 16:92-96.

Shahriary, E., M.W. Palmer, D.J. Tongway, H. Azarnivand, M. Jafari, M. Mohseni Saravi. 2012. Plant species composition and soil characteristics around Iranian piospheres. *Journal of Arid Environments* 82: 106-114.

Smith, F.J. 2007. Survey for *Astragalus anserinus* in Nevada. Report submitted to U.S. Fish and Wildlife Service Snake River Field Office, Boise, Idaho. 18 pp. + appendices and maps.

Squires, J.R. and L.F. Ruggiero. 1996. Nest-site preference of Northern Goshawks in Southcentral Wyoming. *The Journal of Wildlife Management* 60:170-177.

Stringham, T. K. 2009. Final Report for Agreement No. 68-0436-8-040, USDA Ecological Site Description, MLRA D23 and D24.

_____, W. Krueger, and P. Shaver. 2003. State and transition modeling: An ecological process approach. *Journal of Range Management* 56: 106-113.

_____, P. Novak-Echenique, P. Blackburn, E. Freese, T. Champa, J. Fisher, A. Moody, L. Wiseley, E. Hourihan, G. Back, G. Brackley, H. Garcia, J. Swanson and S. Swanson. 2011a. MLRA 25 State and Transition Model Workshop Summary.

_____, P. Novak-Echenique, E. Freese, L. Wiseley and P. L. Shaver. 2011b. State and Transition Models and Disturbance Response Groups for MLRA 24. Nevada Section Society for Range Management Winter Meeting – Ecological Site Descriptions for Major Land Resource Area 24. Winnemucca, NV

_____, P. Novak-Echenique, P. Blackburn, C. Coombs, D. Snyder, and A. Wartgow. 2015. Final Report for USDA Ecological Site Description State-and-Transition Models, Major Land Resource Area 28A and 28B Nevada. University of Nevada Reno, Nevada Agricultural Experiment Station Research Report 2015-01.

Stiver, S.J., E.T. Rinkes, D.E. Naugle, P.D. Makela, D.A. Nance, and J.W. Karl, eds. 2015. Sage-Grouse Habitat Assessment Framework: A Multiscale Assessment Tool. Technical Reference 6710-1. Bureau of Land Management and Western Association of Fish and Wildlife Agencies, Denver, CO.

Tausch, R.J., and N.E. West. 1995. Plant species composition patterns with differences in tree dominance on a southwestern Utah piñon-juniper site. Pages 16–23. *In* D.W. Shaw, E.F. Aldon, and C. LoSapio (technical coordinators). Proceedings: Desired future conditions for piñon-juniper ecosystems. USDA Forest Service, General Technical Report RM-258.

Thomas, J.W., C. Maser, and J.E. Rodiek. 1979. Wildlife habitats in management rangelands: the Great Basin of southeastern Oregon. US Department of Agriculture, Forest Service, General Technical Report GTR-PNW-80.

U.S. Fish and Wildlife Service. 2013. Greater Sage-grouse (*Centrocercus urophasianus*) Conservation Objectives: Final Report. U.S. Fish and Wildlife Service, Denver, CO. February 2013.

_____. 2015. Conservation and Agreement Strategy for Goose Creek Milkvetch (*Astragalus anserinus*). Utah Ecological Services Field Office, Utah.

Western Association of Fish and Wildlife Agencies. 2019. Western monarch butterfly conservation plan, 2019-2069. Version 1.0.

Warkentin, I.G., and M.J. Reed. 1999. Effects of habitat type and degradation on avian species richness in Great Basin riparian habitats. *Great Basin Naturalist* 59:205-212.

Weltz, M.A., K. Spaeth, M.H. Taylor, K. Rollins, F. Pierson, L. Jolley, M. Nearing, D. Goodrich, M. Hernandez, S.K. Nouwakpo and C. Rossi. 2014. Cheatgrass invasion and woody species encroachment in the Great Basin: Benefits of conservation. *Journal of Soil and Water Conservation* 69:39A-44A.

Whisenant, S.G. 1999. *Repairing damaged wildlands: A process-oriented, landscape-scale approach*. Cambridge Univ. Press. 312 pp.

Wildlife Action Plan Team. 2012. Nevada Wildlife Action Plan. Nevada Department of Wildlife, Reno.

Xerces Society (Xerces). 2018. Managing monarchs for the West: best management practices for conserving the monarch butterfly and its habitat. Xerces Society for Invertebrate Conservation, Portland, Oregon, USA.

Young, James, and B. Abbot Sparks. 2002. *Cattle in the Cold Desert*. First published by Utah State University in 1985, revised and reprinted by University of Nevada Press in 2002.

Younk, J.V. and M.J. Bechard. 1994. Breeding ecology of the northern goshawk in high-elevation aspen forests of northern Nevada. *Studies in Avian Biology* 16:119-121.