BLM

U.S. Department of the Interior

Bureau of Land Management

Rangeland Health Assessment and Evaluation Report

Paine Livestock LLC Grazing Permit Renewal

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List of Acronyms/Abbreviations

Acronym or Abbreviation	Full Phrase
17 Indicators	17 Indicators of Rangeland Health
AIM	Assessment, Inventory, and Monitoring
AMP	Allotment Management Plan
AML	Appropriate Management Level
AUM	Animal Unit Month
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BHCA	Bird Habitat Conservation Area
BLM	Bureau of Land Management
BSSG	Bi-State Sage Grouse
"C"	Custodial
CCDO	Carson City District Office
CFR	Code of Federal Regulations
CWA	Clean Water Act
DD	Determination Document
DIRH	Describing Indicators of Rangeland Health
DRG	Disturbance Response Group
EA	Environmental Assessment
EC	Electrical Conductivity
EIS	Environmental Impact Statement
ER	Evaluation Report
ESA	Endangered Species Act
ESD	Ecological Site Description
ET	Extreme to Total (Departure)
FAC	Facultative
FACU	Facultative Upland
FACW	Facultative Wetland
FAR	Functioning at Risk
FMUD	Final Multiple Use Decision
FONSI	Finding of No Significant Impact
GBBO	Great Basin Bird Observatory
HAF	Habitat Assessment Framework
HMA	Herd Management Area
HWAD	Hawthorne Army Depot
"I"	Improve
IDT	Interdisciplinary Team
IIRH	Interpreting Indicators of Rangeland Health
IMCDS	Intermountain Cold Desert Shrub
KMA	Key Management Area
KSM	Key Species Method
LLC	Limited Liability Company
LMWC	Lower Montane Woodlands and Chaparral
LPI	Line Point Intercept

Acronym or Abbreviation	Full Phrase
LUPA	Land Use Plan Amendment
M	Moderate (Departure)
“M”	Maintain
MBTA	Migratory Bird Treaty Act
ME	Moderate to Extreme (Departure)
MIC	Maintain, Improve, Custodial
NAC	Nevada Administrative Code
NDEP	Nevada Department of Environmental Protection
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NF	Non-Functioning
NRCS	National Resource Conservation Service
NRI	Natural Resources Inventory
NS	None to Slight (Departure)
OBL	Obligate
PFC	Proper Functioning Condition
RAC	Resource Advisory Council
RHA	Rangeland Health Assessment
RMP	Resource Management Plan
ROD	Record of Decision
RPS	Rangeland Program Summary
SFO	Stillwater Field Office
SFFO	Sierra Front Field Office
SM	Slight to Moderate (Departure)
SMU	Soil Map Unit
SSS	Special Status Species
TDS	Total Dissolved Solids
TRS	Township, Range, Section
UPL	Upland
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WAP	Wildlife Action Plan
WBC	Walker Basin Conservancy
WRI	Water Resources Inventory

1.0 Introduction

1.1 Purpose

This document provides an assessment and evaluation of the River, East Walker, Lucky Boy and Nine Mile allotments in accordance with the Bureau of Land Management (BLM) policy. The BLM 43 CFR 4180.1 Rangeland Health Standards establish a process in which rangeland health is documented and evaluated. This process consists of a rangeland health assessment (RHA), an evaluation report (ER), and a determination document (DD) as discussed below.

Rangeland Health Assessment (RHA) - The first step in the process, the RHA is the compilation and summarization of all available data and information to compare the current resource conditions within a specified geographic area to the applicable Nevada rangeland health standards and resource management plan (RMP) objectives. The RHA evaluates the status of resource conditions but does not state conclusions as to whether or not the standards are determined as met or not met.

Evaluation Report (ER) - The ER is the analysis and interpretation of the assessed data in the RHA to the applicable Nevada rangeland health standards as required by the BLM (BLM, 1997a). This document contains the rationale for whether or not the standards are determined as "met," and identifies desired resource conditions. When the standards are determined as "not met," the ER also discloses if trends in resource conditions indicate that significant progress toward meeting the standards is occurring.

Determination Document (DD) - A DD is required when the ER, based on rangeland health standards are determined as "not met," and identifies the causal and/or contributing factors that led to not meeting the standards. Ideally, the DD is completed prior to or in conjunction with, the completion of a National Environmental Policy Act (NEPA) document. This ensures the development of adequate alternatives to address the causal and/or contributing factors for not meeting the standards and the timely implementation of the corrective management actions.

This specific document serves as the RHA and ER for the four allotments in the Paine Livestock Grazing Term Permit Renewal. Shortly after this document is finalized, and as applicable, the BLM will also complete the DD for these allotments, prior to the completion of the NEPA phase of this grazing permit renewal process.

2.0 Standards and Evaluation Methods

2.1 RAC Standards

Standards for rangeland health and guidelines for management of livestock are the result of the Bureau's grazing administration regulations (43 CFR 4100), which became effective August 21, 1995. In 1997, in accordance with 43 CFR 4180.2(b), the Nevada BLM adopted rangeland health standards and guidelines for livestock grazing management, which were developed in coordination

with the states resource advisory council (RAC). In 2006, BLM promulgated new grazing regulations. 71 Fed. Reg. 39,402 (July 12, 2006). Following a legal challenge, the 2006 regulations were permanently enjoined. *Western Watersheds Project v. Kraayenbrink,* 632 F.3d 472 (9th Cir. 2011) (affirming the District Court's permanent injunction). As a result, the 1995 grazing regulations remain the operative regulations.

The purpose of developing standards and guidelines is to provide the BLM with the basis for determining whether current management is meeting the Fundamentals of Rangeland Health as described under 43 CFR 4180.1. Standards and guidelines provide specific measures of rangeland health and identify acceptable or best management practices. The River, East Walker, Lucky Boy and Nine Mile allotments fall within the Sierra Front-Northwestern Great Basin Area. The approved standards for the Sierra Front-Northwestern Great Basin Area RAC, and their associated indicators for rangeland health, which are the basis for this assessment, are as follows:

Standard 1. Soils: Soil processes will be appropriate to soil types, climate and landform.

- Surface litter appropriate to the potential of the site
- Soil crusting formations in shrub interspaces, and soil compaction are minimal or not in evidence, allowing for appropriate infiltration of water
- Hydrologic cycle, nutrient cycle and energy flow are adequate for the vegetative communities
- Plant communities are diverse and vigorous, and there is evidence of recruitment

Standard 2. Riparian/Wetlands: Riparian/wetland systems are in properly functioning condition.

- Sinuosity, width/depth ration and gradient are adequate to dissipate streamflow without excessive erosion.
- Riparian vegetation is adequate to dissipate high flow energy and protect banks from excessive erosion.
- Plant species diversity is appropriate to riparian-wetland systems

Standard 3. Water Quality: Water quality criteria in Nevada or California[1] State Law shall be achieved or maintained.

- Chemical constituents do not exceed the water quality standards
- Physical constituents do not exceed the water quality standards
- Biological constituents do not exceed the water quality standards
- The water quality of all water bodies, including ground water located on or influenced by BLM lands will meet or exceed the applicable Nevada or California water quality standards. Water quality standards for surface and ground waters include the designated

[1]Allotments, or portions thereof, that fall within California but are managed by Nevada BLM would be subject to California State Law. As the allotments are located entirely within Nevada, California law does not apply here.

beneficial uses, numeric criteria, narrative criteria, and anti-degradation requirements set forth under state law and as found in section 303(c) of the Clean Water Act (CWA).

Standard 4. Plant and Animal Habitat: Populations and communities of native plant species and habitats for native animal species are healthy, productive and diverse.

- Good representation of life forms and number of species
- Good diversity of height, size and distribution of plants
- Number of wood stocks, seed stocks, and seed production adequate for stand maintenance
- Vegetative mosaic, vegetative corridors for wildlife, and minimal habitat fragmentation

Standard 5. Special Status Species Habitat: Habitat conditions meet the life cycle requirements of special status species.

- Habitat areas are large enough to support viable populations of special status species
- Special status plant and animal numbers and ages appear to ensure stable populations
- Good diversity of height, size and distribution of plants
- Number of wood stocks, seed stocks, and seed production adequate for stand maintenance
- Vegetative mosaic, vegetative corridors for wildlife, and minimal habitat fragmentation

2.2 Assessment and Evaluation Methods Criteria

The BLM interdisciplinary team (IDT) used a variety of data sources collected between 2000-2020 to assess resource conditions pertaining to the RAC standards listed above. The IDT consisted of a Rangeland Management Specialist, Range Technicians, a Wild Horse and Burro Specialist, a Biological Technician, a Wildlife Biologist, a Hydrologist and a Botanist. The following quantitative and qualitative methods of assessment contributed to the assessment and evaluation: (1) Assessment, Inventory and Monitoring (AIM), (2) Landscape Monitoring Framework (LMF), (3) Frequency and Photo Trend, (4) Interpreting Indicators of Rangeland Health (IIRH), (5) Proper Functioning Condition assessments (PFC), (6) Water Resources Inventory (WRI) and (7) Utilization and Use Pattern Mapping (Appendix A, maps 1-4). Data were collected by the IDT, contracted field crews, and United States Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS) crews.

2.2.1 Data Sources and Methodology

Assessment, Inventory, and Monitoring (AIM)

To collect quantitative data, the BLM utilized the Assessment, Inventory, and Monitoring (AIM) terrestrial standard approach. This protocol adheres to a set of standardized core methods, and a statistically valid sample design to provide defensible ecological data (Herrick et al. 2017). The core methods produce indicators essential in describing ecosystem attributes as they relate to function. These attributes include soil and site stability, hydrologic function, and biotic integrity (MacKinnon et al. 2011). The quantitative measurements used in this protocol to derive indicators include line point intercept (LPI), vegetation height, gap intercept, soil stability, and species inventory. AIM field crews collected data across the four allotments. To supplement these data

sets, crews also conducted the Interpreting Indicators of Rangeland Health (IIRH) qualitative assessment at each AIM plot.

Landscape Monitoring Framework (LMF)

The LMF protocol was developed by the USDA-NRCS as part of the Natural Resources Inventory Grazing Land On-Site Study. The same set of core methods as the AIM protocol are collected at each sample point, however, the transect lines are twice as long also increasing plot size. Two data points from 2016 collected by the LMF field crews were used in the sage grouse habitat assessment for this evaluation.

Frequency and Photo Trend Plots

Frequency sampling provides a quantitative measure of the presence or absence of individual plants of a species within quadrats along a designated transect line. The collection of these data at various points in time allows for trend evaluation within vegetation communities. The definition of Frequency in this method is "the percentage of occurrence of a species in a series of samples of uniform size taken at the same location over time." Frequency data collected adheres to the protocol described in the 1984 Nevada Rangeland Monitoring Handbook.

Frequency transects at Key Management Areas (KMAs) are comprised of 100- or 50-foot base lines, that have 10 or 20 belt transects respectively, positioned perpendicular to the base line at predetermined locations. Each belt transect consists of contiguously placed nested quadrats. The nesting frames used are determined based on plant size and abundance and adjusted in order to calculate changes in the plant community over time.

In 2018, BLM personnel revisited all the established frequency plots on these four allotments. Seven frequency plots were found and were still in existence on BLM managed lands, with data recorded in accordance with the frequency transect protocol. This data informs the BLM of the vegetative trend at those locations, thereby assisting with the RAC standards evaluation.

Photo plots are a type of trend monitoring that uses photographs of permanently marked frames to record the trend of vegetation, litter, and soil surface characteristics over time (BLM 1999a). Photo plots within these four allotments consist of either three- or five-foot square frames. They are both a quantitative measure of vegetation at small scales, as well as qualitative when viewed as part of landscape changes. Within the plot area, the data aids in evaluating exotic or weedy species changes in abundance and more beneficial successional changes such as increased perennial grass vigor and abundance.

In 2018, BLM personnel revisited all established photo point sites on these four allotments. Five photo plots were located that were still in existence on BLM managed lands. The BLM collected data in accordance with the photo point protocol. This data aids in determining the trend of the vegetation community, which then assists the BLM in addressing RAC standards.

Interpreting Indicators of Rangeland Health

IIRH is a qualitative and standardized method to assess 17 Indicators of Rangeland Health version 5 (Pellant et al. 2005). In this method, data collectors evaluate indicators against a reference community of similar ecological potential using an ecological site description (ESD) reference sheet. These reference communities are areas with the same characteristics as the assessed site and categorized, according to the NRCS, as being in the same ecological site. Ecological sites share the same ecological potential and response to disturbances. These comparisons, when conducted according to IIRH, determine the extent to which the three primary ecosystem attributes (soil and site stability, hydrologic function, and biotic integrity) have departed from reference.

The sites in which the Stillwater Field Office (SFO) IDT completed IIRH assessments were randomly selected using the Shiny Spatially Balanced Sampling Tool through The Landscape Toolbox Website. Six sites were visited by an IDT from the BLM in 2019. This IDT consisted of a Rangeland Management Specialist and a Range Technician. The Rangeland Management Specialist served two of the three needed journeymen level backgrounds in vegetation and hydrology. The range technician served the role of soil expert due to his extensive prior work experience in a university soil lab and as a crew lead for BLM's AIM program. These sites were revisited by contracted AIM crews to better reflect seasonality in identifying plants occurring in Sage Grouse habitat in 2020 for evaluating BSSG habitat. This contracted data was ultimately the data used for IIRH assessments by the SFO IDT. In this process the Describing Indicators of Rangeland Health (DIRH) attributes were analyzed and informed an IIRH assessment used in this document.

This sampling design using the previously mentioned landscape toolbox, creates a digitally stratified and spatially balanced sample design. The monitoring sites were stratified based on disturbance response groups (DRG) within the allotment. DRGs are groups of ecological sites that respond similarly to natural or human-induced disturbance with varying rates of responses, but with the same endpoint (Stringham et al. 2016). By allotment, the design sampled the DRGs containing the highest acreage, assigning monitoring locations aimed at best representing the entire allotment. The largest DRGs received more respective monitoring points; some of the smallest DRGs are unlikely to be sampled unless outside entities happened to provide that data, as the goal is to represent the allotment using a finite number of monitoring locations. Using this method, the BLM determined that sampling would occur on nine DRGs. When combining frequency and photo points, the total number of DRGs sampled increased from nine to ten. This point selection process includes oversampling and rejection criteria based on slope and total distance from a road. A summary of these sites is located in Appendix B.

Monitoring teams used a preponderance of evidence approach to select the appropriate departure for each attribute in IIRH. Departure ratings include none to slight (NS), slight to moderate (SM), moderate (M), and moderate to extreme (ME), and extreme to total (ET). Monitoring teams assign ratings based on a variety of factors and not solely based on the majority of indicators for each attribute. These ratings included a weighted indicator if the team determined an indicator was particularly important for the site (Pellant et al. 2005).

Proper Functioning Conditioning

Riparian and wetland areas are complex and dynamic ecosystems that incorporate biological, physical, and chemical processes. The PFC Assessment Protocol refers to a consistent qualitative approach to assess the functional condition of hydrologic, vegetative and geomorphic attributes of riparian and wetland areas; as well as used to understand how well the physical processes are functioning, and to evaluate if a site still exhibits riparian or wetland characteristics.

The PFC Assessment for Lotic Areas (Technical Reference 1737-15) is the primary method used for assessing riparian conditions (Dickard et al. 2015). A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lentic Areas (Technical Reference 1737-16) is the primary method used for evaluating wetland conditions (Prichard et al. 2003).

Within the allotments, 18 lentic or lotic Proper Functioning Conditioning (PFCs) were completed from 2018 to 2020 (BLM, 2003a). The PFC Assessment Protocol refers to a consistent qualitative approach to assess the functional condition of hydrologic, vegetative, and geomorphic attributes of riparian areas. Proper Functioning Condition Assessment for Lotic Areas (Technical Reference 1737-15) is the primary method used for assessing riparian conditions (Dickard et al. 2015). A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lentic Areas (Technical Reference 1737-16) is the primary method used for evaluating wetland conditions (Prichard et al. 2003). In a PFC evaluation, an interdisciplinary team assesses a riparian area to its potential, defined as "the highest ecological status attainable in the present climate" (Dickard et al. 2015). PFC assessments evaluate 17 lotic or 20 lentic attributes and processes of a riparian or wetland system. For sites where the monitoring team determines altered site potential, by human activity or natural events, the team assesses the site against this altered potential. Examples of altered potential are road capture of streambed flow and excessive erosion events resulting in channel incision and changes in streambed morphology. Based on the responses and comments on the assessment form, an IDT places the stream reach in one of three rating categories:

Proper functioning condition (PFC): A lotic or lentic riparian area is PFC, or "functioning properly," when adequate vegetation, landform, or woody material is present to–

- Dissipate energy, thereby reducing erosion and improving water quality; and
- Capture/filter sediment and aid floodplain development; and
- Improve floodwater retention and groundwater recharge; and
- Develop root masses that stabilize streambanks and shoreline features against erosion; and
- Restrict water percolation; and
- Maintain channel and wetland characteristics.

A riparian or wetland area in PFC will, in turn, provide associated values such as wildlife habitat or recreation opportunities.

Functional–at-risk (FAR): These riparian or wetland areas are in limited functioning condition;

however, existing hydrologic, vegetative, or geomorphic attributes make them susceptible to impairment. An apparent trend (upward, downward, or not apparent) is applied to FAR ratings based on field observations.

Nonfunctional (NF): These riparian or wetland areas clearly are not providing adequate vegetation, landform, or woody material to dissipate stream energy associated with moderately high flows, and thus are not reducing erosion, improving water quality, etc.

Evaluating the potential of a riparian or wetland area, and completing a PFC assessment, can also provide an opportunity to determine the capability of a site to recover; recovery potential is dependent upon addressing whether or not the hydrologic, vegetative and geomorphic attributes are functioning, and if riparian or wetland characteristics exist. For areas that are not functioning properly (rated as FAR or NF), changes have to be made to allow for recovery of the riparian-wetland system. A change, such as increasing vegetation cover and diversity, results in changes that improve function, and allows for recovery and development of riparian and wetland characteristics. For recovery to be successful, the riparian-wetland system must have the right elements present to dissipate energy, which puts the physical process into working order and provides a foundation to sustain improved and desired functioning condition.

Aquatic (Lotic) AIM

Aquatic assessment, inventory, and monitoring (AIM) protocol using standardized core methods was used to quantitatively assess the condition of aquatic resources within the allotments. The aquatic core indicators applicable to wadeable perennial systems (i.e. lotic systems) relate to wetland and riparian function under four fundamental groups. These groups include water quality, watershed function and instream habitat quality, biodiversity and riparian habitat quality, and ecological processes. Aquatic core indicators used to assess riparian health standards include bank cover, bank stability, large woody debris, and floodplain connectivity and were analyzed against standardized benchmarks to determine if streams had a minor, moderate, or major departure from reference standards. Field methods to collect core and contingent data are outlined in the BLM Technical Reference 1735-2, AIM National Aquatic Monitoring Framework: Field Protocol for Wadeable Lotic Systems (BLM 2021) and additional information can be found in BLM Technical Reference 1735-1, Introducing the Framework and Indicators for Lotic Systems (BLM 2015). In 2015 and 2020, lotic AIM data was collected at two points along Baldwin Canyon Creek: Baldwin 1 and Baldwin 2.

Water Resource Inventory

Water Resources Inventory (WRI) documents various attributes of water resources on public lands and records site-specific information that can be utilized to assist in land management decisions. The attributes recorded include site location; condition; general observations and uses; field water quality data collection of pH, temperature, electrical conductivity (EC), total dissolved solids (TDS), salinity, appearance, and flow (discharge); and range improvement documentation, as applicable. Evaluation of WRI data can help identify baseline conditions and factors contributing to less than adequate hydrologic function, as well as assess field water quality conditions of lentic and lotic systems. In 2019 and 2020, WRI was completed on TV Canyon Creek, Rattlesnake

Spring (Exclosure), and Fletcher Spring (Exclosure) within the Lucky Boy, East Walker, and 9 Mile allotments, respectively.

Use Pattern Mapping and Utilization

Use pattern mapping is important in evaluating the effects of grazing and browsing by livestock, wild horses, and wildlife on the allotment. The BLM uses the Key Species Method (KSM) to collect utilization data, which is an ocular estimate of the remaining weight of a grazed key species in relation to the weight of the key species that are unavailable to grazing (BLM 1999a). Key species are plant species that indicate the general degree of forage use on a key area. Key species should be abundant on rangelands with satisfactory species composition and should be plentiful enough to provide an adequate seed source on areas with unsatisfactory species composition. In 2018, the BLM collected this data on the four allotments to create use pattern maps specific to each allotment. This data collection was specific to these allotments for purposes of evaluating grazing pressure. These maps are located in Appendix A, maps 13-15.

2.2.2 Data Assessment and Interpretation

The IDT assessed the resource conditions and evaluated whether they were meeting the RAC standards using the above mentioned qualitative and quantitative data sources. The team incorporated recommendations from policy, technical references, and best practices for using AIM and other data in grazing permit renewals to assess conditions on the range according to the RAC standards and associated indicators of the Sierra Front-Northwestern Great Basin Area. For each RAC standard, the IDT determined which data sources and associated AIM indicators mentioned above could be used to assess the past and current resource conditions. The team then evaluated whether RAC standards were met by following recommendations for evaluating the results of each protocol. This multiple lines of evidence approach provided the IDT with different perspectives of the ecological conditions for each standard.

Specifically, to evaluate AIM data, the team incorporated recommendations from policy, technical references, and best practices for using AIM data in grazing permit renewals (BLM 2001a). The advised approach for using these quantitative datasets to evaluate RAC standards is to establish benchmarks for each quantitative indicator evaluated (Kachergis 2020). The IDT set various benchmarks adapted from policy, technical references, peer-reviewed literature, ecological site concepts, and professional judgement to evaluate the quantitative indicators selected for the assessment (BLM 2001a). As with the IIRH assessment, in which an IDT determines the departure from reference based on ecological site descriptions (ESDs) reference worksheets, some of the AIM and data indicators were similarly evaluated. Ecological site concepts are a description of a specific unit or area within a landscape with similar soils, vegetation, and disturbance responses developed by the NRCS. These concepts and associated reference worksheets can be used to evaluate rangeland health standards for management and evaluation of land-use activities (Caudle et al. 2013). Refer to section 5.0 for detailed information on data sources, indicators, and benchmarks used to evaluate each RAC standard.

3.0 Environmental Resources

3.1 Analysis Setting

These four allotments lie on the boundary of the SFO and SFFO in the southwestern portion of the CCD. East Walker contains 32,520 BLM administered acres, Nine Mile contains 26,991 BLM administered acres, Lucky Boy contains 23,796 BLM administered acres and the River allotment contains 121 BLM administered acres. In total the four allotments contain 83,428 acres. 20 sensitive species are thought to occur on these four allotments including 11 bats, 4 plants, 3 mammals, one mollusk and one bird.

The East Walker Allotment varies from rugged mountainous terrain to low lying valleys with elevations ranging from a high of 8,625 ft. to a low of 4,849 ft. above sea level. The Nine Mile allotment shares a similar elevation profile with a high of 8,982 ft. and a low of 6,053 ft. The Lucky Boy allotment is the most mountainous of the four allotments with a high point of 10,524 ft. and a low of 6,551 ft. The River allotment shows the least variation with a high of 5,718 ft. and a low of 4,931 ft. Table one provides each allotment and pasture by acres of land ownership.

Table 1: Acres of land ownership by pasture and allotment

Allotment	Pasture	BLM Acres	Private Acres	Other Federal	State
River Allotment	Entire	120	0	0	0
East Walker Allotment	Entire	30,080	0	0	2,376
Nine Mile Allotment	Entire	26,880	0	0	0
Lucky Boy Allotment	Entire	19,565	4,039	40	200
Lucky Boy Allotment	Lapon Canyon (Lucky Boy)	2,648	0	40	0
Lucky Boy Allotment	Baldwin Canyon (Lucky Boy)	4,097	0	0	200
Lucky Boy Allotment	Big Indian Mountain (Lucky Boy)	1,773	179	0	0
Lucky Boy Allotment	Lucky Boy Pass Area (Lucky Boy)	3,333	6,801	0	0

Three of these allotments, East Walker, Lucky Boy and Nine Mile, contain 47,734 acres of designated Bi-State Greater Sage Grouse habitat. Additionally, the East Walker allotment contains 1,513 acres of designated horse management area (HMA) for wild horses belonging to the Wassuk HMA (Appendix A, map 12).

3.2 Climate

Climate data for the area was taken from the Climate Engine Application (Huntington et al. 2017). The Climate Engine Application uses a combination of remote sensing, and gridded weather and climate data to generate a variety of data, including precipitation and temperature across the United States. The Climate Engine Application can be used to extract precipitation data from the allotments using multiple data sources.

The East Walker, Lucky Boy, Nine Mile and River Allotments lie within and along the margins of the Wassuk mountain range, with portions extending westward to the east fork of the Walker River. Elevations vary in the four allotments from 10,542 ft. to 4,849 ft. The area is characterized by a variation of vegetation types due to a wide diversity of soils, topography, elevation and climate. The allotments are located within the Great Basin, which is a part of the arid basin and range province that occupies much of the western and southwestern part of the United States. The province has a varied topography consisting largely of numerous small, roughly parallel mountain ranges (trending north south) separated by nearly flat desert plains, or basins. The basins are generally 4,000 to 5,000 feet above sea level, and the mountain ranges rise 3,000 to 5,000 feet above the level of the basins. The climate of the Great Basin Desert is characterized by extremes: hot, dry summers and cold, snowy winters with temperatures ranging from over 90^{o}F during the day and 40^{o}F during the nights, on average.

The following graphs depict precipitation averages over the entire allotments that encompass the Paine LLC grazing permit and therefore represent combined elevation ranges and precipitation averages. It is important to note that precipitation increases with increasing elevation, where the majority of precipitation occurs in the mountains rather than the lower valley flats of the allotment. The higher elevations typically receive precipitation in the form of winter snowstorms while precipitation in the lower elevation may be dominated by summer convection storms. Therefore, annual precipitation and water year averages are likely to be higher in the high elevation mountains of the allotment, and lower in the low elevation valley flats. This is graphed in figure 1.

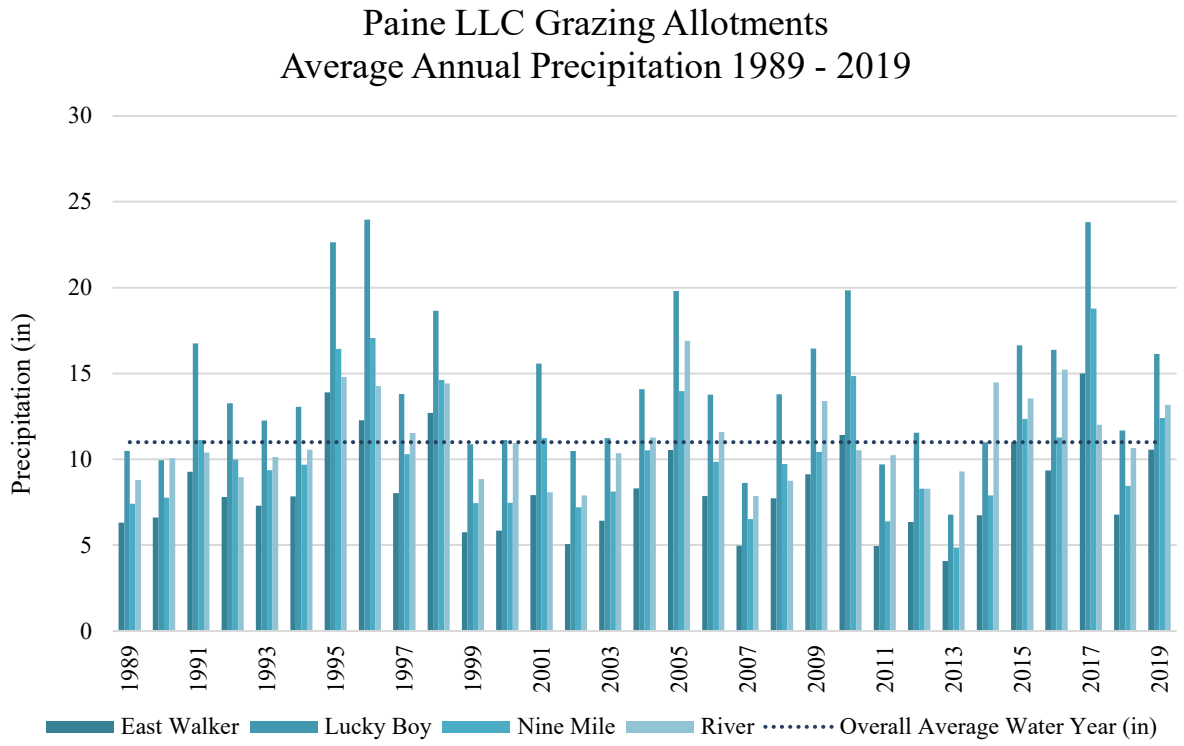
From 1989-2019, the average annual precipitation within the allotments ranged from approximately 8.3 to 14.3 inches, with the average water year yielding approximately 8.3 to 14.4 inches per year (shown in table 2) and were calculated using the Climate Engine Application.

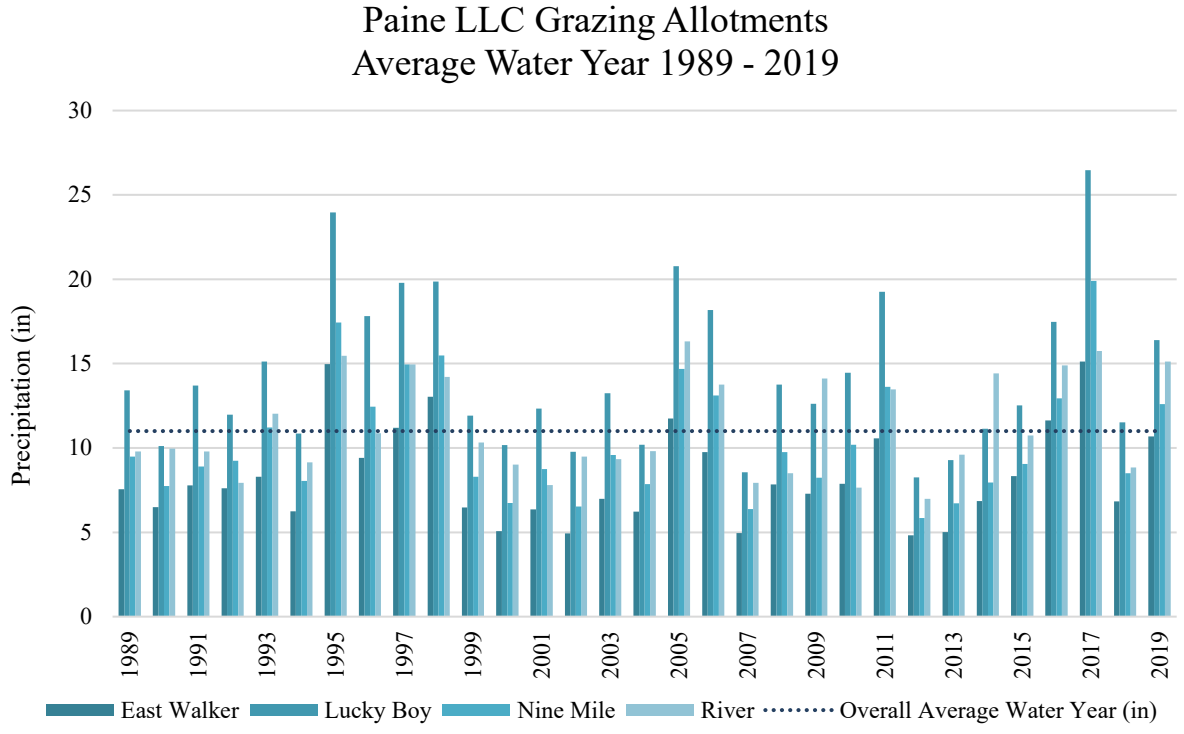
Table 2: Climate Engine application average annual (total) precipitation and average water year for the Paine LLC grazing permit allotments.

Allotments	Avg. Annual Precip. (in)	Avg. Water Year (in)
East Walker	8.3	8.3
Lucky Boy	14.3	14.4
Nine Mile	10.4	10.4
River	11.2	11.2

Annual precipitation values are calculated during a standard calendar year, from January 1 through December 31, while water year values are calculated during October 1 through September 30 starting the previous year. The average annual water year represents precipitation received starting in October of the prior year which would be stored and considered available water supply for the following growing season. For example, precipitation and snow accumulation from the fall and winter months of 2018 would provide available water (and is calculated for water surplus) for the growing season of the spring and summer months of 2019. The average annual water year can then be used to calculate water surplus (or available water) which is the difference between precipitation and potential evapotranspiration. Knowing the water year averages is important for understanding the potential amount of water available for vegetation during the following growing season, which can help to understand plant growth and response within the allotment (NDVI). As shown in figures 1a and 1b, annual precipitation and annual water year for the allotments as a group average approximately 11 inches although there were multiple years of above and below average precipitation.

Figure 1: Climate Engine Application (a) Average Annual (total) Precipitation Data and (b) Average Water Year for the Paine LLC grazing permit allotments.





3.3 General Description of Geology and Soils

Soil resources in the allotments occur predominantly on foothills, mountains, and piedmont slopes comprised of various parent material, with volcanic material being dominant. The NRCS Soil Survey of Mineral County Area, Nevada (NV774); Lyon County Nevada (NV625); and Hawthorne Ammunition Plant, Nevada, Part of Mineral County (NV799) provides details of soil map units occurring across the allotments. Soil map units are made up of one or more soil series correlated to a corresponding ecological site, for a given area. The majority of soils across the allotments are well drained. Soil surface textures are commonly sandy loams and loams, however there are a large range of textures represented throughout the allotments. Rock fragments in the soil profile range from gravelly to very stony. Soils are commonly moderately deep (50-100 cm) and deep (100-150 cm) to bedrock but range from very shallow to very deep (< 25 cm to >150-200 cm plus). Accumulations of silica, carbonates, or clay sometimes exist above the bedrock.

3.4 Riparian and Wetland Resources, and Water Quality

3.4.1 Riparian and Wetland Resources

Riparian and wetland areas are the transition zones between aquatic systems and adjacent uplands, reflecting vegetation and physical characteristics that indicate water availability at or near the ground surface. Healthy riparian and wetland areas provide many important resource values, such as enhancing water quality and availability, providing wildlife habitat, affording recreation opportunities, and others. These areas also attract livestock and wild horses due to water availability, higher forage production, and shade. The allotments contain a number of riparian and wetland resources (Appendix A, map 5).

Riparian areas, or lotic systems, are characterized by actively moving water and represent perennial and intermittent streams, but not ephemeral systems, within the allotments. The presence of lotic systems depends on adequate streamflow for significant periods of time. Generally, overland flow is a primary factor in channel formation, where downhill running water creates a channel capable of carrying water. Stream flow within these channels primarily originate as groundwater discharge through springs, seeps, or channel inflow, however rainfall and snowmelt runoff also have an influence. Snowmelt dominates spring runoff and is probably most responsible for channel forming processes since small, common flood flows associated with snowmelt carry the greatest amount of sediment over time. However, convective summer storms can cause significant rapid changes because they result in some of the most intensive, higher energy flows.

Wetland areas, or lentic systems, are characterized by relatively still water and by the presence of saturated soil for extended periods of time. Lentic systems require an inundation by water, either permanently throughout the year or on a seasonal basis; are affected by wind and wave, or overland flow energies, versus high flow events; and typically have a restrictive layer that limits water percolation to maintain the site (Prichard et al. 2003). The allotments include several lentic areas, mainly as perennial springs and seeps that result from the upwelling of groundwater. Springs and seeps, also referred to as discharge wetlands, result when the surface water (or

groundwater) level of a wetland is lower hydrologically than the water table of the surrounding land. Springs and seeps are often found at the base of steep slopes where the groundwater surface intersects the land surface. This type of wetland can be an isolated low point in the landscape; more often, it discharges excess water downstream as surface water or as groundwater (Mitsch and Gosselink 2015).

Not only are riparian and wetland systems characterized by their ability to maintain hydrologic characteristics (as described above), they are also characterized by their ability to support plant species that require saturated conditions throughout the year, or for part of the year. Plant communities in riparian and wetland areas are different from those in adjacent uplands and are a key factor in determining riparian and wetland functioning condition. The soils, hydrology, and species characteristics will affect the potential vegetative community of a site, so the appropriate vegetation at one site is not necessarily appropriate at another.

Plant species typically found in riparian areas and wetlands include obligate wetland plants (OBL), facultative wetland plants (FACW), and facultative plants (FAC) (Lichvar et al. 2012). Obligate wetland plants almost always occur in wetlands, and both herbaceous and woody species are typically found in standing water or seasonally saturated soil (14 or more consecutive days) near the surface. Facultative wetland plants usually occur in wetlands but may occur in non-wetlands; they predominantly occur with hydric soils and often in geomorphic settings where water saturates the soils or floods the soil surface at least seasonally. Facultative plants can occur in both wetlands and non-wetlands, with a wide tolerance of soil moisture conditions, from wet to drier. The occurrence of FAC in different habitats represent responses to a variety of environmental variables other than just hydrology, such as shade tolerance, soil pH, and elevation. Plant species that usually, or almost never, occur in wetlands, but are rather typically found in upland sites include facultative upland plants (FACU) or upland plants (UPL). Facultative upland plant species usually occur in non-wetlands, and predominately occur on drier sites where water rarely saturates the soils or floods the soil surface seasonally. Upland plants rarely occur in wetlands and typically occupy non-wetland habitats that almost never have standing water or saturated soils present.

3.4.2 Water Quality

To achieve the water quality goals of Standard 3 for the Sierra Front-Northwestern Great Basin Area, State of Nevada water quality standards must be achieved. Following mandates in the federal Clean Water Act (CWA), the Nevada Division of Environmental Protection (NDEP), and Bureau of Water Quality: (1) designates beneficial uses for waterbodies, (2) establishes water quality standards applying to all surface waters, and standards applying to specific beneficial uses and specific water bodies, (3) assesses the quality of the waters, and (4) determines whether water quality standards are being achieved and beneficial uses supported. State water quality standards are found in the Nevada Administrative Code (NAC) (NAC 445A); standards applicable to the allotments are discussed below in section 5.4.2. The NAC standards are applicable to all surface waters and beneficial uses in the allotments (NAC 445A.121 and NAC 445A.122). They outline general substances all surface waters of the State should be free from, including no substances that will settle to form sludge, bottom deposits, floating debris, or odor, as well as being free from high temperatures, suitable for the watering of livestock without treatment, and suitable as a habitat for aquatic life existing in a body of water.

The State compiles a list of waterbodies that do not meet water quality standards and do not support one or more beneficial uses. The list is commonly referred to as the "303(d) list" for the section of the CWA that mandates it. Also, in accordance with section 305(b) of the CWA, the State prepares an overall assessment of surface water quality and describes the extent to which current conditions provide for the protection of beneficial uses.

The State publishes the results of its efforts in a biennial report, the most recent of which is titled Nevada 2014 Water Quality Integrated Report (NDEP 2016). The most recent 2016 integrated report provides information regarding the condition of State water quality and provides the foundation for the assessment of water quality.

3.5 Vegetation

Tables 3 and 4 list, respectively, the most common plant species and dominant ecological sites with their dominant plant communities in the four allotments. The lower elevation plant community is mostly characterized by Indian ricegrass (*Oryzopsis hymenoides*); Galleta grass (*Pleuraphis jamesii*); Bailey's greasewood (*Sarcobatus baileyi*); and shadscale (*Atriplex confertifolia*). At mid elevations this plant community becomes dominated by big sagebrush (*Artemesia tridentada*), low sage (*Artemisia arbuscula*), Sandberg's bluegrass (*Poa secunda*), squirreltail (*Elymus elymoides*) and needle and thread grass (*Hesperostipa comata*), while Indian ricegrass remains frequent, some of the associated shrub species at this elevation are desert bitterbrush (*Purshia tridentata var. glandulosa*) and green ephedra (*Ephedra viridis*).

Moving up the elevation gradient, above this community, single-leaf pinyon (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*) start to shade out the understory. In more open stands of the pinyon-juniper the understory supports big sagebrush; low sage; desert bitterbrush and green ephedra. Moving above the Pinyon-Juniper zone we continue to have a community with high frequency of big sagebrush and low sage; desert snowberry (*Symphoricarpos longiflorus*) becomes a more frequent shrub species; and grasses including Indian ricegrass, needle and thread grass, Sandberg's bluegrass, Nevada bluegrass (*Poa secunda nevadensis*) and creeping wildrye (*Leymus triticoides*) become more frequent.

Like most large landscapes, some unique plant communities and associations exist. Throughout all these elevation gradients, riparian areas are found dominated by sedges (*Carex spp.*), rushes (*Juncus spp.*), cottonwood (*Populus fremontii*) and willow (*Salix spp.*). Some of the low to mid elevation ranges support winterfat (*Krascheninnikovia lanata*) communities. There are also some aspen (*Populus tremuloides*) groves at higher elevations, and at some of the highest portions of the Lucky Boy allotment, communities of limber pine (*Pinus flexilis*) are present.

Table 3: Plant species most commonly found on the allotments.

Common Name	Scientific Name	Species Code
Indian ricegrass	*Achnatherum hymenoides*	ACHY
Desert needlegrass	*Achnatherum speciosum*	ACSP12
Letterman's needlegrass	*Achnatherum lettermanii*	ACLE9
Thurber needlegrass	*Achnatherum thurberianum*	ACTH7
Bristly fiddleneck	*Amsinckia tessellata*	AMTE3
Low sagebush	*Artemisia arbuscula*	ARAR8
Mountain big sagebrush	*Artemisia tridentate var. vaseyana*	ARTRV
Wyoming big sagebrush	*Artemisia tridentata var. wyomingensis*	ARTRW8
Milkvetch	*Astragulus spp.*	ASTRA
Fourwing saltbush	*Atriplex canescens*	ATCA
Shadscale saltbush	*Atriplex confertifolia*	ATCO
Cheatgrass	*Bromus tectorum*	BRTE
Littleleaf mountain mahogany	*Cercocarpus intricatus*	CEIN7
Yellow rabbitbrush	*Chrysothamnus viscidiflorus*	CHVI8
Cryptantha	*Cryptantha*	CRYPT
Western tansymustard	*Descurainia pinnata*	DEPI
Bottlebrush squirreltail	*Elymus elymoides*	ELEL5
Nevada ephedra	*Ephedra nevadensis*	EPNE
Mormon Tea	*Ephedra viridis*	EPVI
Rayless shaggy fleabane	*Erigeron aphanactis*	ERAP
Annual buckwheat	*Eriogonum spp.*	ERIOG
Spiny hopsage	*Grayia spinosa*	GRSP
Needle and Thread	*Hesperostipa comata*	HECO26
Little Utah Juniper	*Juniperus osteosperma*	JUOS
Prairie Junegrass	*Koeleria macrantha*	KOMA
Winterfat	*Krascheninnikovia lanata*	KRLA2
Lupine	*Lupinus spp.*	LUPIN
Spiny menodora	*Menodora spinescens*	MESP2
bud sagebrush	*Picrothamnus desertorum*	PIDE4
Singleleaf pinyon	*Pinus monophylla*	PIMO
James' galleta	*Pleuraphis jamesii*	PLJA
Sandberg's bluegrass	*Poa secunda*	POSE
Antelope Bitterbrush	*Purshia tridentate*	PUTR2
Spiny hopsage	*Grayia spinosa*	GRSP
Broom snakeweed	*Gutierrezia sarothrae*	GUSA2
Desert Gooseberry	*Ribes velutinum*	RIVE
Bailey's greasewood	*Sarcobatus baileyi*	SABA14
Russian thistle	*Salsola kali*	SAKA
Black greasewood	*Sarcobatus vermiculatus*	SAVE4
Tall tumblemustard	*Sisymbrium altissimum*	SIAL2
Desert globemallow	*Sphaeralcea ambigua*	SPAM2
Sand dropseed	*Sporobolus cryptandrus*	SPCR
Spineless horsebrush	*Tetradymia canescens*	TECA2
Spiny horsebrush	*Tetradymia spinosa*	TESP2

Table 4: Dominant disturbance response groups and their acreage, elevation and plant community on the four allotments.

Dominant Disturbance Response Group	Acres of Dominant Disturbance Response Group (DRGs)	Percent of Ecological Site in Allotments	Dominant Plant Community and Potential Plant Composition
PIMO WSG:0R0602 R026XY060NV	23,096	27.7%	Dominated by singleleaf pinyon, Mountain big sagebrush and Desert needlegrass.
Cobbly Claypan 8-10 PZ R027XY049NV	16,186	19.4%	Dominated by low sagebrush and Thurber needlegrass
Gravelly Loam 4-8 R027XY018NV	9,089	10.9%	Dominated by shadscale saltbush, Bailey's greasewood and Indian ricegrass
Gravelly Claypan 8-10 R027XY079NV	5,127	6.1%	Dominated by Lahontan sagebrush and Thurber's needlegrass.
Loamy Slope 14+ R026XY038NV	4,504	5.4%	Dominated by mountain sagebrush and western needlegrass
Mountain Ridge R026XY028NV	3,133	3.7%	Dominate by low sagebrush, pine needlegrass and prairie junegrass

3.6 Wild Horse and Burro

The official boundary for the Wassuk HMA overlaps only a small portion (1,513 acres) in the northeast corner of the East Walker allotment (see Appendix A, map 6). The HMA in its entirety is 52,309 acres mostly lying on the Butler Mountain, Gray Hills and Black Mountain grazing allotments. However, the herd has expanded outside of this boundary in pursuit of available water and forage. Boundary fences are scarce on these allotments and the steep topography creates serious challenges in fence construction while simultaneously allowing the horses to roam freely. The Appropriate Management Level (AML) range for the Wassuk HMA is 110-165 wild horses. In 2012 there were an estimated 623 horses. At this population level some sites are showing heavy horse use closer to the HMA boundary in riparian areas and on available feed. This led to an emergency gather in 2013 where the animals were removed down to the low AML. In 2017 the HMA was estimated at 121 horses. By 2022 the herd population size had grown to an estimated 264 horses (see table 5 and figure 2). A comparison of those sites to sites with riparian exclosures, or grazing areas that are at a greater distance from water shows the effects the wild horse overpopulation in the HMA, both currently and historically, is having on the ecological condition of these areas. These ecological impacts are cumulative, as many sites have not been able to fully recover from severe overuse that occurred in 2012. Horses have been seen throughout the East

Walker allotment, as well as East onto the Lucky Boy allotment.

The Wassuk HMA partially lies within the East Walker allotment (Section 3.6 above). The AML for the Wassuk HMA is a range of 110-165 wild horses, as determined through a Final Multiple Use Decision (FMUD) signed in 1997 which allocated forage to wildlife, wild horses, and livestock (BLM, 1997b). In 2012, due to drought conditions and an HMA population far above AML, range conditions and wild horse body condition scores were so poor, that an emergency gather was conducted which brought the population to AML. The National Academy of Sciences has concluded that the BLM census counts can underestimate wild horse populations by 20-30% (2013).

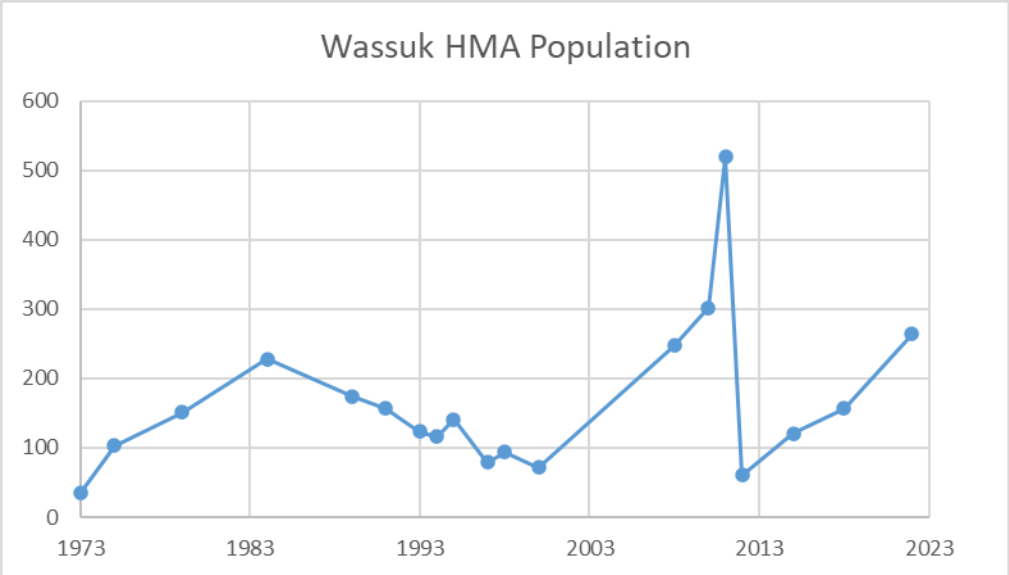
The data collected on East Walker analyzes grazing by horses of upland vegetation and riparian areas. Documentation of wild horse impacts can be analyzed through monitoring procedures taking place on the eastern central portion of the East Walker allotment at the base of the Wassuk range stretching south to Rattlesnake Spring. A frequency transect, Key forage transect, PFC assessment and AIM core plots supported these observations.

Wild horse utilization was collected at monitoring plot E002 in the East Walker allotment in 2018. This plot is located 1.8 miles north of Rattlesnake spring, and 6.5 miles south of the Wassuk HMA boundary. Using the key forage utilization method, 82% use was documented on Indian ricegrass. As noted at this site, significant wild horse sign (tracks and stud piles) and slight to no cattle sign were observed.

Table 5: Population estimates for the Wassuk HMA between 1973 – 2022.

Year	Population Estimate	Percent High AML
1973	35	39%
1975	103	113%
1979	151	166%
1984	228	251%
1989	174	191%
1991	157	173%
1993	123	135%
1994	116	128%
1995	141	155%
1997	79	87%
1998	94	103%
2000	72	79%
2008	247	272%
2010	302	332%
2011	519	571%
2012	61	67%
2015	121	133%
2018	157	173%
2022	264	290%

Figure 2: Population estimates for the Wassuk HMA between 1973 – 2022.



3.7 Wildlife

The four allotments provide habitat for a wide range of wildlife, which supports a diversity of birds, reptiles, fish, amphibians, mammals, and invertebrates. According to NDOW records, some of the species that are known to occur on these allotments include black tailed jackrabbit (*Lepus californicus*), brown trout (*Salmo trutta*), coyote (*Canis latrans*), desert cotton tail (*Sylvilagus audubonii*), Fletcher dark kangaroo mouse (*Microdipodops megacephalus ssp. nasutus*), gray fox (*Urocyon cinereoargenteus*), Great Basin fence lizard (*Sceloporus occidentalis ssp. longipipes*), montane vole (*Microtus montanus*), mountain lion (*Puma concolor*), mountain sucker (*Catostomous platyrhynchus*), North American deer mouse (*Peromyscus maniculatus*), Northern harrier (*Circus cyaneus*), rainbow trout (*Oncorhynchus mykiss*), red shiner (*Cyprinella lutresis*), Tahoe sucker (*Catosomus tahoensis*), western fence lizard (*Sceloporus occidentalis*), and zebra tailed lizard (*Callisaurus draconoides*).

Additional priority wildlife species that are known or have the potential to occur in the allotments can be found in the Nevada Wildlife Action Plan (WAP) (NDOW 2013) based on key habitat types found within the allotments (table 6, Appendix A, map 7). Given the harsh conditions of this high desert environment, many of the wildlife species are heavily dependent on the natural spring systems within the allotments as water availability is a scarce resource in this range. The distribution of wildlife tends to reflect the distribution of food and water resources, and therefore with few exceptions, wildlife species are not found in high densities within their Nevada ranges.

Table 6: Dominant habitat types on the four allotments.

Key Habitat Type	**Acres**
Agriculture	612
Alpine and Tundra	40
Barren Landscapes	168
Cliffs and Canyons	1130
Desert Playas and Ephemeral Pools	2
Grasslands and Meadows	209
Intermountain Cold Desert Shrub	17,203
Intermountain Coniferous Forests and Woodlands	2,323
Intermountain Rivers and Streams	430
Invasive Grasslands (not WAP habitat)	45
Lower Montane Woodlands and Chaparral	25,683
Marshes	45
Mojave Warm Desert Mixed Desert Shrub	3
Sagebrush	35,284
Sierra Coniferous Forests and Woodlands	7
Springs and Brooks	1

3.7.1 Migratory Birds

Migratory birds are protected and managed under the Migratory Bird Treaty Act (MBTA) of 1918,

as amended (16 U.S.C. 703 *et. seq.*) and Executive Order 13186. The MBTA makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations. Executive Order 13186 directs Federal agencies to promote the conservation of migratory bird populations.

Common migratory bird species that have been documented to occur on the allotments include the common raven (*Corvus corax)*, black-billed magpie *(Pica hudsonia),* blue-gray gnatchatcher *(Polioptila caerulea),* brown-headed cowbird *(Molothrus ater),* black-throated gray warbler *(Setophaga nigrescens),* black-throated sparrow *(Amphispiza bilineata),* bushtit *(Psaltriparus minimus),* Cassin's finch *(Haemorhous cassinii),* canyon wren (*Catherpes mexicanus)*, chipping sparrow *(Spizella passerine),* cooper's hawk *(Accipiter cooperii),* house finch *(Haemorhous mexicanus),* horned lark *(Eremophila alpestris),* lark sparrow *(Chondestes grammacus)*, mountain chickadee *(Poecile gambeli),* mourning dove (*Zenaida macroura)*, northern flicker (*Colaptes auratus*), northern harrier (*Circus hudsonius)*, rock wren (*Salpinctes obsoletus)*, red-tailed hawk (*Buteo jamaicensis*), sage sparrow (*Artemisiospiza nevadensis)*, spotted towhee (*Pipilo maculatus)*, and Western scrub jay (*Aphelocoma californica)*.

3.7.2 Big Game Species-Mule Deer and Pronghorn Antelope

Mule deer (*Odocoilous hemionus*) and pronghorn (*Antilocarpa americana*) are big game species that reside within the boundaries of the allotments. NDOW uses the terms year-round habitat, winter range, summer range, crucial winter range, and crucial summer range to delineate seasonal mule deer and pronghorn antelope habitat. The BLM definition of crucial habitat is the following: "Habitat on which a species depends on for survival; there are no alternative ranges or habitats available."

Mule Deer

Mule deer move between the forest edges at higher elevations to the desert floor, depending on the season. Generally, they summer at higher elevations and winter at lower elevations following the snow line. Mule deer occupy almost all types of habitats within their range, yet they seem to prefer arid, open areas and rocky hillsides. Mule deer year-round habitat occurs in riparian, pinyon-juniper, and big sagebrush shrubland vegetative communities. According to NDOW habitat data, the four allotments contain a total of 59,224 acres of mule deer habitat. This habitat consists of 22,695 acres of year-round habitat, 34,004 winter range habitat, and 2,525 acres of agricultural habitat (Appendix A, map 8), however, abundance and distribution are dependent on water availability. Additionally, there is 5,290 acres that consist of a seasonal migrational corridor that overlap with the southernmost portion of the year-round habitat within the allotment area. This habitat is the territory of four different mule deer herds that include Powell Mountain (units 201-206), Hawthorne (units 201-206), Wassuk (units 202, 205, 206), and Mason Valley (unit 203) herds.

According to the NDOW 2020-21 Big Game Status Report, Nevada's mule deer populations have been declining in the recent decades primarily due to the lack of consistent precipitation, large-scale range fires, conversion of native shrubs to invasive grasses, and degraded conditions as a

result of wild horses and burros. NDOW summaries on mule deer units 201, 202, 204-206 (Powell Mountain, Hawthorne, and Wassuk herds) estimate that the populations are declining as a result of limited resources. For the 203 unit (Mason and Smith Valleys), NDOW estimates the herd to be stable based on hunter harvest information. According to NDOW (2021), the highest concentrations of deer exist in and around the Walker River corridor, where thick stands of willows create escape and shelter cover. However, a recent suspected disease event took place within this herd and the impacts on the population levels are currently unknown (NDOW 2021).

Habitat for mule deer consists of good sources of forage, hiding and thermal cover, and healthy riparian areas for sources of water. Leckenby et al. (1982) defined optimal hiding cover on shrub-steppe rangeland as vegetation at least 60 centimeters (24 inches) tall and capable of hiding 90 percent of a bedded deer from view at 45 meters (150 feet) or less. For forage, forb use ranged from 20 percent to greater than 50 percent in the spring, to less than 5 percent use in the winter. Grass use was found to be from 1 percent in the summer to a high of 15 percent in the spring (Tueller et al. 1979). Mule deer also prefer the leaders of browse species such as bitterbrush (*Purshia spp*.), serviceberry (*Amelanchier spp*.), snowberry (*Symphoricarpos spp*.), and sagebrush. An essential component to high quality mule deer habitat consists of healthy riparian areas because proper functioning riparian systems can provide high quality forage, protection from predators and thermal cover (Carson and Peek 1987).

Springs and riparian areas in the Wassuk Range have been identified for protective fencing projects and a number have been completed to date. Fencing key riparian areas allows for increased flow of water while providing areas where shrubs, grasses, and forbs are available to wildlife (NDOW 2019). In addition, pinyon-juniper (PJ) removal has occurred to benefit greater sage-grouse habitat that is being encroached near leks. In 2018-2019, a total of 6,198 acres of PJ was removed within Lucky Boy, Nine Mile and East Walker allotments (Appendix A, map 9). The removal of PJ allows for the establishment of brush and grass species and increased summer and winter ranges for the migrating herd (NDOW 2020). This habitat conversion will enable the deer herd to thrive in these early successional stage plant communities (NDOW 2019).

Pronghorn Antelope

Pronghorn antelope are found primarily in the valleys between mountain ranges in northern and central Nevada. The vegetative cover within the year-round habitat is predominantly located within low elevation sagebrush communities and intermountain cold desert shrub habitats. Small subgroups of antelope occupy a large geographic area in and around limited water sources. Freestanding water is very important for pronghorn during the hot summer months or during drought, and water developments provide the needed space and availability of resources that many perennial water sources do not provide (NDOW 2017).

For the allotments, there is a total of 26,337 acres of crucial winter pronghorn habitat. Additionally, there are 817 acres that consist of a seasonal migrational corridor that overlaps with the southwestern portion of the crucial winter habitat within the allotment area (Appendix A, map 10). This habitat is territory of the Bodie pronghorn herd (units 202, 204). This herd has demonstrated a decline in population in the past five years, which was estimated at 650 animals in 2017 and only over 100 animals in 2021 (NDOW 2017, NDOW 2021). According to the NDOW 2020-21 Big

Game Status Report, the 2020 statewide population estimate for pronghorn is 28,500 which is a slight decline from previous years.

The vegetative height, cover, and community type, as well as the elevation, topography, and distance to water, influence pronghorn antelope habitat selection. Pronghorn primarily eat forbs and shrubs, with grasses being the least preferred forage. Sagebrush, rabbitbrush, and bitterbrush are important pronghorn antelope browse throughout the Great Basin. The following characteristics were common on preferred pronghorn antelope ranges in shrub steppe and semi-desert grassland habitats (Yoakum et al. 2014):

- Ground cover >50 percent live vegetation and <50 percent bare ground, rock, litter, etc.;
- Plant composition is 5-15 percent grasses, 5-10 percent forbs, and 10-35 percent shrubs;
- A variety of plant species including 5 to 10 grass species, 10 to 70 forb species, and 5 to 10 shrub species;
- Low vegetation structure averaging 10-18 inches (25-46 centimeters) in height.

Upland Game Bird Species

Other than bi-state sage grouse (*Centrocercus urophasianus*), other upland game birds on the four allotments are chukar partridge (*Alectoris chukar*), mountain quail (*Oreortyx pictus*), and sooty grouse (*Dendragapus fuliginosus*). A large portion of the four allotments is considered chukar habitat. Chukar live in dry high elevation shrublands between 4,000 and 13,000 feet. They usually occur on steep, rocky hillsides with a mixture of brush, grasses, and forbs. They also occur across barren plateaus and deserts with sparse grasses. In most areas, big sagebrush is the dominant plant species, which can be an important part of their diet. Chukar tend not to stray far from water, especially during the short, hot summers. Springs and spring brooks are important for the survival of these game birds.

3.8 Special Status Species

Per the BLM Special Status Species manual 6840, BLM special status species (SSS) are: (1) species listed or proposed for listing under the Endangered Species Act (ESA), and (2) species requiring special management consideration to promote their conservation and reduce the likelihood, and need, for future listing under the ESA. Bureau sensitive species lists are reviewed, and updated every five years, by each State Director (BLM 2008). Additionally, all federal candidates, proposed, and delisted species in the five years following delisting are designated as Bureau sensitive species (BLM 2008).

Within the Carson City District, 138 species were designated as BLM sensitive by the Nevada BLM State Director in 2017 (Appendix C). The Nevada BLM Sensitive Species list contains a complete list of species and associated habitats that have the potential to be found in or near allotments in the Carson City District. These sensitive species include a variety of birds, reptiles, amphibians, mammals, fish, invertebrates, and plant species. A few of the important special status species that occur or have the potential to occur on these allotments are discussed in detail below.

Special status wildlife species include the bi-state sage-grouse, pygmy rabbit (*Brachylagus idahoensis*), American pika (*Ochotona princeps*), and multiple bat species. Additional special status wildlife species known to have occurred on the four allotments include desert horned lizard (Phrynosoma platyrhinos), golden eagle (*Aquila chrysaetos*), Great Basin collared lizard (*Crotaphytus bicinctores*), long-nosed leopard lizard (*Gambelia wislizenii*), mountain white fish (*Prosopium williamsoni*), northern river otter (*Lontra canadensis*), and Rocky Mountain bighorn sheep (*Ovis canadensis ssp. canadensis*). Special status plant species known to have occurred on the allotment include Wassuk beard tongue (*Penstemon rubicundus*), Bodie Hills rockcress (*Boechera bodiensis*), and Mono County phacelia (*Phacelia monoensis*).

3.8.1 Bi-State Sage-Grouse

The Bi-State Sage-Grouse is a distinct population segment of the Greater Sage Grouse (GRSG), a sensitive species. Sage-grouse are found where sagebrush is present, or in where there are mixtures of sagebrush, meadows, and aspen in close proximity. BSSG is a sagebrush obligate species that uses the sagebrush for food, nesting, as well as shelter and cover. They build their concealed nests in depressions on the ground under sagebrush. During the winter sage-grouse mainly feed on sagebrush leaves, but they also feed on the leaves, blossoms and buds in spring and summer. They also eat insects such as ants and grasshoppers. Although once very abundant across Nevada, due to diminishing habitat of slow growing sagebrush as a result of development, fire, invasive weeds and other factors, the species has been declining.

After receiving petitions to list the species as threatened or endangered under the Endangered Species Act (ESA). The USFWS determined in March 2010, that listing was warranted but precluded, and subsequently added sage grouse to the candidate species list. The 2016 Record of Decision and Land Use Plan Amendment (LUPA) for the Nevada and California Greater Sage-Grouse Bi-State Distinct Population Segment in the Carson City District and Tonapah Field Office amended the Carson City Field Office Consolidated Resource Management Plan. The LUPA adds goals, objectives, action and best management practices specifically designed to conserve, enhance and/or restore habitats for the long-term viability of the Greater Sage Grouse Bi-State Distinct Population Segment.

Based on the NDOW bistate sage-grouse habitat layer, there is a total of 47,734 acres of habitat and four leks within the four allotment boundaries (Appendix A, map 11). Within the Nine Mile allotment boundary, three leks and their 2020 status are listed as follows: Mud Springs (inactive), Nine Mile Flat (inactive) and Baldwin Canyon (pending). Within the East Walker allotment boundary is the Mt. Grant 4 lek (active). Within close proximity (<0.5 mi) to the BLM boundary on Forest Service and U.S. Military administered lands, there are four additional leks which include Nine Mile Flat 2 (active), Mt. Grant 2 (active), Mt. Grant 3, and Lapon (pending).

Sage-Grouse Habitat Assessment Framework

The Sage-Grouse Habitat Assessment Framework (HAF) establishes indicators to determine the status of sage-grouse habitat (including bistate sage grouse) at multiple scales and for seasonal habitats (Stiver et al. 2015). The results of these assessments provide the necessary information to evaluate whether the BLM managed lands are meeting the rangeland health standard for habitat

with regards to sage-grouse. The HAF utilizes data collected as described in BLM Technical Note 443 (Kachergis et al. 2020), AIM-Monitoring: A Component of the BLM Assessment, Inventory, and Monitoring Strategy as well as other similar data sets in which habitat indicator values can be derived. Habitats are evaluated using the HAF protocol, which outlines specific habitat indicators and their respective ranges, and includes lek habitat, nesting/early brood-rearing habitat, upland summer/late brood-rearing habitat, riparian summer/late brood-rearing habitat, and winter habitat (tables 5-9). In the case of Bi-State sage grouse, since habitat areas have not been delineated within the boundaries of the Bi-State sage grouse areas, all ecological monitoring points that fell within the Bi-state sage grouse habitat area were evaluated for each habitat type.

Lek Habitat Suitability

Table 7 displays the HAF indicators for lek habitat and suitability categories for the NV CA Sage Grouse.

Table 7: NV CA Sage Grouse Lek Habitat Indicators and Suitability Categories

Habitat Indicator	Suitable	Marginal	Unsuitable
Availability of Sagebrush Cover	Adjacent sagebrush cover provides escape cover	Adjacent sagebrush cover provides sparse escape cover	No adjacent sagebrush escape cover
Proximity of Linear Features	Nearest road (excluding two-tracks): > 3.1 mi	Nearest road (excluding two-tracks): 3.1 mi to ≥ 0.25 mi	Nearest road (excluding two-tracks): < 0.25 mi
Proximity of Surface Disturbance	Nearest Surface Disturbance: > 3.1 mi	Nearest surface disturbance: 3.1 mi to ≥ 2.0 mi	Nearest Surface Disturbance: < 2.0 mi
Proximity of Tall Structures	Nearest tall structure: > 2.0 mi	Nearest tall structure: 2.0 mi to ≥ 0.6 mi	Nearest tall structure: < 0.6 mi
Proximity of Low Structures	Nearest low structure: > 1.2 mi	Nearest low structure: 1.2 mi to ≥ 0.12 mi	Nearest low structure: < 0.12 mi
Conifer Cover (%)	< 2% landscape cover within 0.6 mi of a lek	< 2 to 4% landscape cover within 0.6 mi of a lek	> 4% landscape cover within 0.6 mi of a lek

Nesting/Early Brood-Rearing Habitat Suitability

The HAF nesting/early brood-rearing habitat indicators and suitability categories for the CA/NV Sage Grouse are reflected in table 8.

Table 8: NV CA Sage Grouse Nesting/Early Brood-Rearing Habitat Indicators and Suitability Categories

Habitat Indicator	Suitable	Marginal	Unsuitable
Sagebrush Canopy Cover (mean)	Arid: ≥20% Mesic: ≥20%	Arid: 14 to <20% Mesic: 18 to <20%	Arid: <14% Mesic: <18%
Sagebrush Height (mean)	Arid: >43cm Mesic: >59cm	Arid: 30-43cm Mesic: 40-59cm	Arid: <30cm Mesic: <40cm
Predominant Sagebrush Shape (mode)	Spreading	Mix of spreading and columnar	Columnar
Perennial Grass Height (mean) (Includes residual grasses)	Arid: >12cm Mesic: >18cm	Arid: 11-12cm Mesic: 10-18cm	Arid: <11cm Mesic: <10cm
Perennial Forb Height (mean)	Arid: >6cm Mesic: >8cm	Arid: 1-6cm Mesic: 1-8cm	Arid: <1cm Mesic: <1cm
Perennial Grass Cover (mean; residual and live)	Arid: >7% Mesic: >13%	Arid: 3-7% Mesic: 5-13%	Arid: <3% Mesic: <5%
Perennial Forb Cover (mean)	Arid: >5% Mesic: >9%	Arid: 4-5% Mesic: 3-9%	Arid: <4% Mesic: <3%
Preferred Forb Availability (relative to site potential)	Preferred forbs are common	Preferred forbs are sparse	Preferred forbs are not present
Annual Grass Cover	Arid: <3% Mesic: <3%	Arid: 3-5% Mesic: 3-5%	Arid: >5% Mesic: >5%
Total Shrub Cover	Arid: >28% Mesic: >26%	Arid: 19-28% Mesic: 23-26%	Arid: <19% Mesic: <23%
Proximity of Tall Structures	No tall structures exist within 800m	Tall structures are sparse within 800m	Tall structures are common within 800m
Proximity of Conifer Trees	<3% landscape conifer cover within 800m	3-4% landscape cover within 800m	>4% landscape conifer cover within 800m

Upland Summer/Late Brood-Rearing Habitat Suitability

Table 9 below outlines the HAF upland summer/late brood-rearing habitat indicators and suitability categories for the CA/NV Sage Grouse.

Table 9: NV CA Sage Grouse Upland Summer/Late Brood-Rearing Habitat Indicators and Suitability Categories

Habitat Indicator	Suitable	Marginal	Unsuitable
Sagebrush Cover (mean)	Arid: >20% Mesic: >15%	Arid: 10-20% Mesic: 1-15%	Arid: <10% Mesic: <1%
Sagebrush Height (mean)	Arid: >41cm Mesic: >38cm	Arid: 24-41cm Mesic: 23-38cm	Arid: <24cm Mesic: <23cm
Perennial Grass and Forb Cover (mean)	Arid: >19% Mesic: >25%	Arid: 5-19% Mesic: 10-25%	Arid: <5% Mesic: <10%
Preferred Forb Availability (upland perennial forb availability	Preferred forbs are common	Preferred forbs are sparse	Preferred forbs are not present

Habitat Indicator	Suitable	Marginal	Unsuitable
and understory species richness)			
Deep Rooted Perennial Grass Height (mean)	Arid: >12cm Mesic: >14cm	Arid: 9-12cm Mesic: 6-14cm	Arid: <9cm Mesic: <6cm
Perennial Forb Cover	Arid: >10% Mesic: >10%	Arid: 3-10% Mesic: 4-10%	Arid: <4% Mesic: <4%

Riparian Summer/Late Brood-Rearing Habitat Suitability

The HAF riparian summer/late brood-rearing habitat indicators and suitability categories for the NV CA Sage Grouse are shown in table 10.

Table 10: NV CA Sage Grouse Riparian Summer/Late Brood-Rearing Habitat Indicators and Suitability Categories

Habitat Indicator	Suitable	Marginal	Unsuitable
Riparian Functioning Condition	Proper Functioning Condition (PFC)	Functioning at Risk (FAR)	Non Functioning (NF)
Preferred Forb Availability (relative to site potential)	Preferred forbs are common	Preferred forbs are sparse	Preferred forbs are not present
Availability of Sagebrush Cover (mean) (Riparian area/meadow interspersion w/adjacent sagebrush cover)	Has adjacent sagebrush cover within 200m	Minimal adjacent sagebrush cover within 200m	No adjacent sagebrush cover within 200m
Understory Species Richness (all plants)	High species richness	Moderate species richness	Low species richness

Winter Habitat Suitability

Table 11 outlines the HAF winter habitat indicators and suitability categories for the NV CA Sage Grouse.

Table 11: NV CA Sage Grouse Winter Habitat Indicators and Suitability Categories

Habitat Indicator	Suitable	Marginal	Unsuitable
Sagebrush Cover (mean)	≥10%	5 to <10%	<5%
Mean Sagebrush Height (above snow) (cm)	≥25cm	>10 to <25cm	≤10 cm

3.8.4 Bats

There are 16 species of bats designated as sensitive in the Carson City District. According to data from the NDOW Wildlife Action Plan, of the 16 species, 11 species are known to occur or have the potential to occur with the four allotments. These species include western red bat (*Lasiurus*

blossevillii), silver-haired bat (*Lasionycteris noctivagans*), Mexican free-tailed bat (*Tadarida brasiliensis*), hoary bat (*Lasiurus cinereus*), Townsend's big-eared bat (*Corynorhinus townsendii*), long-eared myotis (*Myotis evotis*), fringed myotis (*Myotis thysanodes*), spotted bat (*Euderma maculatum*), western small footed myotis (*Myotis ciliolabrum*), little brown bat (*Myotis lucifugus*), and canyon bat also known as the western pipistrelle (*Parastrellus hesperus*).

Bats have specific needs for roosting, nesting, and foraging. Abandoned mines and structures provide roosting, maternity, and hibernacula for bats throughout the Great Basin. Based on the Nevada Department of Minerals data, the Wassuk mountain range shows abandoned mines on the four allotments. Foraging sources consist of moths and other insects and typically take place around riparian or spring areas. Habitat for bats, both riparian and upland, is threatened by wildfire and unmanaged grazing (Bradley et al. 2009).

3.8.5 Sensitive Birds/Birds of Conservation Concern

The 1988 amendment to the Fish and Wildlife Conservation Act mandates the U.S. Fish and Wildlife Service (USFWS) to "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act (ESA) of 1973." The USFWS list of Birds of Conservation Concern (BCC) for 2021 is the most recent effort to carry out this mandate. Bird species considered for the BCC include:

- Nongame birds;
- Gamebirds without hunting seasons;
- Subsistence-hunted nongame birds in Alaska; and
- ESA candidate, proposed and recently delisted species.

The overall goal of the BCC is to accurately identify migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent our highest conservation priorities. Bird conservation regions (BCR) are ecologically distinct regions in the United States with similar bird communities, habitats, and resource management issues. The allotments lie within the Great Basin Region 9 BCR. Appendix C lists the bird species in region 9. Of the 34 species listed, 12 species occur or could potentially occur within the allotments based on habitat. Distribution of these species varies by year-round resident, summer breeding, winter and migratory species. The WAP (NDOW 2013) has detailed information on many of these birds of conservation concern.

In addition to BCC species, several other sensitive bird species have the potential to exist within the four allotments. While many of these bird species are also found in the BCC list, others are not and may be found under the bird section in the Carson City District Office (CCDO) sensitive species list (appendix C). Moreover, the allotments fall within the Mount Grant Bird Habitat Conservation Area (BHCA) which is a designation provided by the Intermountain West Joint Venture. These designated areas were selected by experts based on their combination of priority

bird occurrences and habitat and are likely to benefit from conservation efforts.

3.8.6 Additional Sensitive Animal Species

- Fletcher Dark Kangaroo Mouse (*Microdipodops megachephalus nasutus*) is a rodent classified as a BLM sensitive species with potential to occur on the four allotments based on historical data. This species is a sand-obligate desert species, long recognized to be taxonomically different than other populations of kangaroo mice (Hafner et al., 2006).

- Inyo Shrew (*Sorex tenellus*) is a rodent classified as a BLM sensitive species with potential to occur on the four allotments based on historical data. This shrew is among the smallest of North American insectivores. Most records of this species are found in montane sites, although other sightings in more arid lower elevations suggest a broad ecological tolerance (Hoffman and Owen, 1980)

- Wongs Pyrg (*Pyrgulopsis wongi*) is a snail species classified as a BLM sensitive species with potential to occur on the four allotments based on historical data. This species is an aquatic mollusk inhabiting springs.

- American Pika (*Ochotona princeps*) is a rodent classified as a BLM sensitive species. American Pika are high elevation species with narrow tolerances for summer heat (Yandow et al., 2015). Populations of American Pika are restricted to alpine environments.

3.8.7 Sensitive Plant Species

The following sensitive plant species have been found to occur on the four allotments.

- Wassuk Beardtongue (*Penstemon rubicundus*) is classified as sensitive by the BLM, its habitat is open, rocky to gravelly soils on perched tufa shores, steep decomposed granite slopes, rocky drainage bottoms, and roadsides or other recovering disturbances with enhanced runoff, locally abundant on recent burns, in the pinyon-juniper, sagebrush, and upper mixed-shrub and shadscale zones.

- Bodie Hills rockcress (*Boechera bodiensis*) is classified as sensitive by the BLM, its habitat is dry, open, rocky, high or north-facing slopes or exposed summits of granitic or rhyolitic material, on moisture accumulating microsites in sagebrush associations within the pinyon-juniper and mountain sagebrush zones.

- Mono county phacelia (*Phacelia monoensis*) is classified as sensitive by the BLM, its habitat is alkaline, barren or sparsely vegetated grayish, brownish, or reddish shrink-swell clays of mostly andesitic origin, on various slopes and aspects, mostly on stabilized or low-intensity artificial or natural disturbances. It is most abundant on road berms that cross such soils, less frequently on naturally eroding badlands or apparently undisturbed soil, in the Pinyon-Juniper and mountain sagebrush zones.

4.0 Allotment Management Overview

The allotments include portions of the Wassuk mountain range, along with the lower elevation boundaries towards the East Walker River and Pine Grove Flat road on the East, and the boundary with USFS lands along Lucky Boy Pass road to the South. These allotments lie on the county boundary between Mineral and Lyon counties. The nearest population centers are Yerington, Smith Valley and Hawthorne.

4.1 Allotment Objectives

Based on the Carson City Field Office Consolidated Resource Management Plan (BLM 2001b), objectives listed below are the livestock grazing management desired outcomes which the CCDO has outlined.

1. Maintain or improve the condition of the public rangelands to enhance productivity for all rangeland and watershed values.
2. Initially, manage livestock use at existing levels.
3. Provide adequate, high quality forage for livestock by improving rangeland condition.
4. Improve overall range administration.

Furthermore, grazing objectives from the Bi-State Sage Grouse LUPA include:

1. New and renewed grazing permits, annual operating instructions, or other appropriate mechanism for livestock management shall include terms, conditions, and direction to move toward or maintain BSSG habitat desired conditions.
2. Manage livestock grazing to maintain residual cover of herbaceous vegetation so as to reduce predation during breeding/nesting season (March 1 to June 30).
3. Manage livestock grazing in accordance with the utilization standards in Table ROD-4.
4. Remove fences and other infrastructure associated with livestock grazing negatively impacting BSSG and its habitats.
5. Any new structural range improvements and location of supplements (salt or protein blocks) shall not hinder the conservation, enhancement, or restoration of BSSG habitat.
6. To reduce BSSG mortality, remove, modify, or mark fences in sage-grouse habitat based on nearest proximity to lek, lek size, and topography where fence densities exceed 1.6 miles of fence per section (640 acres).
7. Livestock watering and handling facilities (corrals, chutes, dipping vats, etc.) or sheep bedding grounds shall not be located within 2 miles of an active lek and 0.6 miles from riparian areas.
8. Salting or supplemental feeding stations shall not be located within 2 miles of an active lek and 0.6 miles from riparian areas.

<u>WALKER AND LAHONTAN RANGELAND PROGRAM SUMMARY</u>

The long range objectives of the grazing management program are to manage, maintain, and improve the rangeland conditions on the public lands through the following:

A. Maintain a sufficient quality, and diversity of habitat and forage for livestock, wildlife, and wild horses through natural regeneration and/or vegetation manipulation methods.
B. Improve the vegetation resource and range condition by providing for the physiological needs of key plant species.
C. Reduce soil erosion and enhance watershed values by increasing ground cover and litter.
D. Improve and maintain the condition of the riparian habitat. (Reno RPS 1984).

4.2 Permitted Use

4.2.1 Historic Permitted AUMs and Allotment Management

In 1989, BLM completed the Walker Resource Area Rangeland Program Summary that designated selective management categories for each grazing allotment. In that summary both the East Walker and Nine Mile allotments were classified under the (improve) "I" category, under the BLM's "MIC" priority status (IM2009-018). These "I" classified allotments receive the highest priority for processing authorizations, actively managing uses, and monitoring achievement of land health standards. The Lucky Boy allotment was classified under the "M" (maintain) category, designating the allotment as a lower priority than the formerly referenced "I" allotments. The River allotment, which had not been established in 1989 was later classified as a category "C" (custodial) designation making it the lowest priority allotment. However this designation was made based on the former public land and private land percentages for the allotment prior to the land swap with the USFS. Currently, that allotment could not qualify under the custodial status unless the pasture boundaries were re-defined to include the private lands. Custodial allotment designations are reserved for allotments in which the public acreage in the allotment is miniscule compared to the private lands in that same allotment.

In 1971, an Allotment Management Plan (AMP) was developed for the Flying M Ranch permit addressing grazing management on all four of these allotments (BLM 1971). This AMP provided for 900 head of cattle for the East Walker and Nine Mile allotments between October 15th and May 31st. These 900 head of cattle were subject to a four-year rest and rotation schedule on four pastures making up these two allotments. Since the development of that AMP, a land exchange with the USFS, and the division of the East Walker and River allotments has led to changes in the AUM distributions.

Under the 1971 AMP, 200 head of cattle also grazed the Lucky Boy allotment between June 1st and October 15th. Boundary changes between the BLM and the Hawthorne Ammunitions Depot, as well as a BLM environmental assessment (EA) have changed the 1971 grazing schedule to a five-year deferred rest rotation grazing system (BLM, 2003a). This grazing system is set forth in the (2003) EA developed by the BLM. This EA also modified the grazing period dates to those described under the current grazing permit. The Lucky Boy allotment has 4,644 acres of private land within its boundaries.

In December 1999, BLM issued another grazing decision for the Nine Mile allotment following a 1999 allotment evaluation (BLM, 2000). This decision authorized 2,290 AUMs on the allotment and modified the classification from "I" category to "M" following the confirmed positive trend reported from field monitoring. Existing grazing seasons of use from October 1st – November 30th

and April 1st – May 31st were maintained. An objective of less than 60% utilization for key perennial grasses and 50% for identified key shrubs in the upland areas of the allotment was added, while older objectives were removed and no longer apply. In January, 2000 BLM issued a grazing decision for the East Walker allotment, maintaining the 1,977 AUMs of authorized grazing and modifying the periods of grazing use to December 1 – March 31st. The same utilization objective from the Nine Mile allotment (above) was also added to the East Walker allotment, while old objectives were removed. This Decision also reclassified the East Walker allotment from the Improve categorization to the Maintain categorization.

Most recently, in May, 2003 a FONSI and Decision Record was signed for the Lucky Boy allotment. This decision implemented a five-year deferral and rest grazing system which goes as follows. Years one and two, 234 cattle may graze between June 1st and July 31st. On the third year, the allotment is rested from grazing. On years four and five 234 cattle may graze between August 1st and September 30th. In the same decision, a distinction is made that in the Lucky Boy Pass area, 95 cattle may graze from June 1st to October 15th with the possibility of rotating two years of use and two years of rest for a total of 398 AUMs. The utilization standards for the Nine Mile and Lucky Boy allotments were also adopted, with the monitoring of these areas to be conducted and assessed in the month of July. This decision also included the implementation of water haul sites, the establishment of quadratic frequency sites to be read every five years, the implementation of Sage Grouse Guidelines, and required actual use reports with specific cattle locations and numbers.

Adjudicated Land Base

The four allotments lie in the N3 grazing district, which was set up as a land base grazing district. In a land base grazing district, for grazing preferences to qualify, an applicant is required to own or control through lease, the base property offered for grazing preference that the authorized officer determines to meet the definition of a base property. Per 43 CFR 4100.0-5, "base property means land that has the capability to produce crops or forage that can be used to support authorized livestock for a specified period of the year." At the time of preparation of this EA, the offered base property for these allotments, which is controlled through lease, is a forty-acre parcel at Northeast ¼ Northwest ¼, Section 14, Township 6 North Range 27 East. The lease, which grants Paine Livestock LLC to "pasture and graze cattle" from the State of Nevada, expires December 31, 2026. The base property is owned by the state of Nevada. The state acquired this base property which is the Flying M ranch in an acquisition process. This ranch is the base property for all four allotments.

Although the grazing preference for the four allotments is attached to the 40-acre base property, a termination of this lease would not result in the State of Nevada obtaining the grazing permit, as they are not an eligible permittee under BLM's regulation at 43 CFR 4110.1(a)(2). However, the grazing preference would remain with the base property and be available to an eligible new owner or person in control of that base property through the application and transfer procedures described at 43 CFR § 4110.2-1(d).

4.2.2 Current Permitted Use and Livestock Grazing Management

The current permit (table 12) authorizes cattle grazing (cow/calf) on all four allotments. It was issued pursuant to 43 CFR Part 4100 and contains the standard terms and conditions for SWFO

grazing permits. On the East Walker allotment the permit authorizes 497 head of cattle, totaling 1,978 AUMs from December 1st to March 31st. On the Lucky Boy allotment, the permit authorizes 200 head of cattle, totaling 835 AUMs from June 1st to October 5th. For the Nine Mile allotment the permit authorizes two separate grazing periods beginning with 1,922 head of cattle between April 1st and May 31st, the second period being 408 head of cattle between October 1st and November 30th. These two grazing periods for Nine Mile have an authorized 1,889 AUMs and 401 AUMs respectively on BLM managed land. On the River allotment, the permit authorizes 7 head of cattle year-round totaling 84 AUMs. The total AUMs authorized by the current permit are 5,187.

Table 12: Allotment permitted dates

Allotment	Permitted Dates	Permitted Number
Lucky Boy	6/1 – 10/5	200
River	3/1 – 2/28	7
East Walker	12/1 – 3/31	497
Nine Mile (49%)	10/1 – 11/30	408
Nine Mile (49%)	4/1 – 5/31	1,922

In the past ten years, this permit has undergone several transfers; however, the ranch manager, who is now the permit holder has been a constant. Land swaps between the USFS and Hawthorne Army Depot (HWAD), along with private land changes from working ranches to state of Nevada managed recreation areas, has contributed to the rationale behind the permitted dates, AUM numbers and rotations becoming obsolete. The original year-long grazing rotation which included USFS allotments and private lands, no longer applies with respect to grazing of the four BLM allotments. The current base property lease will expire in 2026.

Livestock Management

A summary of the current cattle management system is set out in BLM's February 15, 2019 correspondence with the permittee. That description addresses working agricultural fields being taken out of commission on newly owned State Lands, which formerly provided hay for the operation. It also lines out the way private lands, not under management of the BLM are used in the grazing annual rotation. This is important as a comprehensive understanding of the ranch's operation can help identify needs and opportunities.

Currently hay production, leases and rotations are in constant change on the ranch as the operations on the state recreation area continue to develop, it is in flux as the Walker Basin Conservancy (WBC) conducts their restoration practices along formerly irrigated fields. Some pastures will eventually be removed from grazing.

Currently, the Flying M, now Paine Livestock LLC, is a cow-calf operation. Calving generally takes place in late February through May. Weaning takes place in October. Following weaning,

the calves are preconditioned for 45 days and are usually sold and shipped off the ranch in December. On the BLM allotments, the rotation begins on East Walker starting on December 1st. Bred cows are turned out on the southern portion of the allotment. The cows are moved north on that allotment, and gathered off the BLM land on March 31st onto the state owned property at the former Flying M ranch, a portion of which is the base property. From this property, cows are brought to the BLM Nine Mile allotment, as early as April 1st. In mid-May to June 1st the cattle are placed on State of Nevada, leased Nine Mile pastures. From these pastures, part of the herd will be brought up to the Lucky Boy allotment, while the other portion of the herd is trailed down Rough Creek (USFS) to Nevada State lands known as the River pasture. By mid-September to October 1st, the cattle which were brought up to graze the Lucky Boy allotment, will again be placed on the State of Nevada Nine Mile pastures and later trailed to the State of Nevada River Pastures. Cows remain on these River Pastures until turn-out on BLM East Walker allotment starting Dec 1st.

Because the calves are weaned in October, the East Walker, Nine Mile (Spring season range) and Lucky Boy are all run as cow calf pairs. For maintenance of herd size and increasing numbers, the Lucky Boy allotment has been used for replacement yearling heifers in past years. From the Lucky Boy allotment, the cattle are brought down to the leased Nine Mile pastures and River pastures (not to be confused with BLM River allotments). Trailing is needed through either Nine Mile BLM or Nine Mile USFS heading North in the Fall.

Actual Use

Grazing history was generated from actual use forms for the past ten years (table 15). The permittee has always been exceptionally conscientious at turning in actual use reports and has been found to be compliant during compliance inspection visits with the grazing permit dates and numbers. The dates for the Nine Mile fall grazing period reflect the possible need for trailing. The Lucky Boy allotment, while used infrequently is an important part of the operation. Challenges in using the Lucky Boy permit in the past have included trespass cattle from another ranch, and a short season of use in which to get up to the higher elevations around Mount Grant and Corey Peak. Figures regarding the River allotment should be interpreted with caution as a historical mapping error in allotment boundaries historically caused some confusion over the allotment's location. To further complicate this error, the River allotment is comprised of two separate pastures, and actual use data was not collected separately for these two pastures but rather submitted as a single figure.

Table 15: A summary of actual use grazing on the four allotments since 2008 by percentage and AUMs utilized by total permitted AUMs

Year	Lucky Boy 6/01 – 10/05	River 3/01 – 2/28	East Walker 12/01 – 3/31	Nine Mile (10/01 – 11/30)	Nine Mile (4/01 – 5/31)
2008	0% (0 AUMs)	8% (7 AUMs)	0% (0 AUMs)	0% (0 AUMs)	13% (246 AUMs)
2009	0% (0 AUMs)	100% (84 AUMs)	44% (863 AUMs)	0% (0 AUMs)	12% (234 AUMs)
2010	28% (237 AUMs)	100% (84 AUMs)	0% (0 AUMs)	0% (0 AUMs)	23% (439 AUMs)
2011	0% (0 AUMs)	0% (0 AUMs)	55% (1,083 AUMs)	0% (0 AUMs)	0% (0 AUMs)
2012	0% (0 AUMs)	8% (7 AUMs)	15% (297 AUMs)	0% (0 AUMs)	1% (19 AUMs)
2013	0% (0 AUMs)	0% (0 AUMs)	0% (0 AUMs)	0% (0 AUMs)	0% (0 AUMs)
2014	50% (418 AUMs)	100% (84 AUMs)	37% (731 AUMs)	0% (0 AUMs)	13% (246 AUMs)
2015	0% (0 AUMs)	42% (35 AUMs)	49% (962 AUMs)	0% (0 AUMs)	4% (73 AUMs)
2016	0% (0 AUMs)	8% (7 AUMs)	47% (845 AUMs)	0% (0 AUMs)	0% (0 AUMs)
2017	0% (0 AUMs)	100% (84 AUMs)	2% (39 AUMs)	0% (0 AUMs)	7% (124 AUMs)
2018	51% (423 AUMs)	100% (84 AUMs)	14% (281 AUMs)	0% (0 AUMs)	1% (18 AUMs)
2019	70% (581 AUMs)	100% (84 AUMs)	67% (1,328 AUMs)	3% (13 AUMs)	<1% (4 AUMs)
2020	56% (468 AUMs)	100% (84 AUMs)	53% (1,065 AUMs)	0% (0 AUMs)	0% (0 AUMs)

Utilization Data

Livestock

In 2018, utilization data were collected using the Key Forage Plant Method (TR-1734-03-Utilization Studies and Residual Measurements). Only a single year of data was collected. This limitation in data occurred because of changing project priorities, limited labor and no pre-existing data once the project was prioritized. These data were used to create allotment scale maps for East Walker, Lucky Boy and Nine Mile, representing grazing pressure throughout the allotment (see Appendix A, maps 13-15). Twenty-two transects were conducted on the four allotments combined. The key species used were Indian Ricegrass (*Achnatherum hymenoides*), Bottlebrush Squirreltail (*Bottlebrush squirreltail*) and Needle and Thread (*Hesperostipa comata*) (see table 14). Whichever key species was observed first ten times when walking the transect was used for the overall average, as defined by protocol. Examples of these transects are in photos 1-8 and summarized in table 16.

Table 16: A summary of key forage transects conducted on the allotment (AcHy = Indian Ricegrass, ElEl = Bottlebrush Squirrelltail, HeCo = Needle and Thread)

Key Forage Transect Summary							
East Walker		River		Lucky Boy		Nine Mile	
Transect	Average Use	Transect	Average Use	Transect	Average Use	Transect	Average Use
1	AcHy 17% Slight	1	AcHy 88% Severe	1	AcHy 88% Severe	1	AcHy 36% Light
2	AcHy 17% Slight			2	AcHy 84% Severe	2	AcHy 2% Slight
3	ElEl 28% Light			3	ElEl 0% No Use	3	AcHy 8% Slight
4	ElEl 19% Slight			4	AcHy 23% Light	4	AcHy 8% Slight
5	AcHy 82% Severe			5	AcHy 56% Moderate	5	ElEl 6% Slight
6	AcHy 10% Slight			6	HeCo 62% Heavy	6	AcHy 12% Slight
7	ElEl 5% Slight			7	AcHy 12% Slight	7	HeCo 32% Light
				8	ElEl 1% Slight		

Photo 1: Heavy and Severe grazing in 2018 on the South Pasture in the River allotment taken from the key forage transect.

Photo 2: Severe grazing on Transect Five of the East Walker Allotment.

Photo 3: Transect 6 East Walker, key forage species showing non-use close to the ranch headquarters

Photo 4: Transect 7 East Walker, from the central portion of the allotment looking southeast.

Photo 5: Severe grazing off the Lucky Boy Pass road from trespass grazing on transect one.

Photo 6: A needlegrass dominated community on a higher elevation utilization transect (number three) on the Lucky Boy allotment

Photo 7: An ungrazed but available needlegrass species on transect six in the higher elevations of central Lucky Boy

Photo 8: A vigorous Indian Ricegrass typical of the flats in the Nine Mile allotment-Transect Five of a key forage transect.

5.0 Rangeland Health Assessment and Evaluation for the River, East Walker, Lucky Boy and Nine Mile Allotments

5.1 Standard 1. Soils

The soils RAC standard and the associated indicators were evaluated to determine the appropriate data sources and indicators from which to assess and evaluate whether the standard is being met. Select AIM indicators, IIRH Indicators, Trend Plots and Frequency Plots were used to evaluate the soils standard and its associated RAC indicators (Table 14). Data and information on bare ground, canopy gaps, trends in the plant community, invasive annual grass trends and signs of wind and water erosion provided the basis for this analysis. Rationale for the use of these indicators is elaborated upon in the sections below.

Table 17: RAC soil standard, associated indicators are listed along with data sources and specific indicators used to evaluate the standard.

RAC Standards	RAC Indicators	Data/Information Sources	AIM Indicators
(1) Soils Soil processes will be appropriate to soil types, climate and landform.	• Surface Litter appropriate to the potential of the site • Soil crusting formations in shrub interspaces, and soil compaction are minimal or not in evidence, allowing for appropriate infiltration of water • Hydrologic cycle, nutrient cycle and energy flow are adequate for the vegetative communities • Plant communities are diverse and vigorous, and there is evidence of recruitment • Basal and Canopy cover (vegetative) is appropriate for site potential	• IIRH • AIM (LPI, Canopy gap, Soil stability) • Frequency Trend Plot • Photo Trend Plot	• Soil Stability • Bare Ground • Canopy Gaps • Litter Cover • Annual Grass Cover

5.1.1 Interpreting Indicators of Rangeland Health (IIRH)

From 2017 to 2020, DIRH and IIRH assessments were conducted on 12 plots (table 18, appendix A, map 1), however, final ratings were not completed for three of the 12 plots (i.e. EW-Site 1, LB-Site 4, and CC-PJ-198) due to no available reference sheets for those ecological sites. Data were collected by terrestrial AIM crews and final ratings were completed by the Stillwater IDT. Final ratings for the three attributes - soil and site stability, hydrologic function and biotic integrity - were assessed using the preponderance of evidence approach as recommended in the IIRH technical reference (Pellant et al. 2018) and are summarized below.

Table 18: List of plots and their final ratings for the IIRH Assessment.

Allotment	Plot Name	Sample Date	ESD	Soil and Site Stability Rating	Hydrologic Function Rating	Biotic Integrity Rating
East Walker	CC-BlackLowSage-036	7/12/2017	R027XY015NV	NS	SM	ME
East Walker	EW-Site 1	9/20/2020	F026XY044NV	NA	NA	NA
East Walker	EW-Site 4	9/21/2020	R027XY018NV	NS	SM	ME
East Walker	EW-Site 7	9/21/2020	R027XY049NV	NS	SM	M
Lucky Boy	LB-Site 1	9/19/2020	R026XY038NV	NS	SM	M
Lucky Boy	LB-Site 4	9/19/2020	F026XY044NV	NA	NA	NA
Nine Mile	CC-BlackLowSage-058	7/27/2019	R027XY049NV	SM	M	M
Nine Mile	CC-PJ-198	7/1/2018	F026XY044NV	NA	NA	NA
Nine Mile	CC-WySage-261	7/27/2019	R029XY006NV	NS	SM	ME
Nine Mile	NM Site-1	7/8/2020	R027XY049NV	SM	SM	M
Nine Mile	NM Site-2	7/9/2020	R027XY049NV	SM	SM	SM
Nine Mile	NM Site-4	7/10/2020	R029XY049NV	SM	SM	M

NA indicates no available reference sheet.
NS indicates none to slight departure from reference.
SM indicates slight to moderate departure from reference.
M indicates moderate departure from reference.
ME indicates moderate to extreme departure from reference.

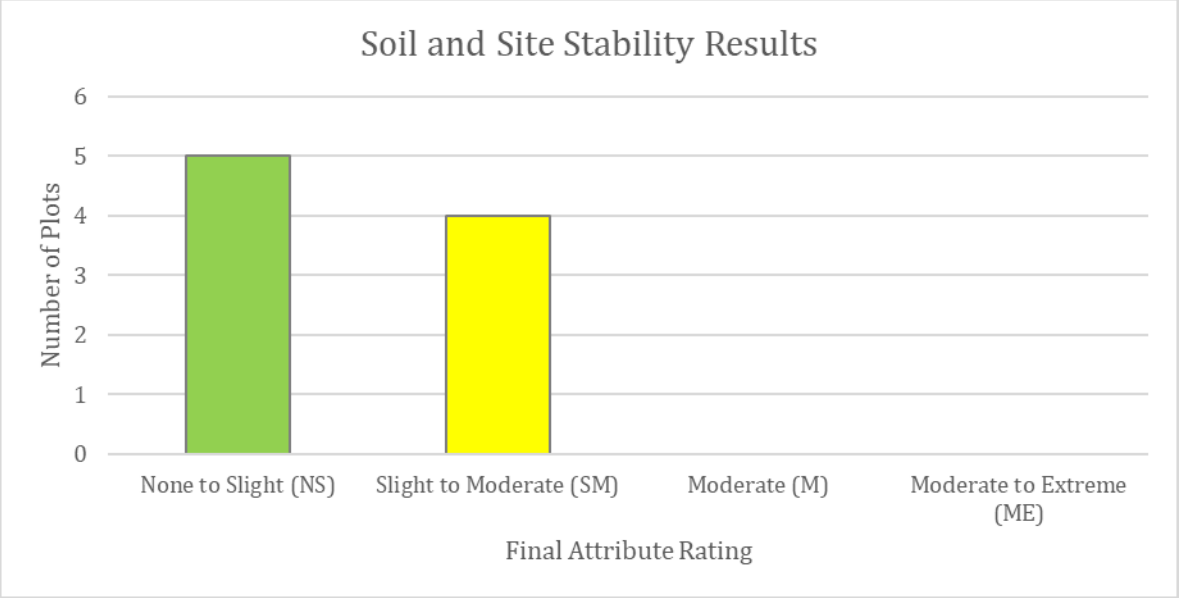
Soil and Site Stability

Final soil and site stability ratings revealed five plots (56 percent) with a none-to-slight departure and four plots (44 percent) with a slight-to-moderate departure (table 18, figure 3).

The slight to moderate departures from the four plots were attributed to observations of water flow patterns; increased bare ground and soil loss; and reduced soil stability. Water flow patterns result from the process of sheetflow or overland flow and are the paths that water follows as it moves across the soil surface during periods when surface water from rain or snowmelt exceeds soil infiltration capacity. Increased sheetflow can increase surface erosion and soil loss, especially when soil stability is low.

Increased bare ground and soil loss at these four sites were observed where there was exposed mineral soil not covered by vegetation (live or dead), gravel/rock, visible biological soil crusts, or litter. Soil loss reported was likely due to a reduction in protective cover, which typically intercepts raindrops, reduces soil particle detachment, and reduces soil movement by water and wind. Reduced soil stability at these sites also contributed to a lack of resistance of surface soil erosion.

Figure 3: Results for DIRH/IIRH Soil and Site Stability by Number of Plots per Rating



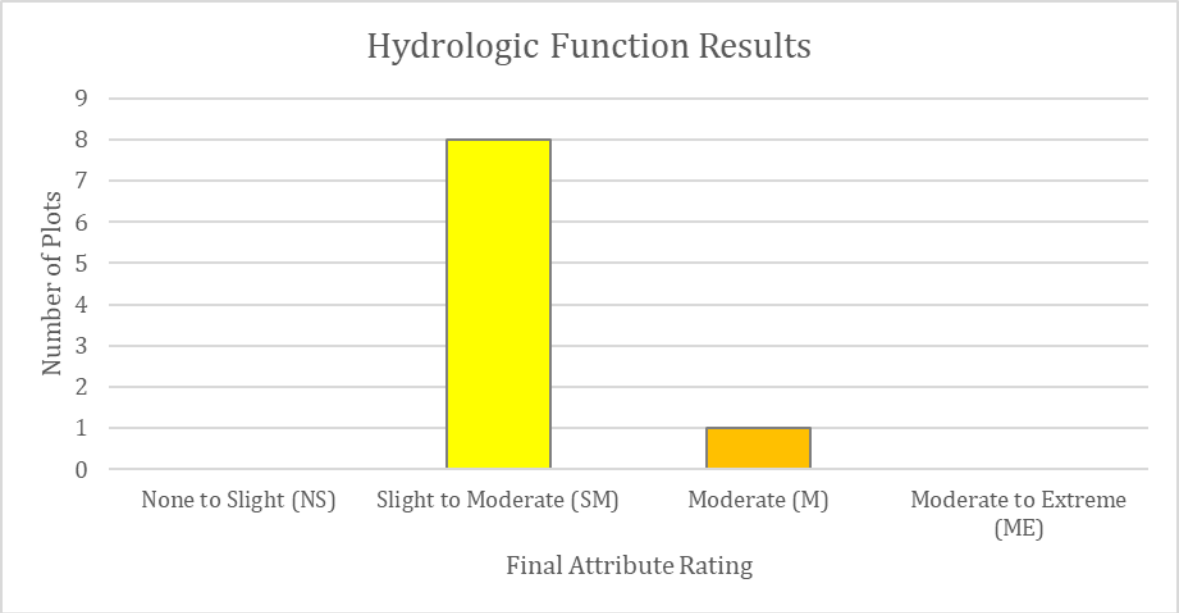
Hydrologic Function

Final hydrologic function ratings revealed eight plots (89 percent) with a slight-to-moderate departure and one plot (11 percent) with a moderate departure (table 18, Figure 4)

The slight to moderate departures from the eight plots were attributed to changes in percent litter cover, changes in plant community type and spatial distribution, and low soil stability within interspaces. The moderate departure from one plot also included increased bare ground cover and the presence of water flow patterns on plot.

The primary indicator common to all plots was the observed change in plant community which affects the infiltration capacity of the soil within the evaluation area and the amount of time water is retained on the soil surface. Infiltration effects due to changes in the plant community are commonly related to changes in soil litter, reduced soil stability, and increased bare ground, as also seen throughout these plots. The observation of these indicators and the presence of water flow patterns indicate water movement, and thus hydrologic function, has departed from reference states within the evaluated plots.

Figure 4: Results for IIRH Hydrologic Function by Number of Plots per Rating



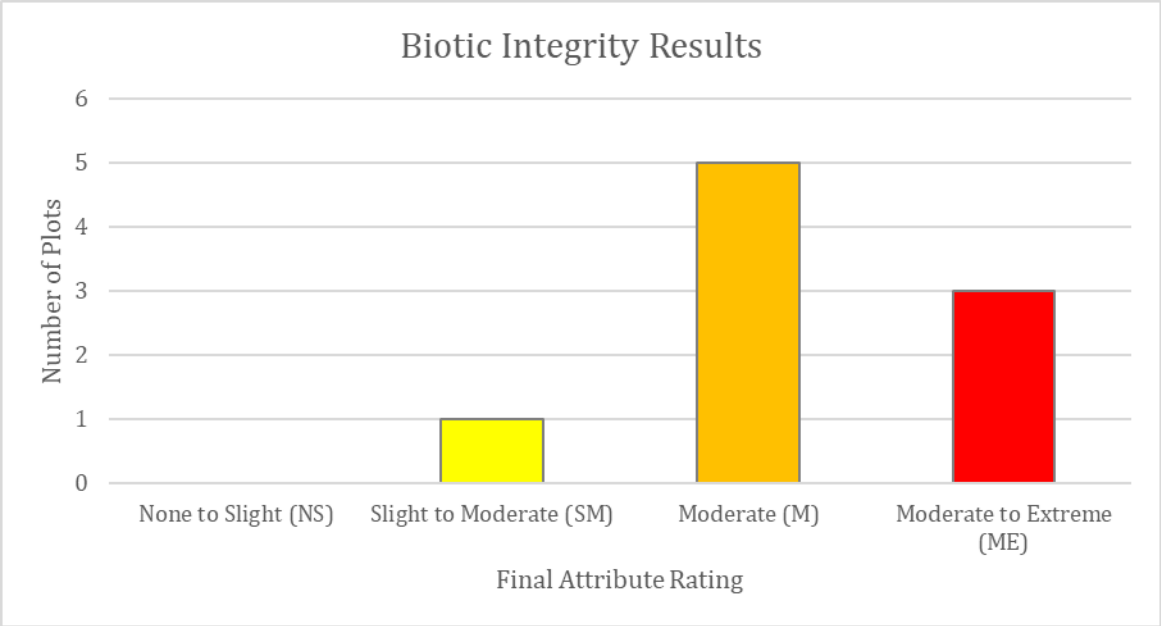
Biotic Integrity

Final biotic integrity ratings revealed one plot (11 percent) with a slight-to-moderate departure, five plots (56 percent) with a moderate departure, and three plots (33 percent) with a moderate-to-extreme departure from ecological site reference (table 18, figure5).

The slight to moderate departure from one plot was attributed to some changes in plant community composition and a decrease in soil stability. The moderate departures from five plots were attributed to changes in plant community type and distribution (reduction or loss of key plant species), reduction of plant vigor, and an increase in annual invasive plant species. The moderate to extreme departure at three sites had similar deviations from those indicators listed under a moderate reduction, however they had additional changes in litter cover and a complete loss of at least one functional/structure group. Two sites had a loss of the primary cool season, deep-rooted perennial grasses specific to the ecological site and the other site had an absence of the key shrub species (Bailey's greasewood).

The primary indicator that drove moderate and moderate to extreme departures from reference was a stark change in plant community composition and distribution, specifically the reduction or absence of key functional/structural groups such as cool-season, deep-rooted perennial grasses. Reduction or absence of these groups is a leading indicator in the decline of ecological site function. Functional/structural groups are grouped together on the basis of similar growth forms or ecophysiological roles. The resilience of a site to invasive plants and other disturbances are enhanced through a mixture of functional and structural plant groups. The reduction or loss of these groups within evaluated sites have led to an increase in cheatgrass or invasion of Pinyon pine-Utah juniper, a loss or reduction of plant vigor, and/or reproduction capability limiting the plant community's potential to rebound.

Figure 5: Results for IIRH Biotic Integrity by Number of Plots per Rating



5.1.2 AIM Data

The following sub-sections present LPI derived indicators, including litter cover, bare ground, and annual grass cover, canopy gap, and soil stability data from the AIM data as they relate to the soil standard and its associated indicators. Within the AIM protocol, the LPI method primarily captures quantitative data regarding ground cover comprised of vegetation, litter, rocks, and biological crusts (Herrick et al. 2017). Secondary information ascertained from LPI data is bare ground and plant composition. The canopy gap method is also used in the AIM protocol and used to determine the percent of gaps for different gap categories. Soil stability data is gathered at each plot to determine the stability of the soils on plot and in turn the erosion potential of the site.

Litter Cover and Bare Ground

Litter cover can positively influence hydrologic function by reducing erosion by protecting soil from raindrop impacts and facilitating infiltration. However, an increase in litter cover, specifically, may reduce infiltration and negatively affect seed germination and decomposition rates. Deviations in litter cover can be a result of changes in plant community composition or due to livestock grazing (Pellant et al. 2018).

Ground cover is one of the most important factors that impacts the water erosion potential of a site. It is positively correlated with soil and site stability as well as hydrologic function (Herrick et al. 2005). Because cover acts as a barrier to impede water flow, it inadvertently limits water and soil erosion. Inversely related to ground cover is bare ground. Larger amounts of bare ground can contribute to soil and water erosion. This negatively affects hydrologic function as high amounts of bare ground allows for water loss from the site before infiltration occurs. Bare ground can also indicate a decrease in forage and an increase in risk of invasives (Pellant et al. 2018). The reference range of values for the appropriate ecological site reference sheet were used as a benchmark when

comparing the litter cover and bare ground in order to determine a departure from site potential. Values that fall outside the reference range do not meet the benchmark whether above or below the benchmark range.

Results for litter cover and bare ground are in table 19 below. Percent litter cover for all plots ranged from 6 to 75.33 percent. Of the plots with identified benchmarks (n=8), percent litter cover results showed that seven plots (87.5 percent) were not meeting the set benchmarks and were above the benchmark range, while six met the benchmarks. Percent bare ground for all plots ranged from 0.67 to 58.67 percent. Of the plots with identified benchmarks (n=8), percent bare ground results showed that seven plots (87.5 percent) were not meeting the set benchmarks. Detailed results (table 16) show that five of the seven plots not meeting the bare ground benchmarks were above the set benchmark range, while two of the plots were below the benchmark range.

Table 19: Summary of AIM data results for litter cover and bare ground in comparison to benchmark values. Bolded values indicate values not meeting the benchmark range.

Allotment	Plot Name	Sample Date	ESD	Litter Benchmark (%)	Litter Cover (%)	Bare Ground Benchmark (%)	Bare Ground (%)
East Walker	CC-BlackLowSage-036	7/12/2017	R027XY015NV	NA	10.66	NA	5.33
East Walker	CC-PJ-208	8/24/2016	F026XY060NV	NA	18.67	NA	7.33
East Walker	EW-Site 1	9/20/2020	F026XY044NV	NA	75.33	NA	2
East Walker	EW-Site 4	9/21/2020	R027XY018NV	<5	**34**	20-50	**2**
East Walker	EW-Site 7	9/21/2020	R027XY049NV	10-20	**33.33**	15-20	**21.33**
Lucky Boy	LB-Site 1	9/19/2020	R026XY038NV	<60	**66.67**	10-20	**0.67**
Lucky Boy	LB-Site 4	9/19/2020	F026XY044NV	NA	55.33	NA	4
Nine Mile	CC-BlackLowSage-030	6/27/2016	F026XY044NV	NA	6	NA	16.67
Nine Mile	CC-BlackLowSage-058	7/27/2019	R027XY049NV	10-20	10	15-20	**34.66**
Nine Mile	CC-PJ-198	7/1/2018	F026XY044NV	NA	32	NA	11.33
Nine Mile	CC-WySage-261	7/27/2019	R029XY006NV	15-25	**14**	45-55	45.33
Nine Mile	NM Site-1	7/8/2020	R027XY049NV	10-20	**34**	15-20	**36**
Nine Mile	NM Site-2	7/9/2020	R027XY049NV	10-20	**24.67**	15-20	**38**
Nine Mile	NM Site-4	7/10/2020	R029XY049NV	15-25	**27.33**	40-50	**58.67**

Invasive Annual Grass Cover

Increases in invasive species cover may contribute to declines in soil and site stability and hydrologic function. Additionally, invasives may impact species composition and abundance and in turn negatively influence the nutrient cycle and energy flow within a system (Herrick et al. 2005). The invasive annual grass benchmarks (table 20) were derived from the NDOW's 2013 Wildlife Action Plan. The benchmarks were based on the key habitats in which the AIM plots occurred. These key habitat areas included the Intermountain Cold Desert Shrub (IMCDS), Sagebrush, Lower Montane Woodlands and Chaparral (LMWC), and Intermountain Coniferous Forests and Woodlands. Of the plots with identified benchmarks (n=8), two plots (25 percent) did not meet the invasive annual grass benchmark (table 20). Overall, total invasive cover at all plots ranged from 0 to 47.33 percent cover.

Table 20: Summary of AIM data results for annual grass cover in comparison to benchmark values. Bolded values indicate values not meeting the benchmark range.

Allotment	Plot Name	Sample Date	WAP Habitat Type	Benchmark	Annual Grass Cover (%)
East Walker	CC-BlackLowSage-036	7/12/2017	IMCDS	<15	**47.33**
East Walker	CC-PJ-208	8/24/2016	LMWC	NA	0.66
East Walker	EW-Site 1	9/20/2020	LMWC	NA	0
East Walker	EW-Site 4	9/21/2020	IMCDS	<15	**16.67**
East Walker	EW-Site 7	9/21/2020	Sagebrush	<20	0
Lucky Boy	LB-Site 1	9/19/2020	Intermountain Coniferous Forests and Woodlands	NA	10
Lucky Boy	LB-Site 4	9/19/2020	LMWC	NA	0
Nine Mile	CC-BlackLowSage-030	6/27/2016	LMWC	NA	0
Nine Mile	CC-BlackLowSage-058	7/27/2019	Sagebrush	<20	0
Nine Mile	CC-PJ-198	7/1/2018	LMWC	NA	0
Nine Mile	CC-WySage-261	7/27/2019	Sagebrush	<20	0
Nine Mile	NM Site-1	7/8/2020	Sagebrush	<20	0
Nine Mile	NM Site-2	7/9/2020	Sagebrush	<20	0
Nine Mile	NM Site-4	7/10/2020	Sagebrush	<20	0

(*) IMCDS is the abbreviation for Intermountain Cold Desert Shrub
(**) LMWC is the abbreviation for the Lower Montane Woodlands and Chaparral.

Canopy Gap Intercept

Canopy gap intercept data assesses sites for wind and water erosion potential, susceptibility to weed invasion, and helps in assessing related wildlife habitat indicators, such as hiding cover and thermal environment (Herrick et al. 2017). Literature suggests that gaps of less than 100 centimeters are at lower risk of erosion whereas gaps that are greater than 200 centimeters are at a

high risk of erosion (Okin et al. 2009). Based on this study, the IDT created a benchmark threshold of less than 20 percent canopy gaps over 200 centimeters. Percent canopy gaps greater than 200 centimeters of perennial and annual grass species were calculated (table 18). If the percent of canopy gaps greater than 200 on the plot was greater than 20 percent, then the canopy gap benchmark was not met. Canopy gap intercept data showed that eight of the 14 plots (50 percent) had more than 20 percent of canopy gaps greater than 200 centimeters not meeting the set benchmark (table 21).

Table 21: Summary of AIM data results for canopy gap in comparison to benchmark values. Bolded values indicate values not meeting the benchmark range.

Allotment	Plot Name	Sample Date	ESD	Benchmark	Canopy Gap >200cm (%)
East Walker	CC-BlackLowSage-036	7/12/2017	R027XY015NV	>20	3.4
East Walker	CC-PJ-208	8/24/2026	F026XY060NV	>20	**42.02**
East Walker	EW-Site 1	9/20/2020	F026XY044NV	>20	18.12
East Walker	EW-Site 4	9/21/2020	R027XY018NV	>20	26
East Walker	EW-Site 7	9/21/2020	R027XY049NV	>20	**23.69**
Lucky Boy	LB-Site 1	9/19/2020	R026XY038NV	>20	2.79
Lucky Boy	LB-Site 4	9/19/2020	F026XY044NV	>20	**54.84**
Nine Mile	CC-BlackLowSage-030	6/27/2016	F026XY044NV	>20	**54.77**
Nine Mile	CC-BlackLowSage-058	7/27/2019	R027XY049NV	>20	**30.39**
Nine Mile	CC-PJ-198	7/1/2018	F026XY044NV	>20	**58.96**
Nine Mile	CC-WySage-261	7/27/2019	R029XY006NV	>20	16.67
Nine Mile	NM Site-1	7/8/2020	R027XY049NV	>20	**24.4**
Nine Mile	NM Site-2	7/9/2020	R027XY049NV	>20	16.36
Nine Mile	NM Site-4	7/10/2020	R029XY049NV	>20	**52.88**

Soil Stability

Results for the soil stability indicator by ecological site for each AIM plot sampled between 2017 and 2021 are shown in table 22. Soil stability tests were conducted at each of the plots to provide information about the degree of soil structure development and resistance to erosion when exposed to wetting (Herrick et al. 2017). The reference values for the appropriate ecological site reference sheet were used as a benchmark when comparing the average soil site stability to determine a departure from site potential.

The mean value is the average of 18 total samples per plot which include the "under cover sample" for samples recorded under vegetation and "no cover sample" for samples recorded without vegetation. Of the plots identified (n=8), seven plots (87.5 percent) had a lower soil stability value compared to their reference range and therefore did not meet the benchmark (table 22).

Table 22: Summary of AIM data results for soil stability in comparison to benchmark values. Bolded values indicate values not meeting the benchmark range.

Allotment	Plot ID	Sample Date	ESD	Benchmark	Soil Stability
East Walker	CC-BlackLowSage-036	7/12/2017	R027XY015NV	NA	4.78
East Walker	CC-PJ-208	8/24/2026	F026XY060NV	NA	3.78
East Walker	EW-Site 1	9/20/2020	F026XY044NV	NA	3.61
East Walker	EW-Site 4	9/21/2020	R027XY018NV	2-4	3.5
East Walker	EW-Site 7	9/21/2020	R027XY049NV	3-6	**1.94**
Lucky Boy	LB-Site 1	9/19/2020	R026XY038NV	3-6	**2.94**
Lucky Boy	LB-Site 4	9/19/2020	F026XY044NV	NA	2.83
Nine Mile	CC-BlackLowSage-030	6/27/2016	F026XY044NV	NA	3.22
Nine Mile	CC-BlackLowSage-058	7/27/2019	R027XY049NV	3-6	**1.78**
Nine Mile	CC-PJ-198	7/1/2018	F026XY044NV	NA	2.89
Nine Mile	CC-WySage-261	7/27/2019	R029XY006NV	3-6	**1**
Nine Mile	NM Site-1	7/8/2020	R027XY049NV	3-6	**1.44**
Nine Mile	NM Site-2	7/9/2020	R027XY049NV	3-6	**1.33**
Nine Mile	NM Site-4	7/10/2020	R029XY049NV	3-6	**1.83**

5.1.3 Quadrat Frequency Method

Quadrat frequency method transects (Rangeland Monitoring – Trend Studies 4400-4, 1999a) were conducted at established plots in accordance with BLM protocol from the trend studies technical reference. Frequency plots were analyzed using a chi-square analysis at the 95 percent confidence interval. The plots, which were evaluated in 2018, were compared to their most recent reading when available and additionally to the first reading at the site.

East Walker E0001

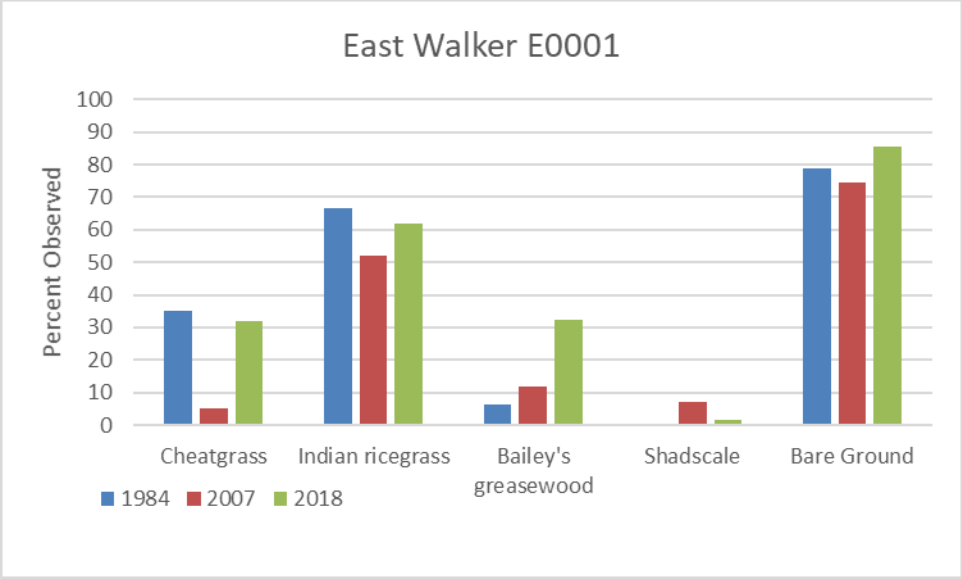
This transect is located north of the Flying M ranch on the northern panhandle of the East Walker allotment (Map one, Appendix A). The ecological site was delineated as a Gravelly Loam 4-8" PZ 027XY018NV. The reference plant community is dominated by Bailey's greasewood, shadscale and Indian ricegrass with an expected 25% grasses, 5% forbs and 70% shrubs. As ecological condition deteriorates, Bailey's greasewood and shadscale increase as Indian ricegrass and other palatable grasses and shrubs decrease. Species most likely to invade this site are cheatgrass and annual mustards. To analyze possible trends related to this ecological site we analyzed cheatgrass, Indian ricegrass, Bailey's greasewood and shadscale using a chi-square analysis at the 0.05 significance level between 2007 and 2018, then separately from 1984 and 2018.

For the 2007 to 2018 analysis we found with 95% confidence, cheatgrass, Bailey's greasewood and bare ground was increasing on the site (Figure 6. The trend for Indian ricegrass was not significant at the 95% confidence level, although the presence of Indian ricegrass in each frame was more than in 2007. Shadscale was found to be decreasing using this significant level. These

results indicate ecological deterioration from the invasion of cheatgrass. However, the mixed results of Indian ricegrass, shadscale and Bailey's greasewood don't necessarily implicate that deterioration is associated with grazing.

For the 1984 to 2018 analysis, we found no statistically significant change in cheatgrass, bare ground, shadscale or Indian ricegrass when using the same significance level (Figure 6). There was a significant increase in Bailey's greasewood between those two dates. It should be noted that in 1984 all 200 frames were read for bare ground, whereas in 2018 only the first half of the frames were recorded for bare ground. This arose from a discrepancy in the data sheet. The analysis was conducted by averaging the number of hits for bare ground so that both years could be compared.

Figure 6: A comparison of specific species from 1984, 2007 and 2018 related to ecological condition at E0001



East Walker E0002

This transect is located in the southern end of the East Walker allotment south of Lapon Canyon but still north of Rattlesnake Creek Canyon (Map One, Appendix A). The ecological site was delineated as a Loamy 8-10" PZ 029XY006NV. The reference plant community is dominated by Wyoming big sagebrush, Indian ricegrass and needleandthread with an expected 50% grasses, 5% forbs and 45% shrubs. Where management results in abusive livestock use by cattle and/or feral horses, Wyoming big sagebrush and Douglas rabbitbrush increase while Indian ricegrass, needlegrasses and fourwing saltbush decrease. Species likely to invade the site are annual forbs and cheatgrass. Utah juniper will readily invade this site and can dramatically increase and eliminate the understory vegetation. This is presented on figure 7.

To analyze trends on this ecological site we analyzed Indian ricegrass, Wyoming sagebrush, cheatgrass and fourwing saltbush using a chi-square analysis at the 0.05 significance level between 2007 and 2018, then separately from 2018 to 1984.

In the 2007 to 2018 analysis we were 95% confident that both Indian ricegrass and cheatgrass was

increasing on the site. Wyoming sagebrush and fourwing saltbush had a static trend. Photos show an adjacent draw with Utah juniper trees getting larger, but not spreading on to the upland site. These results suggest the site may be recovering from historic overgrazing. While 029XY006NV was the best fit for an ecological site, needleandthread grass was not present on the site even in its earliest readings in 1984.

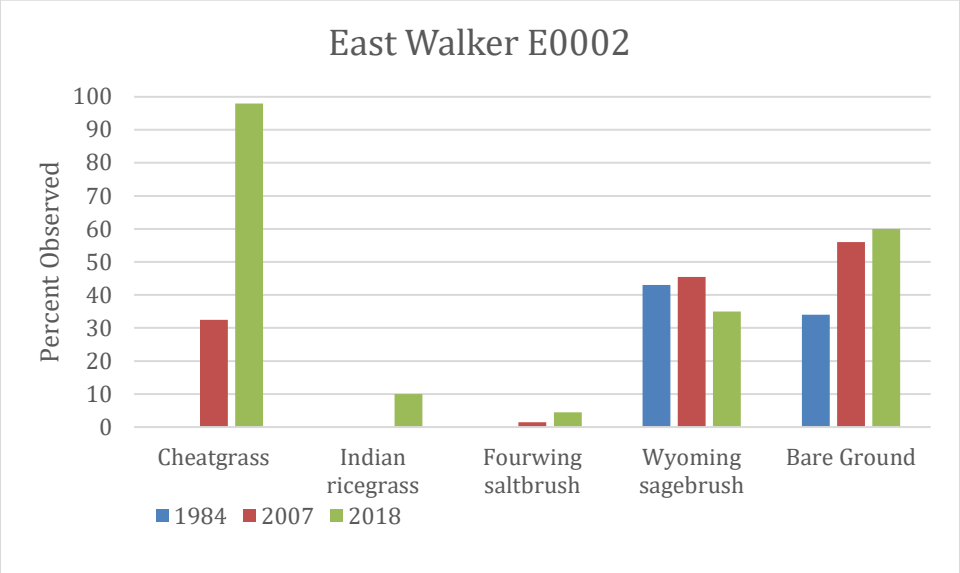
Using the same confidence interval between 1984 and 2018 we were able to show that both Indian ricegrass and fourwing saltbush were increasing (Photo 9). Neither of these species were recorded in the 1984 analysis although fourwing saltbush was mentioned as "trace" in the margins. Wyoming sagebrush and bare ground showed no statistical change. We were unable to analyze the historical change in cheatgrass because the frame size used for this species in 1984 was a 3" frame whereas in 2018 the 18" frame was read. Further complicating this was the 1984 analysis lumped cheatgrass and six weeks fescue together in one group, whereas in 2018 they were broken out.

Photo 9: A utilization "range" cage at frequency point E002 provides an example of utilized vs. unavailable forage in an area with frequently observed Wild Horse use.

This pattern in the vegetation community is typical of historic overgrazing. Initially this data lies in contrast to the southern frequency data at E002 (see above), but a closer look shows the nearest available water source at Chipmunk springs, north of this site 2.5 miles through rugged terrain. It is possible that the upland range at EW3 is being spared because horses dependent on the water at Chipmunk springs are not traveling that far for feed, or possibly the amount of water at Chipmunk springs is the limiting factor for the horse population. Pinyon-Juniper encroachment around Chipmunk Springs, which is documented by satellite imagery and historical photos may be reducing the surface expression of this water. While this is having a beneficial effect on outlying upland areas, this is a net negative value for those areas experiencing Pinyon-Juniper encroachment closer to the spring, as well as the wildlife and livestock dependent on that water

source. Census flight data has traditionally shown heavy horse concentration around this spring. A pinyon and juniper reduction project for this area took place in 2019.

Figure 7: A comparison of specific species from 1984, 2007 to 2018 related to ecological condition at E0002. The 1984 value for cheatgrass was unobtainable using the data recorded but not at zero.



Lucky Boy LB0001

This transect is located at the higher elevation area in the Lucky Boy allotment between 9,000 and 10,000 feet (Map one, Appendix A). It lies directly south of Lapon Meadows and east of Baldwin Canyon. The ecological site was delineated as a Loamy Slope 14+" PZ 026XY038NV. The reference plant community is dominated by western needlegrass and mountain big sagebrush. The expected vegetative composition is 65% grasses and grass like plants, 10% forbs and 25% shrubs. As ecological condition declines, big sagebrush, snowberry and rabbitbrush increase as western needlegrass decreases.

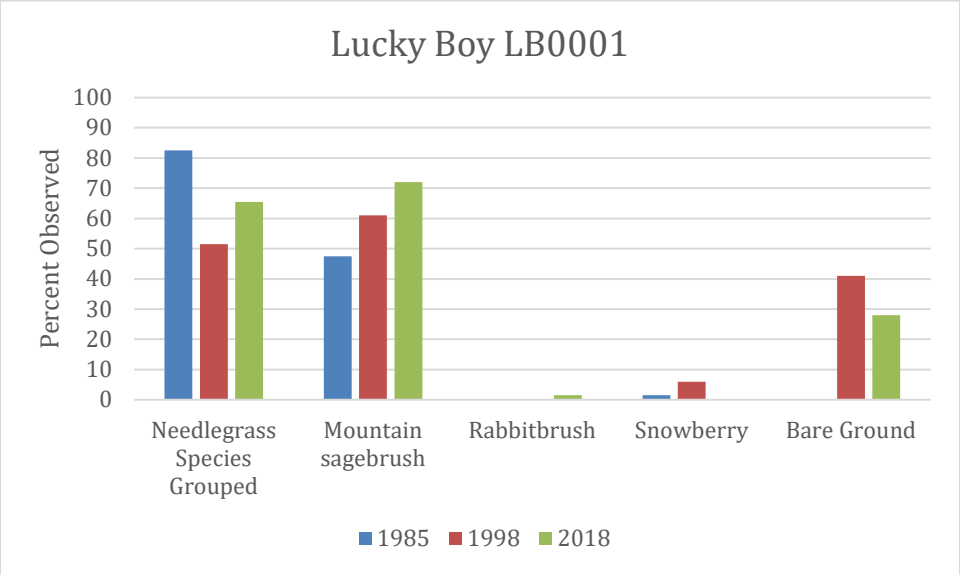
To analyze trends on this ecological site we analyzed needlegrass species grouped, mountain big sagebrush, rabbitbrush and snowberry between 1998 and 2018 using a chi-square analysis at the 0.05 significance level. Then a separate analysis was conducted between 1985, which was the earliest analysis and 2018. We chose to group needlegrass species together as the various needlegrass species present on this site (western needlegrass, Letterman's needlegrass, Thurber's needlegrass and pine needlegrass) can be hard to differentiate from one another at certain times of the year, especially when they are mingled together in dense vegetation. This seemed of benefit over removing the needlegrass analysis or risking incorrect data.

Between 1998 and 2018 we found that needlegrass species were increasing on the site. mountain big sagebrush and rabbitbrush had a static trend between these two periods (Figure 8). Snowberry and bare ground was found to be decreasing. These results indicate that ecological condition is not

in decline and may be improving.

Between 1985 and 2018 we found a significant decrease in needlegrass species on the site (Figure 8). Rabbitbrush and snowberry showed no change. Bare ground was not recorded in 1985 and therefore could not be analyzed. There was a significant increase in mountain sagebrush.

Figure 8: A comparison of specific species from 1985, 1998 and 2018 related to ecological condition at LB0001. Bare ground in 1985 was not recorded.



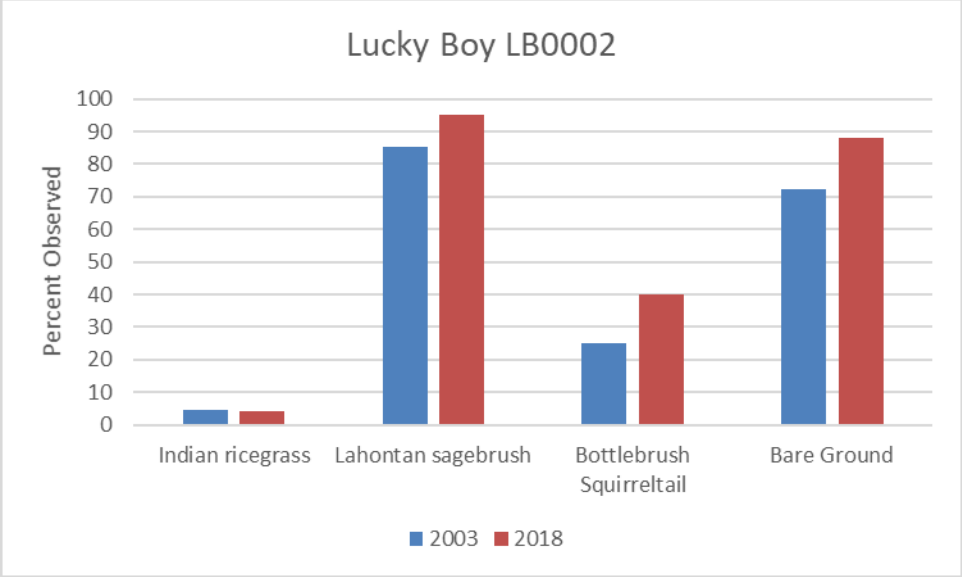
Lucky Boy LB002

This transect is located at the southern tip of the Lucky Boy allotment, close to the boundary with the Nine Mile allotment to the west and USFS land to the south (Map One, Appendix A). The ecological site was delineated as a Droughty Claypan 8-10" PZ 027XY070NV. The reference plant community is dominated by lahontan sagebrush, Indian ricegrass and desert needlegrass with the expected vegetative composition at about 40% grasses, 5% forbs and 55% shrubs. As ecological condition deteriorates, lahontan sagebrush and Bailey's greasewood increase as desert needlegrass and Indian ricegrass decrease, with continued degradation deep-rooted perennial grasses and forbs become scarce. Species likely to invade this site are annual mustards, filaree and cheatgrass.

To analyze trends on this ecological site we analyzed Indian ricegrass, lahontan sagebrush between 2003 and 2018 using a chi-square analysis at the 0.05 significance level, 2003 was the oldest recorded analysis at this site, it was also the most recent site to compare to 2018. Bailey's greasewood and desert needlegrass was not present on the site going back to its establishment in 2003. While desert needlegrass could have been removed from the site, it is unlikely that Bailey's greasewood was ever present. Cheatgrass was not present on the site in 2003 or 2018. This was not a perfect fit for an ecological site but it best reflected the ecological site and was therefore used. Because of this site not being a clear match, we also analyzed bottlebrush squirreltail, which is often described as a successional aid species.

At a 95% confidence level we found no change in Indian ricegrass (Figure 9). Lahontan sagebrush, bare ground, and bottlebrush squirreltail were found to be increasing. These mixed results suggest the site may be trending back towards the reference community of more deeply rooted perennial grasses such as Indian ricegrass, but also showed a lack of recovery of Indian Ricegrass and that bare ground did not decrease. It is likely that a historic event decreased these deep-rooted perennials but through succession the site is recovering.

Figure 9: A comparison of specific species from 2003 to 2018 related to ecological condition at LB0002



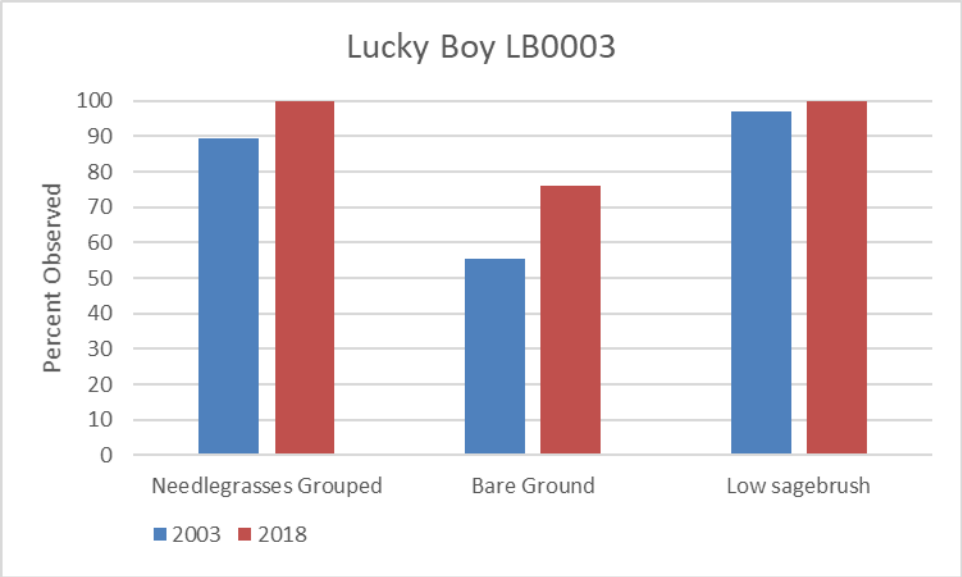
Lucky Boy LB0003

This transect is located in the central portion of the Lucky Boy allotment, directly south of Big Indian mountain and west of Corey Creek Canyon at a relatively higher elevation of 9,000-10,000 feet (Map one, Appendix A). The ecological site was delineated as a Mountain Ridge 026XY028NV. The reference plant community is dominated by low sagebrush and pine needlegrass. Prairie junegrass and bluegrasses are important plants associated with this site. The reference vegetative composition is 40% grasses, 5% forbs and 55% shrubs. As ecological condition declines, low sagebrush, rabbitbrush, Sandberg's bluegrass and mat-forming forbs increase as desirable forage grasses decrease. Cheatgrass is the species most likely to invade this site.

To analyze trends we looked at needlegrass species grouped and low sagebrush between 2003 and 2018 using a chi-square analysis at the 0.05 significance level. 2003 was the earliest the site was analyzed. Mat forming forbs weren't clearly delineated in the data enough to inform an analysis. Cheatgrass and rabbitbrush weren't present on the site. We chose to group needlegrass species together as the various needlegrass species present on this site (western needlegrass, Letterman's needlegrass, Thurber's needlegrass and pine needlegrass) can be hard to differentiate from one another at certain times of the year. This seemed of benefit over removing the needlegrass analysis or risking incorrect data.

We found that needlegrasses grouped as well as bare ground were increasing at a 95% confidence level (Figure 10). Low sagebrush remained static. These findings, together with the absence of cheatgrass and rabbitbrush suggest the site is stable and in good ecological condition.

Figure 10: A comparison of specific species from 2003 to 2018 related to ecological condition at LB0003

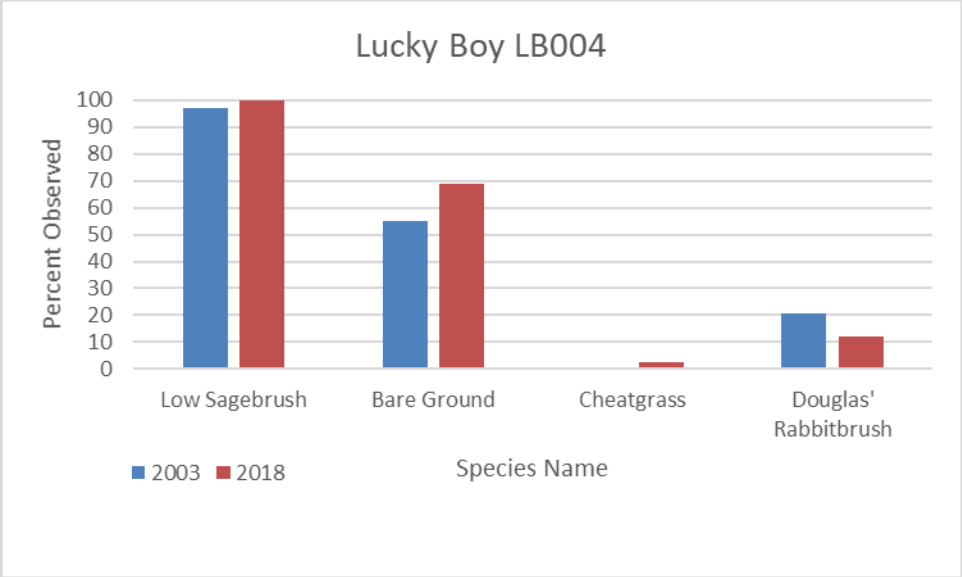


Lucky Boy LB004

This transect sits at the northern end of the Lucky Boy allotment directly northeast of Lapon canyon at a relatively higher elevation of 9,000-10,000 feet. The transect lies on HWAD lands but very close to the BLM boundary. Because of the placement of the fence, this land is essentially managed as BLM land. The ecological site was delineated as Claypan 14+" PZ 026XY039NV. The reference plant community is dominated by low sagebrush, Lettermen's needlegrass, bluegrasses and prairie junegrass. The reference vegetative composition is about 50% grasses, 15% forbs and 35% shrubs. As ecological condition declines, low sagebrush and Douglas' rabbitbrush will increase.

To analyze trend we looked at low sagebrush and Douglas' rabbitbrush between 2003 and 2018 using a chi-square analysis at the 0.05 significance level, 2003 was the earliest the site was analyzed and when the plot was established. The results showed low sagebrush and bare ground to be increasing at the 95% confidence level and Douglas' rabbitbrush and cheatgrass remained static (Figure 11). These mixed results suggest the site could be moving away from the reference but very gradually. The presence of many perennial grasses and forbs on the site suggests a high level of resilience and good habitat characteristics, although this trend is not statistically significant.

Figure 11: A comparison of specific species from 2003 to 2018 related to ecological condition at LB0004



Nine Mile NM002

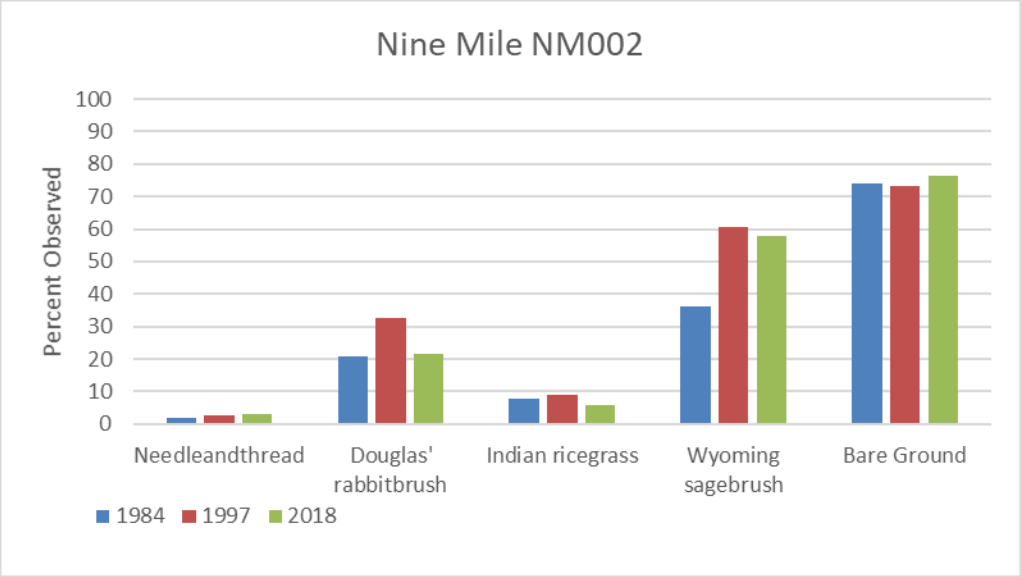
This transect lies on the southern end of the Nine Mile allotment just north of Mud Springs which is on USFS managed lands (Map one, Appendix A). The ecological site was delineated to a Loamy Slope 8-10" PZ 029XY010NV. Its reference plant community is dominated by Wyoming big sagebrush, Indian ricegrass and needleandthread. At its reference the vegetative composition is 45% grasses, 5% forbs and 50% shrubs. Where management results in excessive livestock use either by horses or cattle, Wyoming big sagebrush and Douglas' rabbitbrush increase while Indian ricegrass needlegrasses and fourwing saltbush decrease. Species likely to invade this site are annual forbs and grasses. Utah juniper readily invades this site where it occurs adjacent to juniper woodland areas. If this invasion of trees is allowed to close it can eliminate the understory community.

To analyze the possibility of these trends we looked at Wyoming sagebrush, Douglas' rabbitbrush, needleandthread and Indian ricegrass using a chi-square analysis at the 0.05 significance level between 1997 and 2018. Cheatgrass, fourwing saltbush and Utah juniper were not present on the site. The absence of fourwing saltbush on the site through all years including its establishment in 1984 suggests either the species had historically been removed from the site or there is a close but not perfect ecological site match. Wyoming sagebrush, needleandthread and Indian ricegrass remained static at a 95% confidence level. Douglas' rabbitbrush was found to be decreasing. This trend suggests ecological condition is in transition and could be best described as stable. However, the high amount of galleta grass suggests there was a historic disturbance. This relationship is established on other closely related ecological sites.

Another analysis was conducted between 1984 which was the earliest the site was read and 2018. This analysis was conducted at the same significance level as the 1997 and 2018 analysis. Between 1984 and 2018, there was no significant change for bare ground, needleandthread, Indian ricegrass

or rabbitbrush (Figure 12). There was a significant increase in Wyoming sagebrush.

Figure 12: A comparison of specific species from 1984, 1997 and 2018 related to ecological condition at NM0002



A summary of ecological condition trend for each of the plots is shown in Table 23.

Table 23: A summary of frequency plot statistics and their assessment on the ecological condition.

Allotment	Plot Name	Ecological Site	Ecological Condition Trend
East Walker	E001	027XY018NV	Declining
East Walker	E002	029XY006NV	Improving
Lucky Boy	LB001	026XY038NV	Improving
Lucky Boy	LB002	027XY070NV	Stable
Lucky Boy	LB003	026XY028NV	Stable
Lucky Boy	LB004	026XY039NV	Declining
Nine Mile	NM002	029XY010NV	Stable

5.1.4 Photo Plot Trend Studies

Originally eleven photo plot trend studies were considered for monitoring based on BLM's records. Of these, seven were on the Nine Mile allotment, one was on the Lucky Boy allotment and three were on the East Walker allotment. However, in locating these plots only three were found. Two were determined to be close enough to the old plot that landscape level pictures were still taken. The remaining six were either previously abandoned or had been transferred to the USFS or DoD through the previously discussed land exchanges. Below is the analysis and interpretation of those five sites still considered valid.

Nine Mile P4-1

This plot lies on the east side of the Nine Mile allotment, about 4.5 miles north of Fletcher spring

off of Pine Grove road (Map one, Appendix A). This plot has been converted to a landscape level plot as the angle irons which previously held the corners of the trend plot could no longer be located. In October of 2018 a landscape level photo was taken in the same location that this plot was historically read. This site most closely matches the ecological site description of a Sandy Loam 8-12" PZ 029XY049NV. Its reference community is dominated by Wyoming big sagebrush and Indian ricegrass, composed of 50% grasses, 5% forbs and 45% shrubs.

Where management results in excessive livestock use by cattle and/or feral horses, Wyoming big sagebrush, galleta, and Douglas rabbitbrush increase. Following wildfire, galleta, spiny hopsage and ephedra increase with rabbitbrush, horsebrush, and other fire tolerant shrubs. Species likely to invade this site are annuals such as mustards and cheatgrass. Where this site occurs adjacent to juniper or pinyon woodlands, Utah juniper and/or singleleaf pinyon readily invade onto this site. Tree canopy cover is 5 percent or less within the historic climax community. In the absence of natural fire, tree density can dramatically increase and, over time eliminate most understory.

Comparing photos from 2018 through a time series of photos going back to the plot's establishment in 1969 (Photos 10-12), no significant trends can be observed. However, a quantitative analysis of the plot in 1969 (Figure 12) found galleta to be 11% of the plant composition, Wyoming big sagebrush at 56% and Douglas rabbitbrush at 33%. Another quantitative read in 1979, showed those three species still dominating. No perennial grasses were observed. This suggests historic heavy grazing prior to 1969. The plot in 2018 when observed through the photographs, shows no discernable difference in the vegetation in comparison to all years, going back to 1969. This shows a similar plant community dominated by the same species since 1969 and suggests a stable ecological condition. No tree invasion or signs of wildfire were present.

Photo 10: Nine Mile trend study photo plot (PF 4-1) in 1969.

Photo 11: Nine Mile landscape trend study photo plot (PF 4-1) in 1969.

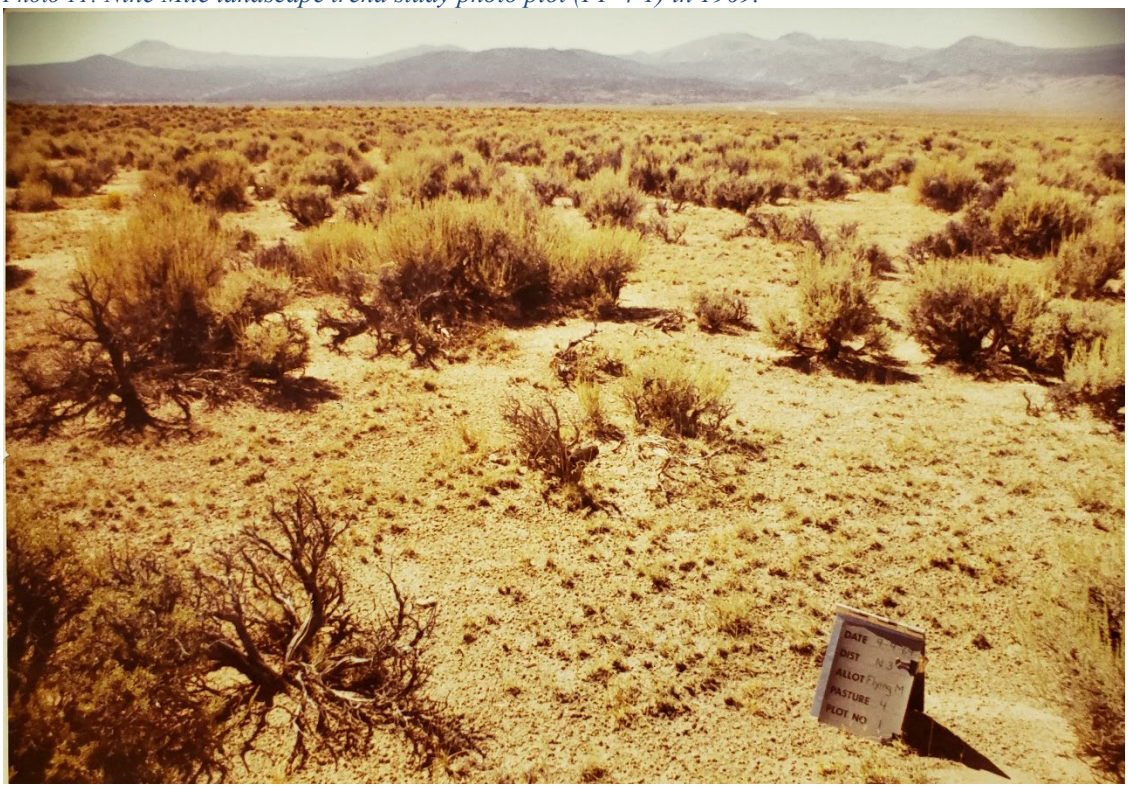
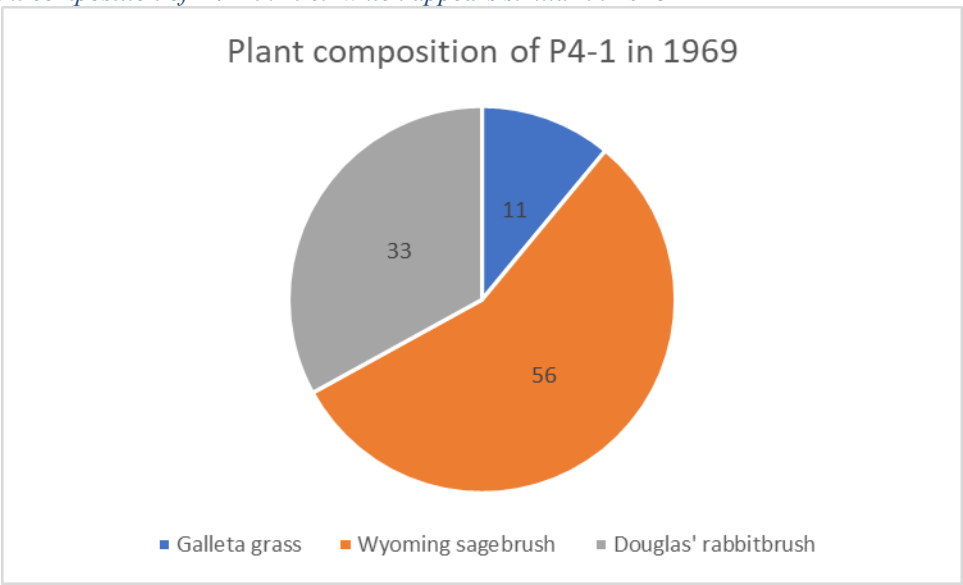


Photo 12: Nine Mile landscape trend study photo plot (PF 4-1) in 2018.

Figure 12: Plant composition of P4-1 in 1969 which appears similar in 2018



Nine Mile P4-2

This plot is located in the southern portion of the Nine Mile allotment just north of Mud Springs which is on USFS managed lands, it lies off of Lucky Boy pass road (Map one, appendix A). This plot was last read in October 2018. The ecological site description which most closely fit this plot is Gravelly Clay 8-10" PZ 026XY041NV. Its reference community is dominated by Lahontan sagebrush and desert needlegrass. Spiny hopsage and fourwing saltbush are other important species associated with this site, composed of 40% grasses, 5% forbs and 55% shrubs. As ecological condition declines, Lahontan sagebrush, rabbitbrush, bottlebrush squirreltail, and Sandberg's bluegrass increase as desert needlegrass decreases. Cheatgrass is the species most likely to invade this site.

Three species, which were present in 1969 were compared to the plot in 2018 using a chi-square analysis at the 0.05 significance level. Two perennial grasses, desert needlegrass and Indian ricegrass showed a static trend. Lahontan sagebrush increased significantly. No cheatgrass was observed on the site. This increase in Lahontan sagebrush suggests ecological decline. However, both the photographs and statistical analysis (Photos 13-16, Figure 13) confirm that perennial grasses are both present and healthy. The trend of this site is unclear.

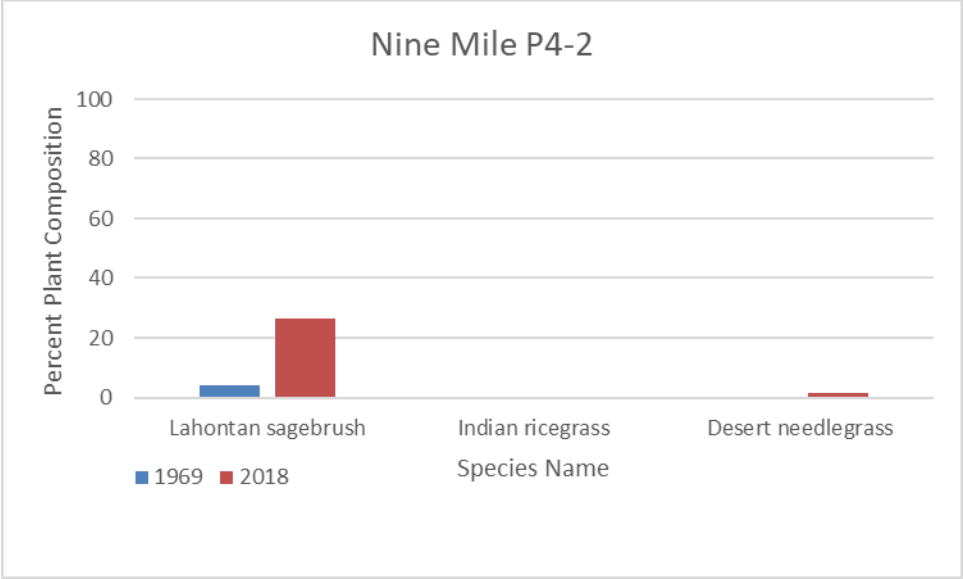
Photo 13: Nine Mile trend study photo plot (PF 4-2) in 1969.

Photo 14: Nine Mile landscape trend study photo plot (PF 4-2) in 1969.

Photo 15: Nine Mile trend study photo plot (PF 4-2) in 2018.

Photo 16: Nine Mile landscape trend study photo plot (PF 4-2) in 2018.

Figure 13: Plant composition of P4-2 in 1969 compared to 2018



Lucky Boy 2-2

This site lies in the southeastern portion of the Lucky Boy allotment. It is south of Corey Peak and around 0.5 miles northwest of the Lucky Boy pass summit (Map one, appendix A). It is just north of the Lucky Boy pass road. This plot has been converted to a landscape level plot as the angle

irons which previously held the corners of the trend plot could no longer be located. In October of 2018 a landscape level photo was taken in the same location that this plot was historically read (Photos 17-22).

The ecological site was delineated as a Loamy 10-12" PZ 029XY029NV. The reference plant community is dominated by big sagebrush, Indian ricegrass and needleandthread with an expected 55% grasses, 5% forbs and 40% shrubs. Stansbury's cliffrose is an important species associated with this site. Where management results in excessive livestock use by cattle and/or feral horses, big sagebrush, rabbitbrush and annual brome grass may dominate the site. As ecological condition declines, perennial grasses, antelope bitterbrush and fourwing saltbush decline. In the absence of periodic wildfire, singleleaf pinyon and Utah juniper readily invade this site where it occurs adjacent to these woodland areas. If juniper-pinyon canopies are allowed to close, they can eliminate understory vegetation.

In lieu of a statistical analysis, we observed these trends through the time series photos between 1969 and 2018 (Photos 17-22). It was quantitatively read twice, once in 1969 and again in 1979, but because of the removal or loss of the angle irons, these numbers could not be compared to the 2018 observation. In 2018 a quantitative measurement was taken at the closest estimated plot area (Figure 14). A clear observation from the photographs was an abrupt and severe change in grazing pressure on the perennial grasses between 1996 and 2018. Utah juniper also appears to be more frequent and denser in the landscape level photos. This site is in ecological decline from grazing pressure and tree invasion. This grazing pressure is most likely due to a cattle trespass issue from a neighboring ranch that BLM has worked to closely manage and document. The area has become challenging to manage because of the trespass issue. Wild horses are rarely seen this far south.

Photo 17: An estimated landscape plot for Lucky Boy 2-2 taken on October 5, 2018.

Photo 18: An estimated ground level plot for Lucky Boy 2-2 taken on October 5, 2018. Compared to the photos 1996.

Photo 19: A landscape plot for Lucky Boy 2-2 taken in 1993.

Photo 20: A ground level plot picture for Lucky Boy 2-2 taken in 1993.

Photo 21: A ground level plot picture for Lucky Boy 2-2 taken in 1969.

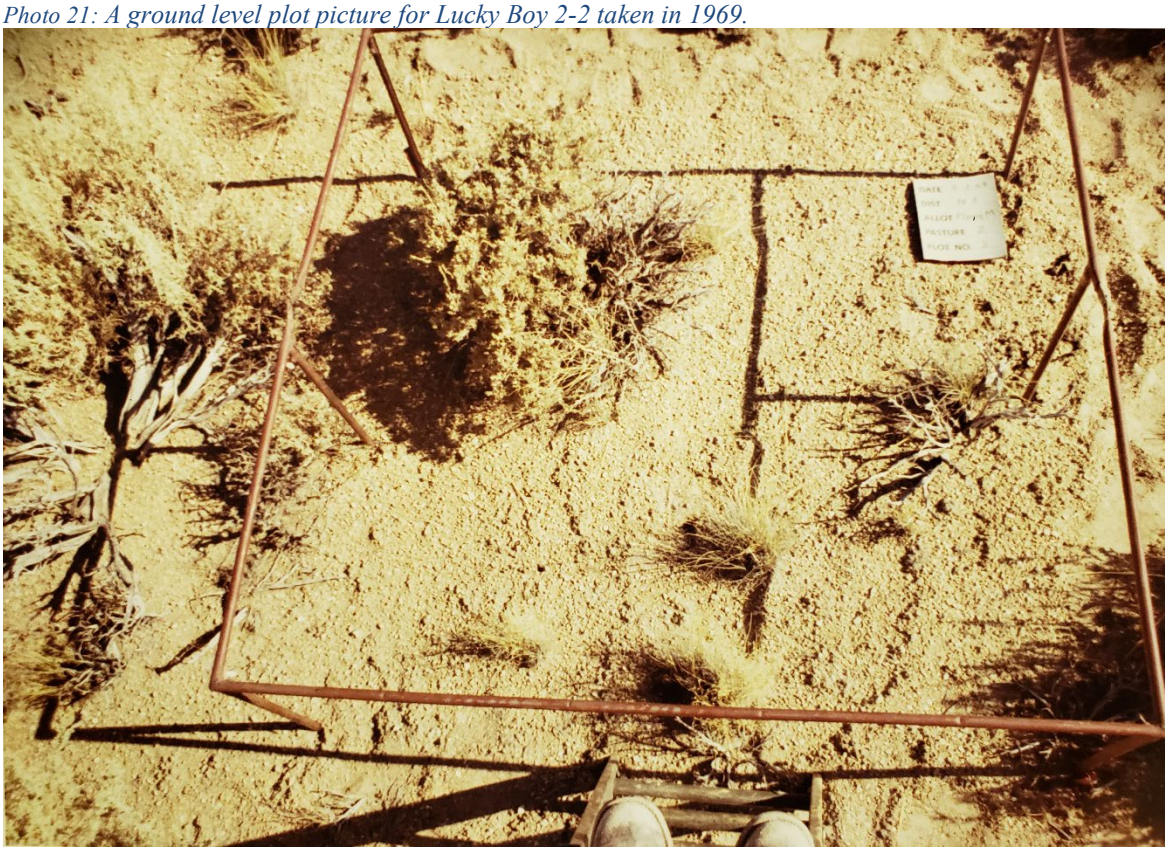
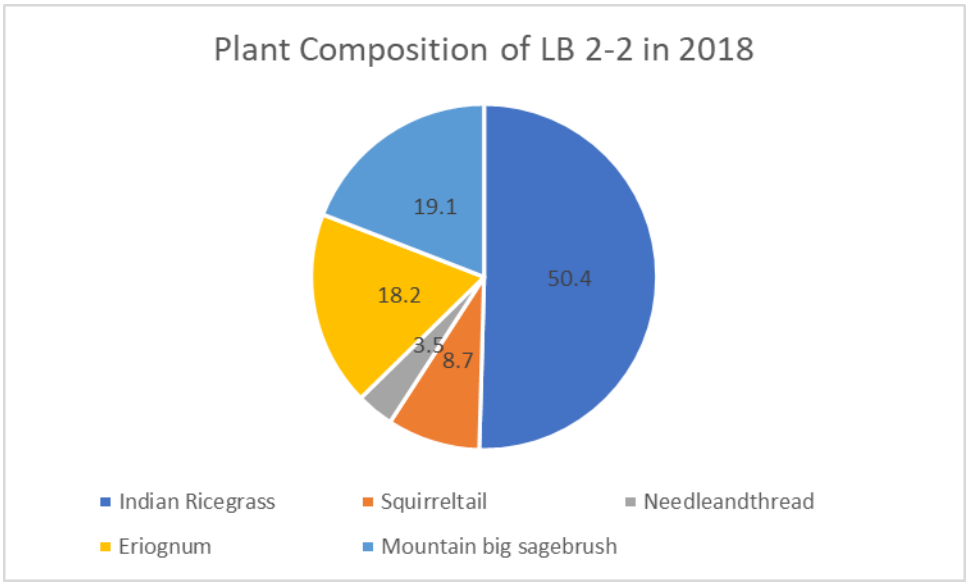


Photo 22: A landscape level plot picture for Lucky Boy 2-2 taken in 1969.

Figure 14: Plant composition of Lucky Boy plot 2-2 in 2018, this site was an estimated location due to the angle irons disappearing.



East Walker 1-2

This plot lies off of Pine Grove Flat road on the east side of the East Walker allotment. It is about 2.8 miles north of Mitchell Spring (Map one, Appendix A). This site most closely correlates with a Stony Slope 4-8" P.Z. 027XY019NV. This site was last read in September 2018. It is dominated by Bailey's greasewood, shadscale and Indian ricegrass. Potential vegetative composition is about 25% grasses, 5% forbs and 70% shrubs.

As ecological condition declines, shadscale, littleleaf horsebrush and Bailey's greasewood increase as Indian ricegrass decreases. After wildfire, galleta and cheatgrass can dominate the plant community. The species most likely to invade this site is cheatgrass.

No quantitative data was recorded for this site except for its most recent reading in 2018 (Photo 23). We relied on pictures to assess ecological trend at this site and make inferences (Figure 15). There was a time series of photos going from 2018 to 1976 (Photo 23-26). The photos showed no noticeable trend in the plant community during this time. In 2018 grass composition at the site was dominated by galleta grass with a trace of cheatgrass (Figure 15). Shadscale and spiny hopsage were also present in the plot. The photos therefore suggest that the ecological site may have had a wildfire prior to 1976 and now is comprised more of galleta grass then other perennial grasses. However, the site appears to be relatively static in trend. The risk of cheatgrass expansion is present since this site is vulnerable to that invasion and the plant community has been altered. Cheatgrass being present in the plot increases the chances that it will continue to invade the site with ongoing disturbances.

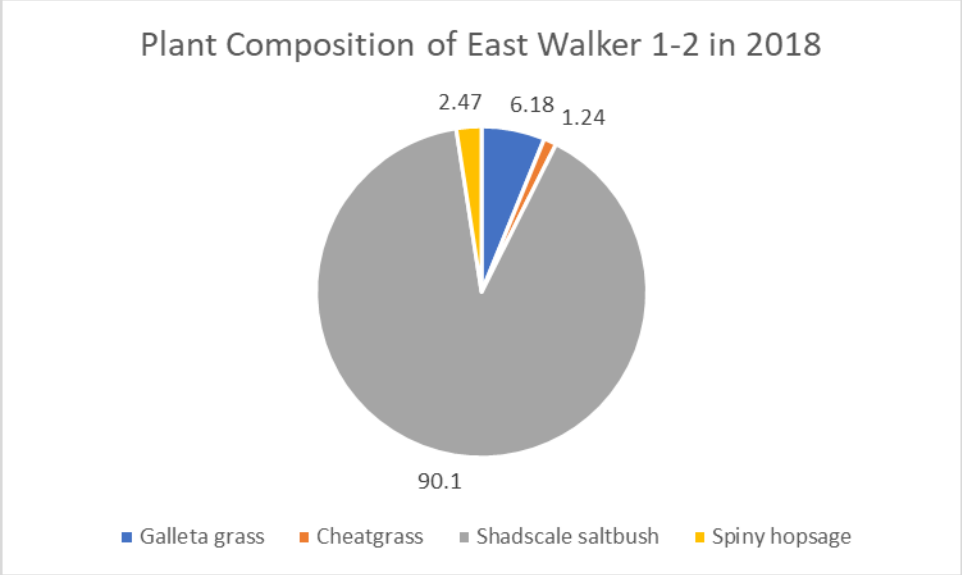
Photo 23: East Walker trend study photo plot (EW 1-2) in 2018.

Photo 24: East Walker landscape trend study photo plot (EW 1-2) in 2018.

Photo 25: East Walker trend study photo plot (EW 1-2) read in 1996.

Photo 26: East Walker trend study photo plot (EW 1-2) read in 1972

Figure 15: Plant composition of East Walker plot 1-2 in 2018, this site had no past quantitative readings to compare to.



East Walker 2-1

This plot lies in the eastern central portion of the East Walker allotment. It is about 3.8 miles directly north of Mitchell Spring (Map one, appendix A). This site most closely correlates Gravelly Loam 4-8" P.Z. 027XY018NV and it is dominated by Bailey's greasewood, shadscale and Indian ricegrass composed of 25% grasses, 5% forbs and 70% shrubs. As ecological condition deteriorates, Bailey's greasewood and shadscale increase as Indian ricegrass and other palatable grasses and shrubs decrease. Species most likely to invade this site are cheatgrass and annual mustards.

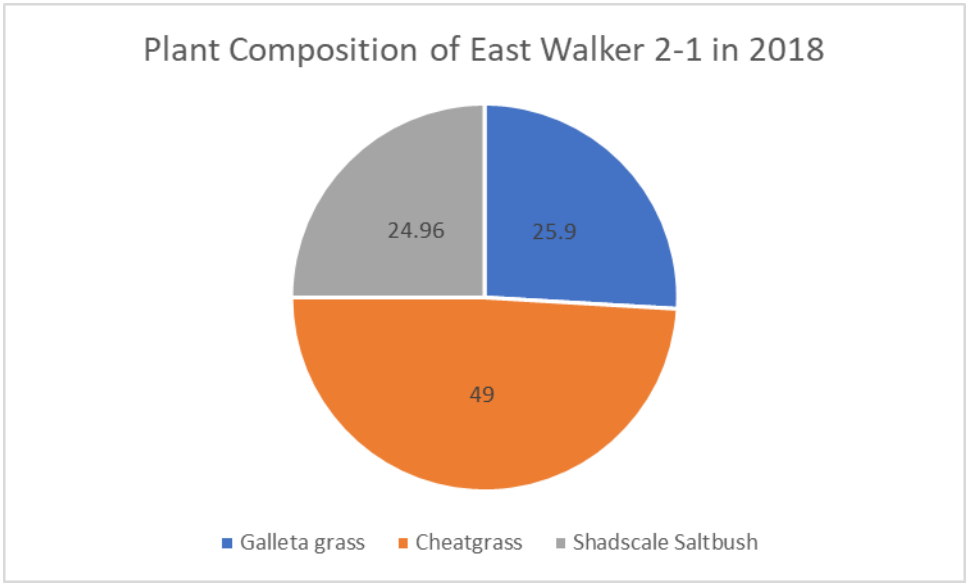
No quantitative data was recorded for this site except for its most recent reading in 2018. We relied on pictures to assess ecological trend at this site and make inferences. There was a time series of photos going from 2018 to 1972 (Photos 27-29). The most apparent finding from the photos was a boom of cheatgrass beginning in the early 1980s. Photos prior to that showed more galleta grass and bare ground. In 2018 the site looks similar to the photos following this cheatgrass boom. In 2018 cheatgrass made up 49% of the plant community composition (Figure 16). This ecological site is in decline and is in a transition to being entirely dominated by annual grass.

Photo 27: East Walker landscape trend study photo plot (EW 2-1) read in 2018

Photo 28: East Walker trend study photo plot (EW 2-1) read in 2018

Photo 29: East Walker trend study photo plot (EW 2-1) read in 1972

Figure 16: Plant composition of East Walker plot 2-1 in 2018, this site had no past quantitative readings to compare to.



Trends taken from the plot statistics above are summarized in table 23 below.

Table 23: A summary of trend plot statistics and their assessment on the ecological condition.

Allotment	Plot Name	Ecological Site	Ecological Condition Trend
Nine Mile	P4-1	029XY049NV	Stable
Nine Mile	P4-2	026XY041NV	Unclear
Lucky Boy	2-2	029XY029NV	Declining
East Walker	1-2	027XY019NV	Stable
East Walker	2-1	027XY018NV	Declining

5.1.5 Standard One – Soils Data Evaluation Finding

Evaluation Finding

☐ Achieving the standard

☐ Not achieving the standard, but making significant progress toward achieving the standard

☒ Not achieving the standard

5.1.6 Standard One – Soils Data Rationale for Evaluation Finding

After reviewing multiple lines of evidence, both qualitative and quantitative, the IDT found RAC resource one (soils) is not being achieved for the following reasons. Lucky Boy trend plot 2-2 and East Walker trend plot 2-1 are in ecological decline. Frequency plots LB004 on Lucky Boy and E001 on East Walker are also in ecological decline.

IIRH data revealed that in 44 percent of the plots, there was a slight to moderate departure in the soil/site stability attribute caused by an increase in water flow patterns, increased bare ground and soils loss and a reduction in soil stability. Bolstering this observation, AIM data showed only one plot was meeting the expected values in litter cover, soil stability and bare ground, the rest of the plots had departed from the reference or achieved a rating of not applicable. The invasive species attribute only found two plots to be meeting the expected values, which would be no invasive species. Most of these invasive species were cheatgrass, a problem ubiquitous to the great basin, but still very problematic in its ability to transition landscape level change to a less desirable state. Half of the plots had values in the Canopy Gap measurement which fell outside the expected range.

Related to the AIM and IIRH data, frequency plot data showed ecological condition to be mixed with two plots in decline, two plots improving and the remaining three showing an unclear trend either through mixed results or showing a more static trend. This was bolstered by the more qualitative trend data, where none of the five plots evidenced an improving trend. Some areas showed signs of erosion, as well as Cheatgrass expansion, a problem ubiquitous to the Great Basin. However, the regeneration of perennial grasses at many sites, along with the health of the majority

of the riparian areas showed that the rangeland is being managed in a way to improve ecological function. Many of the sites that failed to match reference community standards are showing legacy signs of historic but not current overuse. The wild horse over-population coupled with drought circa 2012 was one of these legacy impediments towards ecological health, and like many areas in Nevada, historic overuse may have shifted more favorable perennial grass forage species towards less desirable forage species. However, continued prudent management by the permittee, maintenance of riparian protection structures and the Pinyon-Juniper treatments conducted by the BLM in 2019 will all continue to enhance soil ecological functions such as hydrologic flow and soil stability towards a resilient and sustainable state. This is evident by many of the perennial grass species in our data showing robust and vigorous characteristics, which will begin to restore the hydrologic function of these systems.

5.2 Standard 2. Riparian and Wetlands

The riparian and wetlands RAC standard and the associated indicators were evaluated to determine the appropriate data sources and indicators from which to assess and evaluate whether the standard is being met. The PFC assessments and lotic AIM data were the primary sources of data used to evaluate this standard (Table 22). Appendix A, map 4 shows the locations where these data were collected within the Allotments, and Appendix A, map 2 shows the locations of all water sources within the allotment, including springs, seeps, streams, and wells.

Table 24: RAC Riparian and Wetland Standard and Associated Indicators with Corresponding Data Sources Used to Evaluate the Standard.

RAC Standard	RAC Indicators	Data/Information Sources
(2) Riparian/Wetlands **Riparian/wetland systems are in properly functioning condition.**	• Sinuosity, width/depth ratio and gradient are adequate to dissipate streamflow without excessive erosion • Riparian vegetation is adequate to dissipate high flow energy and protect banks from excessive erosion • Plant species diversity is appropriate to riparian-wetland systems	• PFC • Lotic AIM

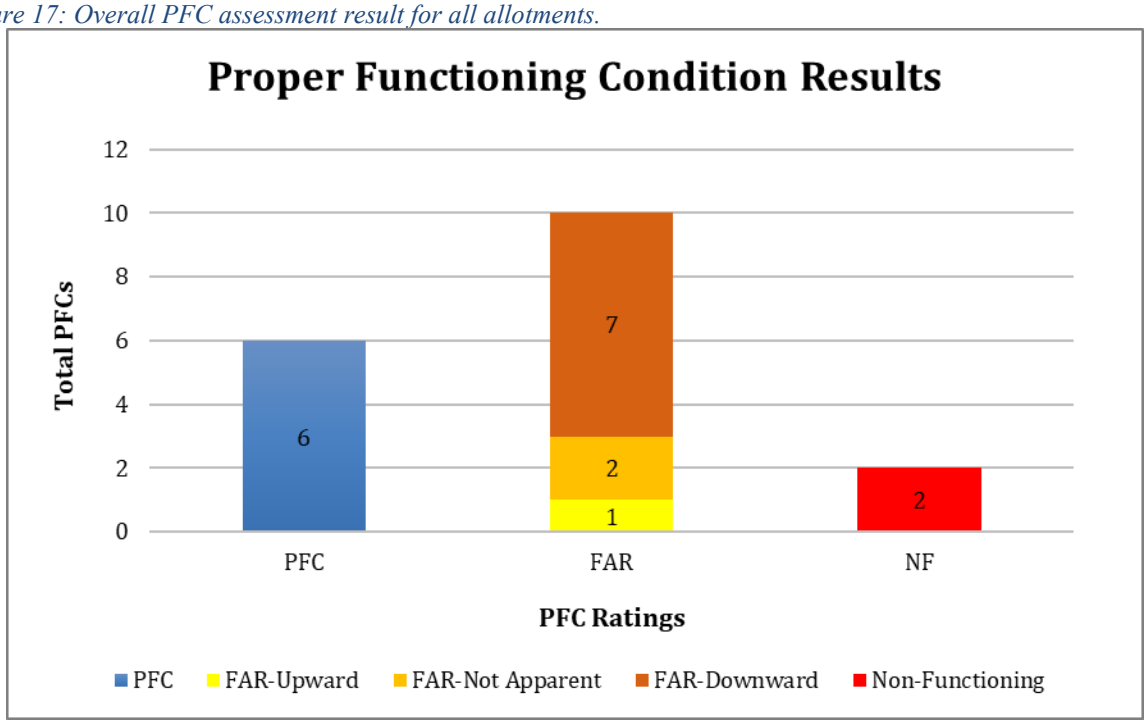
5.2.1 Proper Functioning Condition (PFC) Assessments

From 2018-2020, a total of 18 assessments were completed (Appendix A, map 4) in the field by a BLM IDT consisting of a rangeland management specialist, hydrologist/soil scientist, wildlife biologist, botanist, and seasonal range technicians. Most sites assessed did not include a hydrologist, botanist, or wildlife biologist on the IDT for field assessments, however all PFCs were reviewed by the staff specialists and it was determined only one site required a revisit. Additionally, nine PFC assessments were conducted between 2000-2012. Some of these sites were done in the same wetlands or riparian systems, providing data on observed trend.

The wetland-riparian areas assessed include lotic (stream) reaches and springs with some of the

spring sites being protected by exclosures. Of the 18 assessments, six (33 percent) sites were rated as PFC (Rattlesnake Spring Exclosure, Baldwin Canyon Headwaters Exclosure, Corey Canyon Creek South Fork, Lapon Canyon Creek Upper, Fletcher Spring Exclosure, and East Walker River North); one (6 percent) site was rated as FAR with an upward trend (Lapon Canyon Creek Lower); two (11 percent) sites were rated as FAR, trend not apparent (TV Canyon Creek Upper and East Walker River South) ; seven (39 percent) sites were rated as FAR with a downward trend (Bird Dog spring, Mitchell spring, Lapon Meadows Upper Exclosure, Lapon Meadows Lower Exclosure, Powell Canyon Creek, TV Canyon Creek Lower, and Baldwin Canyon Creek); and 2 (11 percent) sites were rated as non-functioning (Rattlesnake Creek Headwaters and Granite Spring) (figure 17; table 25; appendix A, maps 2-3).

Figure 17: Overall PFC assessment result for all allotments.



The following table 25 and figure 18 detail each of the 18 PFC assessments with correlated ratings and associated contributing factors. Six contributing factors were observed in the field by the IDT specialists during site visits and were developed to assist with PFC ratings and site evaluations. Of the 18 PFC assessments, four (22 percent) documented bank shearing and trampling from livestock; four (22 percent) had channelization and excessive vertical and/or horizontal movement of the stream channel; six (33 percent) had a visible decrease in riparian vegetation from multiple sources (overgrazing, channel movement, incision, and erosion); three (16 percent) had range improvements that were in disrepair or not functioning which resulted in impacts to riparian and wetland areas; eight (44 percent) had encroachment of upland vegetation, such as pinyon-juniper trees, rabbitbrush and sagebrush; and eleven (61 percent) documented outside influences that resulted in degradation or reduced function of riparian and wetland areas, such as road encroachment, trailing, or upland watershed degradation. These factors can help identify what natural causes and/or management-based actions may be contributing to a decline in riparian or wetland function, thus assisting in development of management decisions that may improve

riparian-wetland function.

In addition to identifying contributing factors during PFC assessments, livestock and wild horse use was also observed and documented. During site evaluations all sites had some observations of livestock use by physical observation of cattle, fecal matter, and/or hoof prints, however the extent of use varied between sites; eight (44 percent) of the 18 assessments documented undefined use by wild horses however many of these sites were located within an HMA where documented use has been observed in the past.

Table 25: Details of PFC Assessment Results.

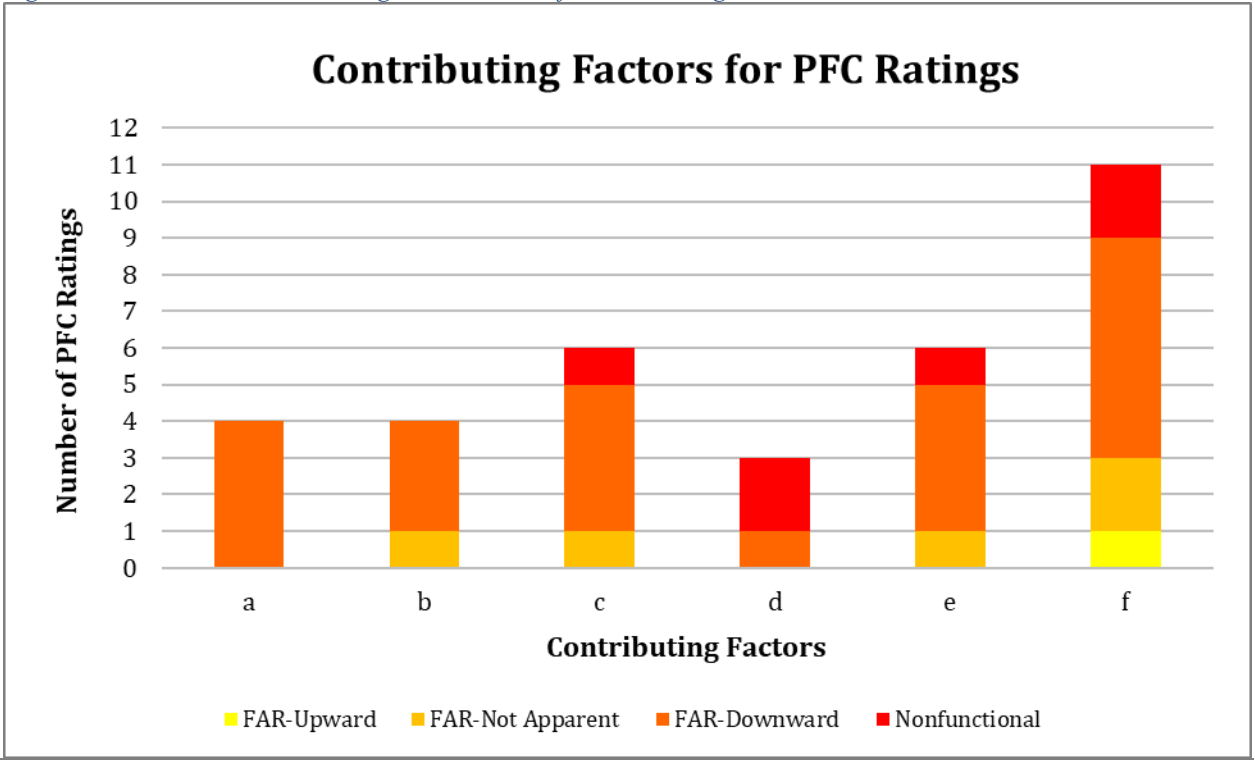
Name	Date Assessed	Easting	Northing	Acres/ Miles	[1]Rating	Trend	[2]Contributing Factors
Bird Dog Spring	6/10/2020	334085	4269204	0.04 ac	FAR	Downward	a, c, e, f
Mitchell Spring	11/16/2018	333106	4265862	0.96 ac	FAR	Downward	e, f
Rattlesnake Creek Headwaters	11/16/2018	336377	4264006	1.20 ac	NF		d, f
Rattlesnake Spring (Exclosure)	6/25/2019	335687	4263135	0.25 ac	PFC		
Baldwin Canyon Headwaters (Exclosure)	7/23/2019	341060	4263694	0.19 ac	PFC		
Corey Canyon Creek (South Fork)	11/27/2018	344326	4259416	0.19 mi	PFC		
Lapon Canyon Creek (Lower)	11/19/2018	338763	4267486	0.41 mi	FAR	Upward	f
Lapon Canyon Creek (Upper)	11/19/2018	339663	4266952	0.70 mi	PFC		

Name	Date Assessed	Easting	Northing	Acres/ Miles	[1]Rating	Trend	[2]Contributing Factors
Lapon Meadows (Upper Exclosure)	7/1/2019	341824	4266093	0.38 ac	FAR	Downward	a, b, e, f
Lapon Meadows (Lower Exclosure)	7/1/2019	341685	4266059	0.31 ac	FAR	Downward	a, c, d, e, f
Powell Canyon Creek	11/20/2018	347937	4257260	0.87 mi	FAR	Downward	c, e, f
TV Canyon Creek (Lower)	11/20/2018	346457	4256753	0.69 mi	FAR	Downward	a, b, e
TV Canyon Creek (Upper)	11/20/2018	345515	4257357	0.76 mi	FAR	Not Apparent	b, e, f
Baldwin Canyon Creek	11/19/2018	339259	4259419	0.44 mi	FAR	Downward	b, c, f
Fletcher Spring (Exclosure)	11/16/2018	333753	4247921	2.63 ac	PFC		
Granite Spring	6/25/2019	334962	4260317	0.46 ac	NF		c, d, e, f
East Walker River (North)	11/14/2018	327638	4276162	0.64 mi	PFC		
East Walker River (South)	11/14/2018	326020	4272727	1.0 mi	FAR	Not Apparent	c, f

[1]Ratings:
PFC = Proper Functioning Condition
FAR = Function-at-Risk
NF = Nonfunctional
[2]Contributing Factors. See Appendix D for definitions.

Name	Date Assessed	Easting	Northing	Acres/ Miles	[1]Rating	Trend	[2]Contributing Factors
a. Bank shearing and trampling from livestock b. Channelization and excessive vertical/ lateral movement c. Decreased riparian vegetation d. Range improvements or structures not functioning e. Encroachment of upland vegetation f. Road encroachment, trailing, or upland watershed degradation							

Figure 18: Cumulative Contributing Factor Results for PFC Ratings



a	Bank shearing and trampling from livestock
b	Channelization and excessive vertical/lateral movement
c	Decreased riparian vegetation
d	Range improvements or structures not functioning
e	Encroachment of upland vegetation
f	Road encroachment, trailing, or upland watershed degradation

Previous PFC Assessments

This rangeland health assessment draws on wetland-riparian data collected from November 2019 to June 2020, however PFC data collected during the summer and fall months of 2000-2001 are also used in this assessment to determine overall riparian health changes throughout the allotments and as a comparison of trend. Table 26 outlines, and compares, the PFC data collected in 2000-

2001 ratings (and associated trend) to the PFC data collected in 2018-2019. Of the seven comparable PFC assessments, two (28 percent) ratings remained the same for East Walker River (North) and Rattlesnake Spring (Exclosure) presented below in photo 30; three (42 percent) assessments had declined ratings for Baldwin Canyon Creek, East Walker River (South), and Mitchell Spring; and two (28 percent) assessments had improved ratings for Fletcher Spring and Lapon Meadows (Exclosure). Three assessments, Big Indian Spring, Lapon Canyon (South) and Lapon Canyon (West Fork), had no comparable assessments to evaluate.

Photo 30: Rattlesnake Springs taken December 18, 2018 in the southern portion of the East Walker allotment, signs of horse use were present including droppings and tracks.

Table 26: Comparison of PFC Assessments completed in 2000-2001 and 2018-2019

Name	Date Assessed	Rating	Trend	Date Assessed	Rating	Trend
Baldwin Canyon Creek	6/13/2000	PFC		11/19/2018	FAR	Downward
Big Indian Spring	7/10/2001	PFC		No Assessment Completed		
East Walker River (North)	6/21/2000	PFC		11/14/2018	PFC	
East Walker River (South)	6/14/2000	PFC		11/14/2018	FAR	Not Apparent
Fletcher Spring (Exclosure)	6/14/2000	FAR	Not Apparent	11/16/2018	PFC	
Lapon Canyon	8/21/2000	NF		No Comparable Assessment		
South Lapon Canyon	8/21/2000	NF		No Comparable Assessment		
Lapon Canyon (West Fork)	11/8/2000	FAR	Downward	No Assessment Completed		
Lapon Meadows (Exclosure)	8/21/2000	NF		7/1/2019	FAR	Downward
Mitchell Spring	6/7/2000	PFC		11/16/2018	FAR	Downward
Rattlesnake Spring (Exclosure)	6/13/2000	PFC		6/25/2019	PFC	

5.2.2 Aquatic (Lotic) AIM Core Methods and Indicators

Lotic AIM identifies several core and contingent aquatic indicators to assess riparian attributes associated with lotic systems. These indicators relate to fundamental groups including (1) watershed function and instream habitat quality, (2) biodiversity and riparian habitat quality, and (3) ecological processes (BLM 2015). Assessments of the physical functioning of stream systems are a major component of the fundamental groups. The "watershed function and instream habitat quality" fundamental assesses whether channel form and function are characteristic for the region,

while the "biodiversity and riparian habitat quality" fundamental requires the maintenance or improvement of aquatic habitat for threatened and endangered, and special status, species. Five core indicators and three contingent indicators are used to assess watershed function and instream habitat quality, and include bank stability and cover, channel incision, floodplain connectivity, and large woody debris. Three core and one contingent indicator are used to assess biodiversity and riparian habitat quality including vegetative canopy cover. Indicators used to assess ecological processes are redundant with the other core and contingent indicators from the other fundamental groups and therefore none are specifically identified. A full list of core and contingent indicators associated with the fundamental groups can be found in Table 4 of the BLM Technical Reference 1735-1 (BLM 2015).

Collectively, the core and contingent indicators provide multiple lines of evidence for quantifying the chemical, physical, and biological conditions and trends of lotic resources, and represent the minimum measurements for quantitatively reporting on the attainment of BLM lotic land health standards (BLM 2015). The methods used to collect these data vary and are dependent upon the indicator being collected. Specific methodologies for field data collection of core and contingent indicators can be found in BLM Technical Reference 1735-2 (BLM 2017).

Two reaches along Baldwin Canyon Creek were assessed using the lotic AIM process, Baldwin1 and Baldwin2 (Table 27) and include data collection for canopy cover, large woody debris (LWD), bank cover and stability, and floodplain connectivity (Table 28). The Baldwin1 site was established in August 2015 and reassessed in June 2020, and the Baldwin2 site was established in Aug 2020 but reassessment has not been conducted.

Table 27: Location of lotic AIM reaches within Baldwin Canyon Creek

Site Name	Date Sampled	Easting	Northing
Baldwin1a	8/25/2015	340696	4262020
Baldwin1b	6/4/2020	340696	4262020
Baldwin2	6/3/2020	339296	4259572

Table 28: Aquatic AIM indicator results for Baldwin Canyon Creek lotic AIM reaches

Site Name	Percent Overhead Cover	LWD* Frequency	Bank Cover Foliar	Bank Cover Basal	Bank Cover Foliar and Stability	Bank Stability	Channel Incision	Floodplain Connectivity
Baldwin1a	42.6	0	N/A	67	N/A	100	0.46	16.08
Baldwin1b	6.8	0	33	N/A	33	62	-0.33	2.36

Site Name	Percent Overhead Cover	LWD* Frequency	Bank Cover Foliar	Bank Cover Basal	Bank Cover Foliar and Stability	Bank Stability	Channel Incision	Floodplain Connectivity
Baldwin2	51.9	1.333	43	N/A	38	57	0.27	5.08
*LWD: Large Woody Debris								

5.2.2.1 Lotic AIM Indicators

The indicators provided in Table 26 are important attributes to identify wetland-riparian health and can be used to help determine if RAC standards are being achieved. Each indicator and its importance to maintaining or meeting the standard is described below. In 2019, the lotic AIM sampling protocol was updated to correlate with BLM's Multiple Indicator Monitoring (MIM) methods and values. This update included changes to measuring and reporting foliar bank and stability values versus basal cover and stability which was the original reporting method, pre-2019. Foliar cover and stability are the methods used in MIM protocol and measure not only the basal crown of a single plant but also measure the stalks, branches, and leaf cover of a single plant. This is important to determine a single plant's ability to stabilize soil (banks) but also to provide shade and stream cover to moderate temperatures, and to provide litter for nutrient input and soil protection.

Percent Overhead Cover

Percent canopy cover measurements are an indicator of the capacity of riparian vegetation to mitigate thermal loading (i.e. provide shade) and thus moderate stream temperatures (Beschta 1997, Johnson and Jones 2000). Stream temperature plays an important role in the growth and survival of all aquatic organisms, including fish and benthic macroinvertebrates. Canopy cover also provides information on the amount of potential leaf litter provided by vegetation into a stream. Using the lotic AIM protocol, *percent overhead cover* is measured as the average percentage of overhead cover provided by streambanks, vegetation, or other objects measured mid-channel (looking four directions) across eleven transects. Units are presented in percent with a minimum value of 0 and a maximum value of 100; sample size (n) = 44.

Large Woody Debris Frequency

Large wood is an important source of cover for aquatic species and provides a break in stream velocity as well as playing a critical role in the formation and maintenance of complex geomorphic channel units such as pools and storing local bed sediments. The size and availability of large woody debris is dependent upon geographic setting and is a function of climate and the ability of an ecosystem to support tree growth. Regardless of size and frequency, even small amounts of woody debris in a stream system can create geomorphic heterogeneity and provide diverse habitat for aquatic organisms. Using the lotic AIM protocol, the *frequency of large woody debris* is measured within the bankfull channel of the reach. Units are the number of pieces per 100 meters; n = 1.

Bank Cover and Stability (Foliar and Basal)

Bank cover and stability measurements assess the susceptibility of stream banks to both natural (e.g. bankfull discharge events) and accelerated erosion rates associated with anthropogenic activities (e.g. flow alterations or removal of stabilizing vegetation). Stream bank erosion is a source of fine sediment loading and channel widening. Increased fine sediment loading can negatively affect water quality and impact aquatic organisms and the suitability of the riparian environment. Bank erosion can also alter channel morphology and overall riparian functionality by altering the balance between the sediment and water supply and thus the transport competence of a stream system. Riparian vegetation and composition, large woody debris, and rock fragments also significantly influences streambank erosion. Using the lotic AIM protocol, *bank cover (foliar)* is measured as the percentage of 42 erosional banks with greater than 50 percent foliar cover provided by perennial vegetation, wood, or mineral substrate >15cm in size. Units are presented in percent with a minimum value of 0 and a maximum value of 100; n = 42. *Bank cover (basal)* is measured as the percentage of 42 erosional banks with greater than 50 percent basal cover provided by perennial vegetation, wood, or mineral substrate >15cm in size. Units are presented in percent with a minimum value of 0 and a maximum value of 100; n = 42. *Bank stability* is measured as the percentage of 42 banks lacking visible signs of active erosion (e.g. slump, slough, fracture). Units are presented in percent with a minimum value of 0 and a maximum value of 100; n = 42. *Bank cover (foliar) plus stability* is measured as the percentage of 42 banks both stable (lacking visible signs of active erosion) and covered (greater than 50 percent foliar cover provided by perennial vegetation, wood, or mineral substrate >15cm in size). Units are presented in percent with a minimum value of 0 and a maximum value of 100; n = 42.

Channel Incision and Floodplain Connectivity

The connectivity or access of a stream to its floodplain is critical in the maintenance and recruitment of riparian vegetation as well as providing energy disbursement within stream systems. Activities that alter sediment transfer and manipulate stream channel formation can negatively affect floodplain development and therefore it is important to mitigate these impacts to ensure riparian health and functionality is maintained. These activities may include natural events (e.g. flooding) or anthropogenic causes (e.g. overgrazing, flow alteration, and upland watershed degradation) that decreases floodplain connectivity and/or increases stream channelization and incision. Using the lotic AIM protocol, *channel incision* is calculated as the logarithm of the difference between average bankfull height and average floodplain height taken from the water surface. The values range from a minimum of -1.0 to a maximum of 2 with no units; n=11. *Floodplain connectivity* is calculated as the ratio of average floodplain height to average bankfull height taken from the thalweg. This is also known as Rosgen's Bank Height Ratio. The minimum value is 1 and there are no units; n=11.

Lotic AIM Indicator Benchmarks

The lotic AIM benchmark tool can be used to derive plot (i.e. reach) specific conditions by defining benchmarks for individual indicators identified in the lotic AIM protocol. Benchmark results were generated for lotic AIM plots at Baldwin1a, Baldwin1b, and Baldwin2 to assess the condition and trend of these reaches. The degree of departure of observed indicator values from benchmarks is used to assign condition ratings of major, moderate, or minor departure from reference conditions

(AIM 2021). Condition ratings were assessed based on a set of default benchmarks which were determined by quantiles of regional values by ecoregions and stream size. The indicators used to evaluate Baldwin Canyon Creek plot reaches and their associated departures from benchmarks are shown in Table 29.

Table 29: Aquatic AIM indicators resulting in benchmark departure for reaches within Baldwin Canyon Creek

Land Health Standard	Indicator	Benchmark Departure (Number of Reaches)		
		Minimal	***Moderate***	***Major***
Biodiversity and Riparian Habitat Quality	Percent Overhead Cover	0	1	2
Watershed Function and Instream Habitat Quality	Large Woody Debris Frequency	1	2	0
	Bank Cover (Foliar)	0	0	2
	Bank Cover (Basal)	0	1	0
	Bank Stability	1	2	0
	Bank Cover (Foliar) and Stability	0	0	2
	Channel Incision	1	1	1
	Floodplain Connectivity	0	0	3

5.2.3 Evaluation of Standard 2

Evaluation Finding

☐ Achieving the standard

☐ Not achieving the standard, but making significant progress toward achieving the standard

☒ Not achieving the standard

Rationale for Evaluation Finding

Standard 2 was not achieved because during the 2018-2020 PFC assessments, twelve (67 percent) sites were not rated as PFC; of these, one (6 percent) site was rated as FAR with an upward trend (Lapon Canyon Creek Lower); two (11 percent) sites were rated as FAR, trend not apparent (TV Canyon Creek Upper and East Walker River North); seven (39 percent) sites were rated as FAR with a downward trend (Bird Dog spring, Mitchell spring, Lapon Meadows Upper Exclosure, Lapon Meadows Lower Exclosure, Powell Canyon Creek, TV Canyon Creek Lower, and Baldwin

Canyon Creek); and 2 (11 percent) sites were rated as non-functioning (Rattlesnake Creek headwaters and Granite spring) (Table 23). Only six (33 percent) assessments rated as PFC, with three of these areas are protected from livestock and wild horse use by exclosure fencing and the other three are protected from grazing use by either dense vegetation (i.e. willow and wild rose) or topography (i.e. steep, rocky terrain). In cases where exclosure fencing was not functioning, dense vegetation was not present, or topography did not restrict stream/spring access, decreased chemical, physical or biological function of riparian and wetland areas were observed.

The wetland and riparian areas within the East Walker, Lucky Boy, Nine Mile, and River allotments have changed over time and have been influenced by both natural forces and land management uses. The allotments have experienced multiple fluctuating periods of drought for several years, and riparian-wetland areas have thus experienced greater than normal use from livestock and wild horses. Although the allotments have experienced periods of below average precipitation and some drought stress, there have also been years where normal to above average precipitation was recorded (Figure 1).

Reported actual use from 2008-2018 varied between years and between allotments, with relatively consistent use occurring mainly in the River and East Walker allotments (Table 11). Within the 11 years reported, the mean annual use on the River allotment was 52 percent of permitted use, with five years reporting 100 percent of permitted use, one year reporting 50 percent, and the remaining five years reporting 0-9 percent of permitted use; the mean annual use on the East Walker allotment was 24 percent of permitted use, with five years reporting between 38-55 percent and six years reporting 0-15 percent of permitted use; the mean annual use on the Luck Boy allotment was 12 percent of permitted use, with three years reporting between 28-51 percent and eight years reporting 0 percent of permitted use; and the mean annual use on the Nine Mile allotment during spring was 7 percent of permitted use, with four years reporting between 12-28 percent and seven years reporting between 0-5 percent of permitted use. Within the past 11 years, the Nine Mile allotment did not have any use during the fall months.

During PFC assessments, six factors were identified as contributing to reduced function of riparian and wetland areas within the allotments (Table 26). Of the 18 PFC assessments, four (22 percent) documented bank shearing and trampling from livestock; four (22 percent) had channelization and excessive vertical and/or horizontal movement of the stream channel; six (33 percent) had a visible decrease in riparian vegetation from multiple sources (overgrazing, channel movement, incision, and erosion); three (16 percent) had range improvements that were in disrepair or not functioning which resulted in impacts to riparian and wetland areas; six (33 percent) had encroachment of upland vegetation, such as pinyon-juniper trees, rabbitbrush and sagebrush; and eleven (61 percent) documented outside influences that resulted in degradation or reduced function of riparian and wetland areas, such as road encroachment, trailing, or upland watershed degradation.

Bank shearing, sloughing, trampling and alternating areas of erosion and sediment deposition are all common in unprotected areas, leading to channelization of spring systems and surface instability of stream banks, making riparian and wetland areas more susceptible to high-flow events and further degradation from livestock and wild horse use. Bird Dog Spring (East Walker allotment), Lapon Meadows (Lucky Boy allotment), and the lower reach of TV Canyon Creek (Lucky Boy allotment) have become channelized as a result of increased hoof action, which

destabilizes the banks and compacts the soil, leading many of these systems to degrade in hydrologic function. Channelization is not characteristic of lentic sites as they are closed systems that usually form in depressions where water remains relatively still, and the surface possess no exit point for water to escape. Through the breakdown of spring banks by hoof action, exit points can be made where water can escape and begin to flow down slope, causing erosion and further channelization, especially during high flow events. As these lentic systems further degrade and lose their ability to retain water, they can channelize and convert to a lotic system, or lose their ability to maintain wetland vegetation. Depending upon the severity of degradation, some of these systems may be able to recover with rest from grazing by allowing vegetation regrowth and sediment deposition in areas where soil was previously lost. As some lentic characteristics are altered through the formation of surface channelization, similarly streams reaches have been altered through the loss of stream sinuosity, and width/depth ratio, due to bank trampling and sloughing from hoof action, such as that seen at TV Canyon Creek. Sinuosity and width/depth ratio of a stream are characterized by the type and morphology of the lotic system. The alteration of sinuosity and width/depth ratio reduces the lotic system's ability to adequately dissipate energy and reduce erosion and sedimentation of stream banks. As stream banks become unstable from hoof action, soil will erode and sinuosity is altered, forming longer sections of straight reaches. As sinuosity is lost, the energy of water flow increases, resulting in further erosion and soil loss along lotic reaches. Bank instability can also lead to incised channels and reduce the occurrence of pools and riffles, ultimately changing the natural morphology of the stream. This degradation of both lentic and lotic systems through trampling and hoof action has been observed at several assessed sites within the allotments.

Many of these springs and streams assessed also exhibit areas of compacted bare ground, indicating recovery and reproduction of riparian vegetation may be limited in these areas, especially where there is not an adequate amount of subsurface water and/or vegetation present for reproduction. As soil is compacted by hoof action, soil porosity and infiltration decreases, reducing soil saturation and increasing surface runoff. Saturated soil during most or all of the year is a requirement for healthy growth and reproduction of obligate and facultative riparian-wetland vegetation. Riparian vegetation is also a key factor in stabilizing banks and protecting the soil surface from further erosion and soil loss. PFC assessments combined with actual livestock and wild horse use history indicate some wetland-riparian areas are experiencing grazing pressure and likely year-round wild horse use, resulting in a reduction of riparian-wetland function. As a result, some of these areas are experiencing a loss of subsurface water, leading to observed encroachment of upland vegetation, further reducing the ability of the riparian-wetland areas to recover to a functioning state.

Livestock and wild horse density and manner of use affects the types of degradation observed in riparian-wetland areas within the allotment. In general, as livestock utilize water sources, they tend to congregate throughout the entire riparian or wetland area, trampling banks and compacting the soil surface as they browse and drink. During site evaluations all sites had some observations of use by livestock as evidenced by cattle fecal matter and hoof prints within and around the water sources. Wild horses also contribute to riparian-wetland degradation within the allotments as they drink and paw at a water sources, with eight (44 percent) of the 18 sites having observed wild horse signs, primarily occurring within an HMA where documented use has been observed in the past. Although wild horses contribute to spring and stream degradation, they typically do not

congregate for an extended period of time like cattle do. Wild horses tend to approach a water source to drink then return to the uplands to graze, therefore the time and frequency of damage to riparian-wetland areas is generally less than that of livestock at some sites. Although the timing and duration of wild horse use at a site is typically less than that of livestock, wild horse use can still result in similar impacts, as would be incurred by livestock within the allotments. Of the seven sites rated at PFC, three of these areas are protected from livestock and wild horse use by exclosure fencing and the other three are protected by either dense vegetation (i.e. willow and wild rose) or topography (i.e. steep, rocky terrain). The remaining eleven sites that were rated at FAR or non-functional were typically exposed in a manner that allows livestock and/or wild horse access to the spring or stream. This typically occurred in areas where there is a lack of protective vegetation or an exclosure fence was not in functioning condition.

Although livestock and wild horse use has been documented at the assessed sites, reported average actual use AUMs has been below what is permitted under the current grazing plan. This indicates that environmental factors other than livestock grazing are also contributing to degradation of lentic and lotic sites within the allotments. Many lotic sites were documented to have excessive vertical and/or lateral channel migration with several areas having incision, a loss of sinuosity, changes in width/depth ratio, and floodplain disconnection.

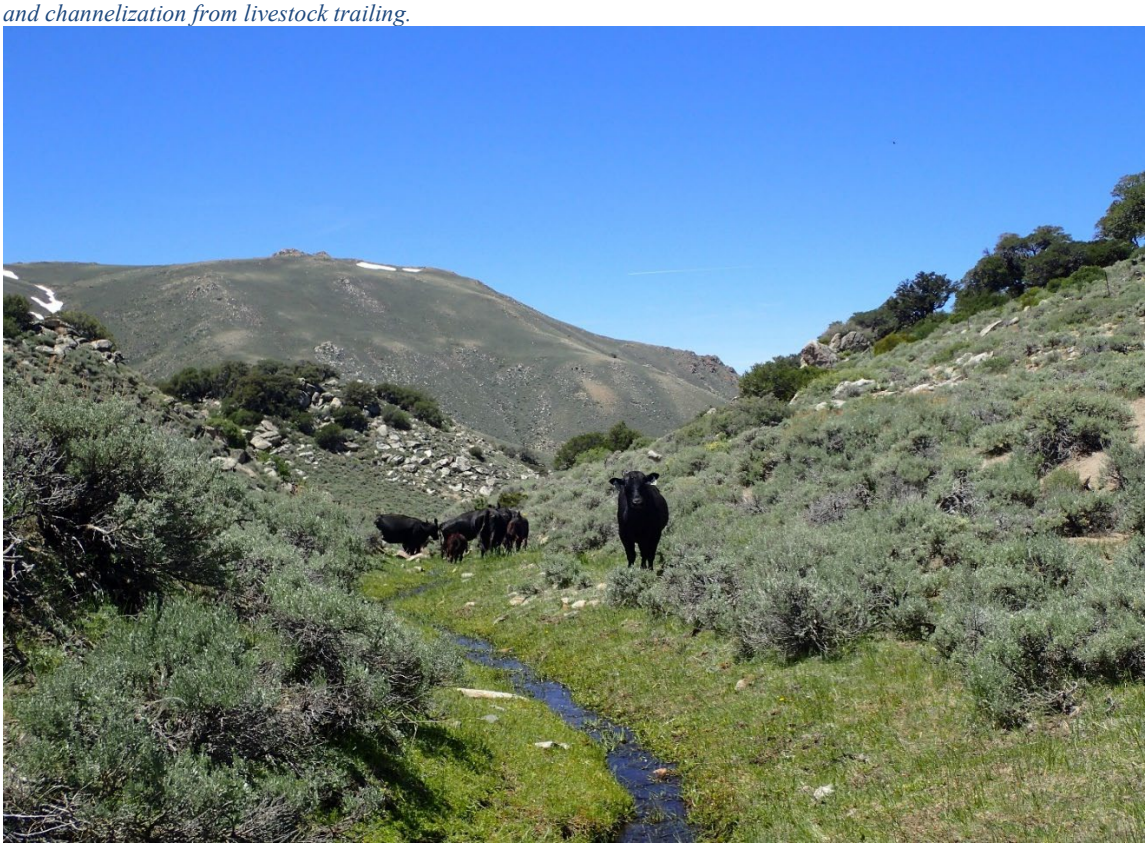
During PFC assessments, multiple photos were taken at each site to provide visual documentation of the current state of the wetland and riparian areas at the time PFC assessments were conducted. Below are visual representations of some contributing factors observed at Lapon Meadows and Baldwin Canyon. These areas are representative of some of the lentic and lotic systems within the allotments and provide a good visual representation to demonstrate why Standard 2 is not being achieved. Locations of PFC assessments are illustrated on (Appendix A, map 2-3).

Lapon Meadows

Lapon Meadows is located in the Lucky Boy allotment and serves as the headwaters for Lapon Canyon Creek. Riparian assessments were conducted in Aug 2000 and July 2019 with PFC ratings of non-functional and functioning-at-risk with a downward trend, respectively. During the 2019 assessment, the IDT did not use the previous 2000 assessment to compare trend and therefore the rating was apparent and not monitored trend. Although wild horses have been observed around the area, there were no signs of wild horse use at the meadow. Livestock were seen within the exclosure during the 2019 assessment as well as cattle feces and hoof prints, which is believed to be the primary cause of use and degradation described below (Photo 31).

Lapon Meadows is just one example of a lentic system which exhibits many of the factors discussed in Section 5.3.2 (Table 26). These observations include: (1) bank shearing and trampling from livestock; (2) lentic channelization; (3) decreased vegetation and altered composition; (3) disrepair of range improvements; (4) encroachment of upland species; and (5) contribution of degradation from the upland watershed. These observations were only documented within the BLM exclosure and do not include assessment from the meadow on HWAD land which includes multiple stockwater ponds, dams, and culverts located up slope. A detailed location of the assessment can be seen on Appendix A, map 12.

Figure 31: *Lapon Meadows; photo taken during PFC assessment in July 2019. Observed cattle use within meadow exclosure and channelization from livestock trailing.*



5.2.3.1.1.1 Bank Shearing and Trampling from Livestock

Lapon Meadows exhibits trampling from livestock which has resulted in bank shearing and sloughing, hummocking, and decreased saturation of hydric soils. Hydric soils are defined as "soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part" (Soil Science Division Staff 2017). When banks become destabilized, they are more susceptible to surface erosion and bank shearing. Stable banks are important to ensure adequate dissipation of energy from water and wind events, to prevent soil loss and erosion. Trampling also leads to increased bare ground and soil compaction which further destabilizes the soil surface. The creation of small hummocks are also observed in the up-slope portion of the meadow, above and near the disconnected trough (Photo 32) which is outside of the BLM and HWAD exclosure fencing. Hummocking creates areas of mounded soil that become separated and disconnected from the surrounding soil surface. During prolonged or severe cases of degradation, this disconnection results in the mounds drying out as water typically spreads through soil as a function of both gravity and capillary action of the pore spaces. When soil mounds are disconnected it becomes increasingly difficult for water to spread solely by capillary action, against gravitational forces, from the predominant soil surface up to these mounds, thus leading to a loss in saturation. The drying out of these hummocks ultimately leads to poor conditions and loss of habitat necessary for the healthy growth and reproduction of riparian plants, therefore increasing the potential to lose important functional and structural groups within the spring system. Without the ability for soils to remain saturated and create an environment for

plants to grow and reproduce, it may become extremely difficult for wetland and riparian systems to recover to a functioning state, especially in lower precipitation areas or ones without periods of rest and recovery from livestock use. Fortunately, the hummocks observed at Lapon Meadows are low profile (only a few inches in width and depth) and are not extensive throughout the system. If restoration efforts are implemented and maintained (e.g. extending protection fencing to enclose this area and moving the trough downslope), it is likely the continued formation of hummocks can be stalled or reversed.

Figure 32: *Lapon Meadows; photo taken during PFC assessment in July 2019. Hoof action and trampling can be seen throughout Lapon Meadows and has led to channelization and soil loss. The formation of small hummocks are also observed in the up-slope portion of the meadow which can contribute to water flow alterations. The area illustrated currently remains outside of the upper (HWAD) exclosure and the lower (BLM) exclosure which sees substantial trampling in comparison to other areas.*

Soil Compaction

Soil compaction, resulting from hoof action, is also evident throughout Lapon Meadows, within and outside the exclosure fencing. Soil compaction leads to a loss of both water holding capacity in the soil, from a reduction in pore space, and a loss of soil surface structure. Water holding capacity is directly related to the ability of a soil to hold water and affects the available water capacity of a soil. Available water is the "portion of water in a soil that can be readily absorbed by plant roots" (Brady and Weil 2017). Soil structure is an important physical feature that aids in the

infiltration of water. Soil structure is the combination or arrangement of soil particles into larger secondary units, or peds (Brady and Weil 2017). Soil structure is important in aiding in water infiltration, as well as plant growth and reproduction, as both water and plant roots follow the outer boundaries (pathways) of these peds to spread their root systems and uptake infiltrated water. A loss of available water and structure in the soil can ultimately result in a reduction of riparian vegetation, and loss of functional and structural groups, because riparian plants become limited in their ability to expand their root systems or uptake water efficiently when soil is compacted. In turn, a reduction or loss of riparian vegetation can lead to further erosion and soil loss as bare ground increases with decreasing vegetative ground cover. It also becomes increasingly difficult for water to infiltrate compacted soils, as pore spaces are lost and pore connectivity is reduced through compaction. As a result, water will pond and/or run off the soil surface rather than infiltrate to maintain soil saturation. Increased runoff also leads to increased soil loss through surface erosion. These conditions can increase bare ground cover as soil becomes drier with decreased water infiltration where riparian plants require these saturated conditions for growth and reproduction.

Lentic Channelization

Extensive trampling, soil compaction, and surface runoff of Lapon Meadows has led to channelization of surface water with potential for a slow conversion of a lentic system to a flowing lotic system (Photos 33 and 34). During channel formation, water commonly follows pathways of compacted soil created by livestock hoof action, primarily due to continued trailing in a localized area. High energy storm events will increase soil erosion and can deepen these newly developed channels, diverting both surface and sub-surface water flow from the overall wetland area. Channelization will alter surface and sub-surface water flow within the spring system and commonly lead to a reduction of riparian-wetland vegetation and encroachment of upland species. The formation of a lentic channel that is not a natural feature is dependent upon the slope, topography, and duration/frequency of use within the area. Lapon Meadows is located on a relatively gentle slope which will likely slow down the development of true lotic features, so long as livestock refrain from exacerbating these features. During the 2019 assessment, the exclosure fence at both the upper and lower sections of Lapon Meadows was in disrepair, allowing cattle access to the meadow. If the exclosure fence is maintained to keep cattle away from the meadow, it is possible to minimize and potentially reverse adverse effects that were observed as a result of channelization.

A lentic system also becomes susceptible to alterations in sediment transport (e.g. changes in erosion and deposition throughout the wetland area) when channelization occurs. Channelization can affect sediment filtration that maintains appropriate nutrient load that allows for proper vegetation reproduction and recruitment, and water quality. It was observed that channelization (and trampling) has resulted in changes to surface and subsurface flow within Lapon Meadows due to changes in the natural disbursement of energy from flow events. This is evidenced by encroachment of some upland species at the wetland perimeter, indicating soil saturation has been altered.

Photo 33: *Lapon Meadows; photo taken during PFC assessment in July 2019. Extensive hoof action and trampling can be seen throughout Lapon Meadows (lentic) and has led to channelization and soil loss.*

Decreased Vegetation and Altered Composition

Decreases in riparian vegetation and alterations of composition were also observed within Lapon Meadows. Upland plant species are encroaching into the wetland area where subsurface flow has been altered by trampling, soil compaction, and channelization. The composition and amount of riparian vegetation has also been altered, primarily due to preferential grazing by cattle. Wild iris was noted to occur in clusters throughout Lapon Meadows and is an indicator of overgrazing and disturbance (Figures 33 and 34). Wild iris (*Iris missouriensis*) is a native perennial plant that is a facultative wetland species however is toxic to animals such as livestock. Wild iris occurs naturally in riparian systems but when cattle are present, they will not eat the toxic iris and can overgraze

the other palatable plants around it. This gives the iris a competitive advantage over other riparian plants, allowing it to expand and outcompete other species.

Photo 34: Lapon Meadows; photo taken during PFC assessment in July 2019. Extensive hoof action and trampling can be seen throughout Topia Creek Headwaters (lentic) and has led to channelization and soil loss.

Range Improvement Disrepair and Upland Watershed Degradation

The entirety of Lapon Meadows is located within two exclosure fences (upper and lower); the upper (larger) exclosure is on HWAD managed land while the lower (smaller) exclosure is on BLM managed land (Appendix A, map 3). The upper most meadow area (HWAD land) has two large stockwater ponds with dams and culverts installed for water retention and flow passage. The dammed ponds retain a large portion of water and appear to have altered the surface/sub-surface flow within upper Lapon Meadow. The culvert of the lower pond (Photo 31) does not seem to function as there is debris that inhibits water passage. During large storm events water likely overflows the ponds which increases sediment load downstream as well as causing erosion within

the meadow. Photo 32 also shows a small area that is not enclosed between the two exclosures, where the trough is placed but also not functioning. This allows cattle open access to the upper meadow where the most hummocking and bare ground were observed. The exclosure fence on HWAD and BLM land was also in disrepair during the 2019 site visit where cattle were observed grazing directly in the meadow (Photo 31).

Baldwin Canyon Creek

Baldwin Canyon Creek is located in the Nine Mile allotment and occurs on both public and private lands (Appendix A, map 4). Riparian assessments were conducted in June 2000, with a rating of PFC, and in November 2018 with a rating of functioning-at-risk with a downward trend. During the 2018 assessment, the IDT did not use the previous 2000 assessment to compare trend and therefore the rating was apparent and not monitored trend. Excessive erosion and channelization were observed at the assessment location which is believed to be the primary cause of degradation described below (Photo 35). Lotic AIM was also conducted at two sites along Baldwin Canyon Creek (Appendix A, map 4). Monitoring was conducted at Baldwin1 in August 2015 and again in June 2020, while Baldwin2 was only monitored in June 2020 however the monitoring was within the same reach as the 2018 PFC assessment.

Baldwin Canyon Creek is just one example of a lotic system which exhibits many of the factors discussed in Section 5.3.2 (Table 31). These observations include: (1) channelization and excessive vertical and/or lateral stream movement; (2) decreased vegetation and altered composition; and (3) contribution of degradation from the upland watershed. These observations were only documented within the assessed reach and do not include assessment on private land.

PFC Assessment

During the 2018 PFC assessment, there was excessive erosion and incision observed that has resulted in deep channelization within the riparian zone (Photo 35). Due to downcutting of the stream channel, the floodplain is limited to a very narrow area and in some cases completely missing. This has caused a loss in riparian vegetation throughout the system, especially the herbaceous component. During the assessment, team members noted the upland watershed has been a major component contributing to the channelization and incision of stream channel due to high energy flows (flooding).

Photo 35: *Baldwin Canyon Creek; photo taken during PFC assessment in November 2018. Excessive channelization and incision has resulted in a loss of floodplain development and lack of key riparian plant species, mainly the reduction in the herbaceous component.*

Channelization and incision within the assessed reach has resulted in a loss of sinuosity and width/depth ratio (i.e. channel morphology) as well as modifying riparian vegetation types and amounts along the stream bank and riparian zone. The channel has become straighter and narrower in many areas which has increased erosion and soil loss from high-energy flows. This alteration has reduced, or in some cases lost, the connectivity of the channel to its floodplain and thus reduced productivity, nutrient cycling, flood control, and biodiversity. Because existing floodplains are not adequate to capture sediment and dissipate energy, erosion and deposition is not in balance with the system and thus is resulting in further incision. Both channelization and incision can increase the occurrence of downslope flooding as the stream gradient changes over time, which is being observed in the assessment reach.

Within Baldwin Canyon Creek, channelization, excessive erosion, and incision have also resulted in a loss of riparian vegetation due to imbalances within the lotic system, especially in areas where the floodplain is non-existent. There is a lack of desired species required for adequate diversification, sediment filtering, and stabilization, especially those herbaceous obligate and facultative-wetland species that allow for sediment filtering and floodplain development (Photo 36). Removal of riparian vegetation by livestock grazing was observed to be minimal or within moderate utilization, and therefore other environmental imbalances are considered to be the main driver in degradation of the assessed reach at present. This includes degradation in upper reaches of Baldwin Canyon Creek and the upland watershed, such as upslope reduction in key species (both riparian and upland species) and increased bare ground which is altering surface flow and increasing erosion and sedimentation downslope within the assessed reach.

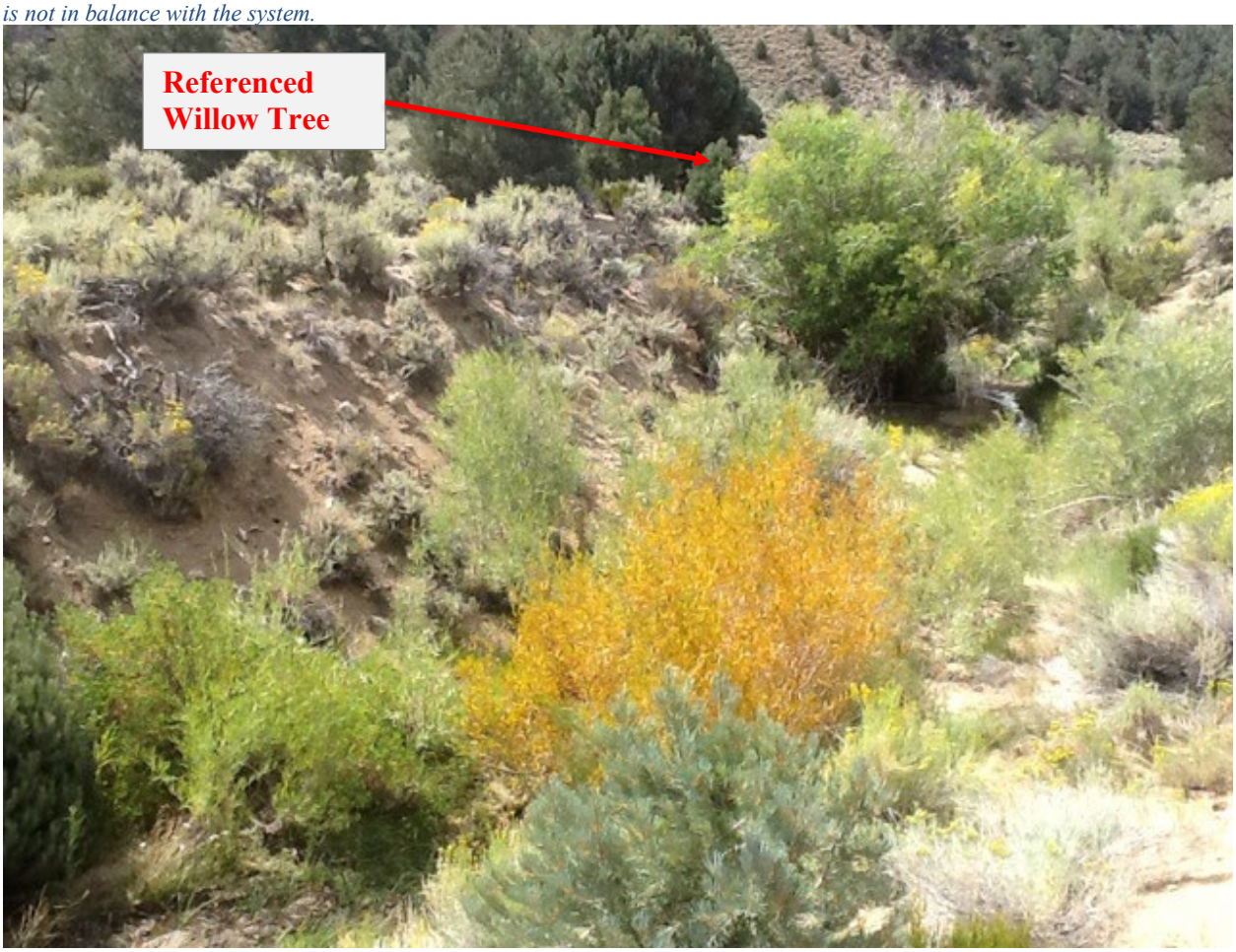
Photo 36: *Baldwin Canyon Creek (Baldwin 2 – SW-SS-67904); photo taken during lotic AIM monitoring in June 2020. Channel segments have become straight and there is an observed loss in sinuosity and width/depth ratio appropriate for the site. Floodplains are small or not present which has reduced herbaceous riparian vegetation and increased the potential for erosion.*

Overall, the PFC assessment as Baldwin Canyon Creek has recorded observed changes in channel morphology and a reduction in herbaceous riparian plant. This has resulted in excessive erosion and incision that is impairing riparian functioning condition. Changes in management may improve conditions by addressing upland watershed function as well as allowing for energy disbursement by reducing high-energy flows.

Lotic AIM Results

Lotic AIM monitoring was conducted in August 2015 and June 2020 at two sites along Baldwin Canyon Creek (Baldwin1a/Baldwin1b and Baldwin2). Details of locations are described in Section 5.3.2 and illustrated on Appendix A, map 4. Monitoring results for Baldwin1a show a minor departure in bank stability; moderate departure in the frequency of large woody debris and bank cover; and a major departure from percent overhead cover, channel incision, and floodplain connectivity. This is illustrated in photo 37 where there is a reduction in vegetation and a narrow, incised channel that does not provide room for adequate floodplain development.

Photo 37: *Baldwin Canyon Creek (Baldwin1a – NC-SS-9144; photo taken during lotic AIM monitoring in August 2015. Site shows pre-blowout from a high-energy flood event. The channel is small and confined within a narrow space. There is a small floodplain with herbaceous and woody vegetation present along stream banks, however sinuosity is low and the width depth ratio is not in balance with the system.*



Monitoring results for Baldwin1b show a moderate departure in the frequency of large woody debris and bank stability, and a major departure from percent overhead cover, bank cover, bank cover and stability, and floodplain connectivity. There was no rating for channel incision recorded. Photo 38 illustrates these results as seen by the widened channel and loss of protective riparian plant cover. The photo also evidences massive erosion and soil loss, along with restructuring of the stream channel by a major flood event that had enough velocity to completely alter hydrologic and vegetative function within the system.

Photo 38: *Baldwin Canyon Creek (Baldwin1b – NC-SS-9144); photo taken during lotic AIM monitoring in June 2020. Photo is taken at the same location as Photo 7a and shows post-blowout from a high-energy flood event. The channel has widened and the stream is trying to repair itself as illustrated by increased sinuosity and the early stages of floodplain development.*

When comparing results for Baldwin1a (August 2015) and Baldwin1b (June 2020) it is clearly observed that the channel has widen and vegetation has been removed. This is likely due to a high-flow and high-velocity flood event which is common in the area. Although there is a moderate to major reduction in bank and overhead cover, bank stability has improved. Figure 64 shows the channel has become wider and is no longer constrained by the surrounding topography. Floodplain connectivity still has a major departure from reference; however the widened channel has visible sediment deposition and the beginning formation of sinuosity and streambanks. If the channel is protected from overgrazing and trampling (and so long as there are no frequent flood events), this section of reach has the ability to recover and improve functioning condition by developing a floodplain with stabilizing vegetation and having a channel with site appropriate morphology.

Lotic AIM monitoring results for Baldwin2 are similar to Baldwin1a/1b in which there is a moderate departure from percent overhead cover; and major departures in bank cover, bank stability, and floodplain connectivity. This is illustrated in photo 38, where the channel is visibly incised from excessive erosion. As noted in the PFC assessment, a loss in sinuosity and floodplain development has contributed to upland watershed degradation. This coincides with the monitored

changes reported upstream at Baldwin1 during both lotic AIM assessments. The flood event that drastically widened the upstream reach on Baldwin Canyon Creek has resulted in deep channelization and incision of the lower reach at Baldwin2 as evidenced by lotic AIM data and the PFC assessment. Therefore, lotic AIM data further supports the large contribution of site degradation due to the upland watershed and therefore it will be important to allow for maintenance and recovery of the upland reaches of Baldwin Canyon Creek to improve the lower reach and prevent further degradation.

5.3 Standard 3. Water Quality

The water quality RAC standard and associated indicators were evaluated to determine the appropriate data sources from which to assess and evaluate whether the standard was being met. The PFC assessments, lotic AIM water quality indicators, and water resource inventories (WRI) were the primary data sources used to evaluate this standard (Table 30). Appendix A, map 5, shows the location where these data were collected within the allotments.

Table 30: RAC Water Quality Standard and Associated Indicators with Corresponding Data Sources Used to Evaluate the Standard

RAC Standard	RAC Indicators	Data Sources
(3) Water Quality **Water quality criteria in Nevada State Law shall be achieved or maintained.**	• Chemical constituents do not exceed the water quality standards • Physical constituents do not exceed the water quality standards • Biological constituents do not exceed the water quality standards • The water quality of all water bodies, including ground water located on or influenced by BLM lands will meet or exceed the applicable Nevada or California water quality standards. Water quality standards for surface and ground waters include the designated beneficial uses, numeric criteria, narrative criteria, and anti-degradation requirements set forth under state law, and as found in Section 303(c) of the Clean Water Act.	• PFC • Lotic AIM • WRI

5.3.1 Water Quality Standards for the State of Nevada

State water quality standards are the primary data source used to determine whether RAC standards are being met or not. Nevada water quality standards are applicable to all surface waters of the State and describe waters as being:

- Free from substances attributable to domestic waste or other controllable sources that will

settle to form sludge or bottom deposits.
- Free from floating debris, scum, and other floating materials attributable to domestic waste in amounts sufficient enough to be unsightly, putrescent or odorous, or in amounts sufficient to interfere with any beneficial use of the water.
- Free from materials attributable to domestic waste in amounts sufficient to change the existing color, turbidity, or other conditions in the receiving stream to interfere with any beneficial use of the water.
- Free from high temperature, biocides, or other deleterious substances attributable to domestic waste or other controllable sources at levels or combinations sufficient to be toxic to animal, plant, or aquatic life.
- Suitable for the watering of livestock without treatment.
- Suitable as a habitat for fish and other aquatic life existing in a body of water; this does not preclude the reestablishment of fish or aquatic life.
- Suitable for the propagation of wildlife and waterfowl without treatment.
- Unique ecological or aesthetic value of the water must be maintained.

The specified standards are not considered violated when the natural conditions of the receiving water are outside the established limits, including periods of extreme high or low flow. These standards are applicable to all water bodies within the allotments and are described in detail in the following sections of the NAC (NAC 2019):

NAC 445A.121 Standards applicable to all surface waters.
NAC 445A.122 Standards applicable to beneficial uses.
NAC 445A.424 Limitations on degradation of water; exemptions.

5.3.2 Proper Functioning Condition Assessments

During the 2018-2020 PFC assessments, the BLM interdisciplinary team assessed water quality quantitatively and in accordance with Nevada State water quality standards. Qualitative assessment included determining if waters were free from substances attributable to the formation of sludge, algae blooms, bottom deposits, or floating debris in amounts sufficient to be unsightly, putrescent or odorous, or in amounts sufficient to interfere with any beneficial use of the water.

Of the 18 water sources that were assessed for PFC, none were reported to have poor water quality, or poor enough to have a negative effect on riparian or wetland vegetative growth or riparian function. Most assessed riparian and wetland systems had water that was overall clear in color, with no murkiness or appearance of film floating on the water's surface; had little to no algae blooms, sludge or bottom deposits present; were free from putrescent odors; and had no high temperatures, biocides or deleterious substances that would be toxic to animal, plant, or aquatic life. In some instances, water that was stagnant or standing was observed to be murky in color and have some formation of sludge, algae, and bottom deposits present, however this did not appear to affect the overall quality of water within these systems.

In some instances, the presence of livestock fecal matter was observed, suggesting nitrogen loading could be a factor contributing to less than suitable water quality in some small, localized areas. Dissolved nitrogen also can induce growth of blue-green algae, which was observed in standing

water at some sites. Although some assessments did have observed algae growth and fecal matter in amounts that may reduce water quality within the affected area, the overall quality of water for most of the assessments was good.

5.3.3 Aquatic (Lotic) AIM Core Methods and Indicators

Lotic AIM identifies three core field methods (pH, specific conductance, and instantaneous temperature) and four contingent methods (total nitrogen, total phosphorous, continuous temperature, and turbidity) to assess water quality. These indicators are not meant to be representative of all state water quality standards, rather are meant to help determine the common chemical stressors resulting from land uses, such as livestock grazing. The methods used to collect these data include a one-time grab sample collected during base flow conditions and is used to identify potential water quality exceedances. Two reaches along Baldwin Canyon Creek were assessed using the lotic AIM process, Baldwin1 and Baldwin2 and include water quality grab sample analysis (Table 28). The Baldwin1 site was established in August 2015 and reassessed in June 2020, and the Baldwin2 site was established in Aug 2020 and reassessment has not been conducted.

Table 31: Aquatic AIM indicator results for Baldwin Canyon Creek lotic AIM reaches

Site Name	Date Sampled	Easting	Northing	*pH	*T (ºC)	**Total N (ppm)	**Total P (ppm)	*SC
Baldwin1a	8/25/2015	340696	4262020	8.3	12.5	153	76.1	200.5
Baldwin1b	6/4/2020	340696	4262020	8.3	15.7	Below Detection Limit	61	214.8
Baldwin2	6/3/2020	339296	4259572	7.6	11.9	Below Detection Limit	71	417.8

*For pH, T (temperature), and SC (specific conductance), no indicator computations are required, as what is measured in the field is what is reported.
**For total N (nitrogen) and P (phosphorous), grab samples are sent to the Aquatic Biogeochemistry Lab at Utah State University for analysis, and detection limits are 25 µg/L and 10 µg/L for total nitrogen and phosphorous, respectively. For the 2020 samples, these were processed at the Environmental Analytical Lab at Brigham Young University. The detection limit for total N is 20 µg/L and samples were reported below this limit.

Lab Standard Operating Procedures for Utah State University can be found at: http://canoeecology.weebly.com/uploads/2/1/0/0/21002098/abl_analytical_lab_manual.pdf.

Lotic AIM Water Quality Indicators

The indicators provided in table 29 are important water quality parameters for wetland-riparian health and can be used to help determine if RAC standards are being achieved. Each indicator and its importance to maintaining or meeting the standard is described below.

Water pH

The pH is a measure of how acidic or alkaline water is (deriving from the relative amount of free

hydrogen or hydroxyl ions in the water), and ranges from 0 to 14, with 7 being neutral. A pH less than 7 indicates acidity, whereas a pH greater than 7 indicates alkalinity. Because natural water contains dissolved minerals and gases, typical surface waters range from pH 6.5 to 8.5, while groundwater ranges from pH 6 to 8.5. Since pH can be affected by chemicals in the water, pH is an important indicator of water that is changing chemically. If spring or stream water becomes too acidic this could lead to toxicity of aquatic species and organisms, including flora and fauna. Riparian plant species richness and density, and leaf litter breakdown rate may be impacted due to a reduction in microbial respiration and decreased number of invertebrate shedders (Dangles et al 2004). High acidification is typically more of a concern than high alkalinity which can be caused by elevated concentrations of bicarbonate and/or increased photosynthetic activity.

Temperature

Water temperature is an important indicator of water quality as it affects the rates of biological processes and chemical processes in the water. The optimal health of aquatic organisms depends on temperature. Water temperature affects the volume of dissolved oxygen (DO) water can hold (water's ability to contain dissolved oxygen decreases as water temperature rises); the rate of photosynthesis by aquatic plants (formation of algae); metabolic rates of aquatic organisms; and the sensitivity of organisms to pollution.

Total Nitrogen and Phosphorous

Nitrogen and phosphorous are the two major nutrients that influence rates of primary productivity in stream systems. Naturally occurring nitrogen typically is derived from N-fixing microbes and decomposed vegetation entering the system through runoff or groundwater inputs (Allan and Castillo 2007). Naturally occurring phosphorous is predominantly derived from the weathering of rocks and soils, particularly from the weathering of sedimentary rocks. In both springs and stream systems, nitrogen and phosphorous can be significantly increased through activities such as cattle grazing, accelerated erosion, and agriculture and is commonly referred to as nutrient loading. Excessive nutrient loading can have adverse impacts on other water quality indicators and affect biological and hydrologic function.

Specific Conductance

Specific conductance increases with the amount (concentration) of ions in solution (e.g. nitrates, chloride, phosphate, magnesium, calcium, iron) and concentrations can become elevated by activities that increase erosion and/or ion loading (e.g. irrigation water withdrawals, mining, grazing) (Miller et al. 2007, Vander Laan et al. 2013). Excessive conductivity degrades the quality of domestic and/or animal drinking water and can impact freshwater organisms through acute toxicity or less dramatically through disrupting osmoregulation. Specific conductance is not affected by changes in water temperature as it is a temperature corrected measurement.

Lotic AIM Benchmark Results

Core and contingent indicators collected during lotic AIM assessments can help to identify priority water quality exceedances and to assess attainment of state water quality standards. The Lotic AIM Benchmark Indicator Tool was used to assess the condition and trend of two lotic reaches along Baldwin Canyon Creek and help identify potential exceedances and assess RAC standards.

The lotic benchmark tool allows users to derive reach specific conditions from collected data by defining benchmarks for individual indicators. The degree of departure of observed indicator values from benchmarks is used to assign condition ratings of major, moderate, or minor departure from reference condition (AIM 2021). The tool provides a set of default benchmarks which were used to derive the departure from reference state (Table 32). Indicator values from Table 31 (above) were used to derive the following benchmark departure ratings.

Table 32: Aquatic AIM benchmark departure results for reaches within Baldwin Canyon Creek

Land Health Standard	**Indicator**	**Benchmark Departure (Number of Reaches)**		
		Minimal	***Moderate***	***Major***
Water Quality	pH – acidic	3	0	0
	pH - alkaline	3	0	0
	Total Nitrogen*	1	0	0
	Total Phosphorous	0	0	3
	Specific Conductance	0	0	3
*Total nitrogen values for 2020 data were excluded from benchmark departure ratings due to not meeting the detectible limit. Based on previously collected data, nitrogen is likely present and an error in laboratory sample processing is assumed.				

5.3.4 WRI Water Quality Data

During site visits to TV Canyon Creek, Rattlesnake Spring, and Fletcher Spring, a water resource inventory (WRI) was conducted to collect field water quality data on water flow rate (gpm); pH; temperature (°F); electrical conductivity (µS/cm); total dissolved solids (ppm); and salinity (ppm). During WRI water quality field data collection, all sources had little to no flow and therefore flow rate was not obtained, however all other field parameters were collected.

For these field parameters, pH and temperature were relatively low and in the expected range, and EC, TDS, and salinity were also in a range typical for these systems, although Rattlesnake Spring did have higher results compared to the others. This could be a factor of parent material (rock type), source ground/surface water chemistry, increased livestock/wild horse fecal matter, excessive erosion/sedimentation, or other factors that could influence the chemistry of surface waters. The overall appearance of water was fairly clear at each of the three sites, however there was observed algae growth, and sludge and bottom deposits in areas of standing or stagnant water at Rattlesnake Spring. See Table 33 below for WRI results.

Table 33: Water quality data collected during WRI from 2019-2020

Name	Date	pH	T (ºC)	EC (µS)	TDS (ppm)	Salinity (ppm)	Appearance/Notes
TV Canyon Creek	9/3/2020	8.0	12.5	140	99	65	Could not capture flow
Rattlesnake Spring (Exclosure)	6/25/2019	8.3	17.6	615	400	282	Observed algae with a murky grey-black sludge and bottom deposits in stagnant water; black soil apparent where vegetation is lacking; could not capture flow
Fletcher Spring (Exclosure)	9/3/2020	7.6	15.9	317	224	149	Could not capture flow; standing water

WRI Water Quality Indicators

Water quality is important to maintain a functioning wetland-riparian system and for overall animal health. Poor water quality can affect livestock feed intake and have other physiological effects on animals. Poor water quality can also affect, or even inhibit, the growth of some obligate and facultative wetland plant species. The collection of field parameters can help us to understand how a water source may be affected in response to changes in the local or regional environment, including both factors within and outside of the control of land management such as livestock grazing or drought. Water temperature and pH are described above in section 5.4.5 and apply to the same sampling methods as those conducted during lotic AIM sampling. Photo 39 below shows water quality at rattlesnake spring.

Photo 39: *Rattlesnake Spring (exclosure); photo taken during PFC assessment in June 2019. Photo shows relatively good water quality that is in conformance with RAC water quality standards. Some algae, floating debris, and bottom deposits were observed, however there is a large diversity of riparian plant species that indicate water quality is good.*

Electrical Conductivity and Total Dissolved Solids

Electrical conductivity is a measure of water's capability to pass electrical flow and is directly related to the concentration of ions in the water. These conductive ions come from dissolved solids; TDS describe all solids that are dissolved in water, usually from mineral salts and inorganic materials. EC and TDS are closely related; the more dissolved solids a water contains, the more conductive the water becomes. The EC of the water is also dependent upon the water temperature; the higher the temperature, the higher the electrical conductivity, and is a good indicator of the total salinity of the water.

Salinity

Salinity refers to the amount of dissolved salts in a body of water and is an important factor in determining the chemistry of natural water as well as the biological processes within it. Salinity

is also a thermodynamic state variable that, along with temperature and pressure, governs physical characteristics like the density and heat capacity of water.

5.3.5 Evaluation of Standard 3

Evaluation Finding

☒ Achieving the standard

☐ Not achieving the standard, but making significant progress toward achieving the standard

☐ Not achieving the standard

5.3.6 Rationale for Evaluation Finding

Standard 3 is being achieved for the allotments as PFC assessments, lotic AIM water quality indicators, and WRI data indicate water sources (spring and streams) are of overall good quality. In accordance with Nevada Water Quality Standards, as outlined in section 5.*4*.2, TV Canyon Creek, Rattlesnake Spring, and Fletcher Spring are meeting overall water quality for NAC state standards (section 5.4.5). Water quality parameters collected for pH and temperature were within a range expected for surface and groundwater. Relatively low to moderate levels were recorded for electrical conductivity, total dissolved solids, and salinity at TV Canyon Creek and Fletcher Spring while these parameters were recorded higher at Rattlesnake Spring. Conductivity, TDS, and salinity values were proportional to the grazing use seen at these sites as documented during PFC assessments.

Fletcher Spring had relatively low values for EC, TDS, and salinity with neutral pH and low temperature. The IDT rated this spring at PFC and there was adequate vegetative diversity to suggest water quality was being maintained to support various species. Standing water that was present did not have observed sludge, bottom deposits, or algae development. The fence was not fully functioning as there was evidence of livestock grazing throughout the spring; however it was in a minimal quantity such that wetland function and water quality did not appear to be affected. TV Canyon Creek had low values for all parameters and was rated as FAR. Although there was bank shearing, trampling, and erosion noted during the PFC assessment, surface water appeared clear and free from debris.

Rattlesnake Spring had higher values for all field water quality parameters, but was rated as PFC due to a large diversity of riparian plant species, expansion of the riparian area, and evidence of energy disbursement. The water quality sample taken at Rattlesnake Spring was within the exclosure but located in an open area where livestock and wild horses had previously accessed the site (Figure 65). The exclosure fence was in need of repair and fecal matter from cattle and wild horses were found within the spring area as well as some sludge, bottom deposits, floating debris, and algae. Sampling was taken at this location as it was the only area with accessible surface water. Increased water quality values thus represent an area that was exposed to possible surface erosion and fecal matter input and do not represent the entirety of the spring area which had obligate and facultative riparian plant species that indicate good water quality.

The PFC assessments for the remaining 15 springs and streams indicate there is visible evidence that most sources exhibit adequate water quality, which includes: (1) limited to no sludge formation or bottom deposits present in open waters; (2) waters are free from floating debris and scum; (3) there are no putrescent odors emanating from standing water; and (4) the overall appearance is clear with little to no color change.

In addition to the visible appearance of overall good water quality recorded during WRIs and PFC assessments, quantitative water quality data collected at Baldwin Canyon Creek also provides evidence for why Standard 3 is being met.

Baldwin Canyon Creek

Lotic AIM water quality data was collected at two sites along Baldwin Canyon Creek in 2015 and 2020 (Section 5.4.5 and Table 30). Data collected includes pH, total nitrogen, total phosphorous, and specific conductance and was input into the Lotic AIM Benchmark Indicator Tool to determine minor, moderate, or major deviations from standard reference values, or benchmarks (Table 29). Results from the benchmark tool reported some major departures from reference (phosphorous and specific conductance) however these deviations are attributed to the natural erosion and sedimentation observed during site visits (Photo 40). Although these values were outside of reference, there was no indication that water quality was not meeting the RAC grazing standard for water quality.

Photo 40: *Baldwin Canyon Creek (Baldwin1b – NC-SS-9144); photo taken during lotic AIM monitoring in June 2020. Photo shows post-blowout from a high-energy flood event. Excessive erosion and soil loss is the main contributor to increased phosphorous and conductivity within the creek. Water was observed to be clear and of good visual quality in accordance to RAC standards (Section 5.4.2).*

Reported values for pH were 7.6 and 8.3 which are within the typical range of surface waters (from pH 6.5 to 8.5) and there was no deviation reported from standard benchmark values. Total nitrogen was only reported for Baldwin1a at a value of 153, which is a minor departure from reference and is interpreted to be within the normal range of this stream. The 2020 water quality samples were submitted to a different laboratory (BYU Environmental Analysis Lab) and samples came back under the reporting limit for total nitrogen. It is assumed that there was an error in sample processing as other parameters and site conditions do not suggest nitrogen would be below the reported limit and therefore total nitrogen analyzed in 2020 was not used in this evaluation. Values for total phosphorous were 61, 71, and 76.1 which are all reported as a major departure from standard reference using the lotic benchmark tool. These values are expected however and likely attributed to the excessive erosion and sedimentation seen throughout Baldwin Canyon Creek. Phosphorous can be significantly increased through activities such as accelerated erosion and is commonly referred to as nutrient loading. Excessive nutrient loading can have adverse impacts on other water quality indicators and affect biological and hydrologic function. However, the low value of nitrogen reported during 2015 does not suggest other activities (i.e. cattle grazing) has caused significant nutrient loading to lead to less than adequate water quality. Further, there were

no visible signs of excessive algae growth which is a common indicator of increased nutrient loading, primarily from increased nitrogen by cattle grazing or wild horse use. Similar to phosphorous, specific conductance was also reported as a major departure for all samples. Specific conductance increases with the amount (concentration) of ions in solution (e.g. nitrates, chloride, phosphate, magnesium, calcium, iron) and concentrations can become elevated by activities that increase erosion and/or ion loading such as excessive channelization and erosion observed at Baldwin Canyon Creek. Excessive conductivity can degrade the quality of drinking water for livestock, wild horses, and wildlife, and impact freshwater aquatic organisms. The major departure of conductance is assumed to be directly related to excessive erosion and would likely improve if measures were implemented to improve the hydrologic function of Baldwin Canyon Creek, such as increasing riparian vegetation amounts and composition to improve sediment retention and nutrient filtering.

5.4 Standard 4. Plant and Animal Habitat

5.4.1 Standard 4. Evaluation Criteria

The plant and animal habitat RAC standard and the associated indicators were evaluated to determine the appropriate data sources and indicators from which to assess and evaluate whether the standard was being met. Of the data collected, IIRH, select AIM indicators, frequency and photo trend, PFC, and population survey data (table 34) were used to evaluate the plant and animal habitat and its associated RAC indicators. Appendix A, map 1, shows the location of where these data were collected within the four allotments.

Table 34: RAC plant and animal habitat standard and its associated indicators are listed along with data sources and specific indicators used to evaluate the standard.

RAC Standard	RAC Indicators	Data Sources	AIM Indicators
(4) Plant and Animal Habitat Populations and communities of native plant species and habitats for native animal species are healthy, productive and diverse.	• Good representation of life forms and number of species • Good diversity of height, size, and distribution of plants • Number of wood stocks, seed stocks, and seed production adequate for maintenance • Vegetative mosaic, vegetative corridors for wildlife, and minimal habitat fragmentation	• IIRH • AIM (LPI cover and height, Canopy Gap Intercept) • Frequency and Photo Plot • PFC • Population surveys	• Bare Ground • Canopy Gaps • Annual Grass Cover • Vegetation Cover • Vegetation Height

5.4.2 Interpreting Indicators of Rangeland Health

In order to meet standard 4, habitats must exhibit a healthy, productive, and diverse population of native and/or desirable plant species, appropriate to site characteristics, to provide suitable forage,

water, cover and living space for special status species and maintain ecological processes. IIRH data were one aspect used to assess Standard 4 and are summarized in detail in section 5.1.1. For soil and site stability, 44 percent (four plots) of IIRH assessments for this attribute were departed from reference. For hydrologic function, 100 percent of final ratings for this attribute were departed from reference. For biotic integrity, 100 percent of IIRH assessments were departed from reference.

5.4.3 AIM Data

Indicators including bare ground, annual grass cover and canopy gap cover are used to evaluate plant and animal habitat. Detailed results for these data can be found in section 5.1.2. Bare ground can be an indicator of reduced vegetation cover and may increase the risk of invasives within a site. With respect to wildlife habitat, it may indicate low forage production available for wildlife species and low-quality wildlife habitat (Pellant et al. 2018). Of the plots with identified benchmarks (n=8), percent bare ground results showed that seven plots (87.5 percent) were not meeting the set benchmarks (table 18). Invasive plant cover is a very important indicator of change in various ecosystems and is associated with a decline in biotic integrity. Invasives may impact species composition and abundance and in turn negatively influence the nutrient cycle and energy flow within a system (Herrick et al. 2005). Of the plots with identified benchmarks (n=8), two plots (25 percent) did not meet the invasive annual grass benchmark. Canopy gap intercept data are used to assesses sites for wind and water erosion potential, susceptibility to weed invasion, and provides information regarding wildlife habitat, such as hiding cover and thermal environment (Herrick et al. 2017). Gaps that are greater than 200 cm are at high risk of erosion (Okin et al. 2009). Canopy gap results for all AIM plots revealed that 50 percent of plots had more than 20 percent of canopy gaps greater than 200 centimeters therefore did not meet the canopy gap benchmark.

5.4.4 Frequency and Photo Trend

Two methods, the nested quadrat frequency and photo trend method provided additional data informing plant and animal habitat. Detailed results for these data can be found in sections 5.1.3 and 5.1.4. Frequency data revealed similar results, where two of the seven plots were in an ecological decline due to decrease of perennial grasses and increases in sagebrush or other plants that indicate an ecological decline such as sagebrush, Bailey's greasewood and cheatgrass. Two plots of seven showed increases in ecological improvement. While the other four plots showed a static trend, some of these plots reveal a lack or have very low amounts of Indian ricegrass or more palatable deep rooted perennial grasses and in some cases increases in sagebrush indicating ecological decline. For photo plot data, two plots indicated a decline in conditions, two plots indicated stable conditions and one plot indicated an unknown trend.

5.4.5 Proper Functioning Conditioning

Section 5.2.1 lists summary data from PFC assessments conducted on the allotments. These assessments offer valuable insight for plant and animal habitat in their relation to riparian resources, an important area on arid landscapes. In many riparian areas, actively growing forage later in the growing season when many upland plants have gone dormant can provide higher

quality feed for wildlife in addition to their primary resource of water. Of the 18 PFC assessments conducted between 2018 and 2020, six (33 percent) sites were rated as PFC; one (6 percent) site was rated as FAR with an upward trend; two (11 percent) sites were rated as FAR, trend not apparent; seven (39 percent) sites were rated as FAR with a downward trend; and 2 (11 percent) sites were rated as non-functioning.

5.4.6 Wildlife Habitat Assessment

The allotments contain a diversity of reptiles, amphibians, mammals, birds, and invertebrates each with their own unique habitat requirements. The Nevada Department of Wildlife's Wildlife Action Plan (NDOW WAP, 2013) characterized Nevada's vegetative land cover into broad ecological system groups and linked those with 22 key habitat types. Based on this analysis, the dominant key habitat types within the allotments include sagebrush (42 percent), lower montane woodlands and chapparal (31 percent), intermountain cold desert shrub (21 percent), and the other key habitat types (6 percent) (Section 3.7, table 4). Key habitats can be used to infer likely occurrences of wildlife species assemblages and associated vegetation that provide shelter, forage, and nesting. Many of the species known to occur in the four allotments can be found in the WAP, which contains information on habitat requirements, trends, distribution, and conservation needs. In addition to the data sources evaluated above, specific habitat qualities per species were assessed below to determine whether Standard 4 was being met.

Migratory Birds/Birds of Conservation Concern

Numerous species of migratory and non-migratory birds, including raptors, utilize habitat such as trees, shrubs, cliffs, and other upland vegetation within the allotment for shelter, nesting, and foraging. Desert shrub/scrub habitats provide nesting structure, protection from predators, and thermal cover for passerines as well as foraging habitat for raptors. Rock outcroppings and crevices provide nesting, roosting, protection from predators for some bird species and rocky ledges provide nesting substrate, and protection from predators for a number of raptor species.

Migratory bird species generally tend to occur in higher concentrations in riparian areas. Although there are some significant springs/marshes within the allotment such as Fletcher Spring and Headwaters of Lapon and Baldwin Canyons, the major water resource for migratory birds on these allotments is the East Walker River, which intersects BLM land on two sites on the North and South pastures of the River allotment. The remaining uplands on these four allotments lacks large riparian areas and water availability is very limited making the function of the existing resources critical to healthy migratory bird habitat.

Mule Deer

NDOW mule deer habitat layers suggest there are a total of 59,224 acres of mule deer habitat on the four allotments. Within the allotments, there is a combination of year-round, winter range and agricultural habitat designations. Lands along the East Walker River have been defined by NDOW as agricultural habitat for mule deer. This contains the entirety of the River allotment. Winter Range habitat has been delineated in the southern portion of the East Walker allotment, the Northeast portion of the Nine Mile allotment, and nearly all of the Lucky Boy allotment with the

exception of fragmented chunks of land right off the Lucky Boy Pass Road. Year-round mule deer habitat has been delineated for the southwestern two thirds of the Nine Mile allotment.

The mule deer habitat that overlaps with the allotments is territory of four different mule deer herds; the Powell Mountain, Hawthorne, Wassuk and Mason Valley herds. According to the NDOW 2020-21 Big Game Status Report, Nevada's mule deer populations have been declining in the recent decades primarily due to the lack of consistent precipitation, large-scale range fires, conversion of native shrubs to invasive grasses, and degraded conditions as a result of wild horses and burros. NDOW summaries on mule deer units 201, 202, 204-206 (Powell Mountain, Hawthorne, and Wassuk herds) estimate that the populations are declining as a result of limited resources. For the 203 unit (Mason and Smith Valleys), NDOW estimates the herd to be stable based on hunter harvest information. According to NDOW (2021), the highest concentrations of deer exist in and around the Walker River corridor, where thick stands of willows create escape and shelter cover. However, a recent suspected disease event took place within this herd and the impacts on the population levels are currently unknown (NDOW 2021).

The quality of mule deer habitat was assessed using a quantitative benchmark based on specified habitat characteristics, which defines that average vegetation height should be at least 60 centimeters for optimal hiding cover (Leckenby et al. 1982). Six plots met the benchmark while the other five plots evaluated within mule deer habitat did not meet the average vegetation height benchmark (Table 35).

Table 35: Average Woody Vegetation Height Results with Respect to the Mule Deer Habitat Benchmark (>60cm). Bolded values indicate that the data did not meet the benchmark values.
**Average woody height used in this analysis.*

Allotment	Plot Name	Sample Date	ESD	Habitat Type	Average Vegetation Height* (cm)	Tree Cover (%)
East Walker	EW-Site 1	9/20/2020	F026XY044NV	Winter	218.94	43.33
East Walker	CC-PJ-208	8/24/2016	F026XY060NV	Year-round	231.58	25.33
Lucky Boy	LB-Site 4	9/19/2020	F026XY044NV	Winter	321.53	27.33
Nine Mile	CC-BlackLowSage-030	6/27/2016	F026XY044NV	Winter	123.53	16
Nine Mile	CC-BlackLowSage-058	7/27/2019	R027XY049NV	Year-round & Corridor	**46.76**	0
Nine Mile	CC-PJ-198	7/1/2018	F026XY044NV	Winter	75.92	17.33
Nine Mile	CC-WySage-261	7/27/2019	R029XY006NV	Year-round	**35.91**	0
Nine Mile	NM Site-1	7/8/2020	R027XY049NV	Year-round	**30.02**	0

Allotment	Plot Name	Sample Date	ESD	Habitat Type	Average Vegetation Height* (cm)	Tree Cover (%)
Nine Mile	NM Site-2	7/9/2020	R027XY049NV	Year-round	**27.4**	0
Nine Mile	NM Site-4	7/10/2020	R029XY049NV	Year-round	**43.97**	0

Pronghorn Antelope

On the Nine Mile, East Walker and Lucky Boy allotments, there are a total of 26,337 acres of crucial winter pronghorn habitat. Additionally, there is an 817 acre seasonal migrational corridor that overlaps with the southwestern portion of the crucial winter habitat within the allotment area (Appendix A, map 17). This habitat is territory of the Bodie pronghorn herd (units 202, 204). This herd has demonstrated a decline in population in the past five years, which was estimated at 650 animals in 2017 and only over 100 animals in 2021 (NDOW 2017, NDOW 2021).

Vegetative cover and height are important components of pronghorn antelope habitat. According to Yoakum et al. (2014) for the purpose of visibility and mobility, pronghorn antelope tend to prefer areas with vegetation heights averaging 25 - 46 centimeters. Pronghorn antelope, in general, also prefer habitat with an average foliar cover of less than 50 percent and an average of other cover (e.g., rock, litter, etc.) greater than 50 percent (Yoakum et al. 2014). The quality of pronghorn antelope habitat was assessed using these quantitative benchmarks evaluated against AIM plots that fell within pronghorn habitat boundaries within the four allotments. In reviewing the average shrub height at each of the AIM plots in pronghorn habitat, all five plots averaged between 25 - 46 centimeters and therefore met the shrub height benchmark. Results also showed that all five plots that fell into mule deer habitat, also met the total foliar and ground cover benchmarks (table 36).

Table 36: Average Woody Vegetation Height, Foliar Cover, and Other Ground Cover Results with Respect to Pronghorn Antelope Habitat Benchmarks.
Bolded values indicate that the data did not meet the specified benchmark values.
** Woody vegetation height values were used to analyze this benchmark.*

Allotment	Plot Name	Sample Date	ESD	Habitat Type	Average Vegetation Height* (cm)	Total Foliar Cover (%)	Other Ground Cover (%)
Nine Mile	CC-BlackLowSage-058	7/27/2019	R027XY049NV	Crucial Winter	46.67	26.67	73.33
Nine Mile	CC-WySage-261	7/27/2019	R029XY006NV	Crucial Winter	35.92	32	68
Nine Mile	NM Site-1	7/8/2020	R027XY049NV	Crucial Winter	30.02	30	70
Nine Mile	NM Site-2	7/9/2020	R027XY049NV	Crucial Winter	27.4	26.67	73.33

Allotment	Plot Name	Sample Date	ESD	Habitat Type	Average Vegetation Height* (cm)	Total Foliar Cover (%)	Other Ground Cover (%)
Nine Mile	NM Site-4	7/10/2020	R029XY049NV	Crucial Winter	43.97	20	80

5.4.7 Evaluation of Standard 4

Evaluation Finding

☐ Achieving the standard

☐ Not achieving the standard, but making significant progress toward achieving the standard

☒ Not achieving the standard

5.4.8 Rationale for Evaluation Finding

In reviewing the field monitoring data presented in sections 5.5.2 through 5.5.3 along with Standards 1 and 2 as they pertain to the plant and animal habitat standard, BLM has concluded that Standard 4 is not achieving the standard primarily due to declines in vegetation communities as seen in upland as well as most riparian sites not meeting PFC. Functioning of upland plant communities and quality riparian sites are a critical component to wildlife habitat. In order to evaluate standard 4, which is whether populations and communities of native plant species and habitats for native animal species are healthy, productive and diverse within the allotments, the IDT assessed the results of the available datasets to evaluate each of the plant and animal habitat RAC indicators listed below:

Plant and Animal Habitat: Populations and communities of native plant species and habitats for native animal species are healthy, productive and diverse.

- Good representation of life forms and number of species
- Good diversity of height, size and distribution of plants
- Number of wood stocks, seed stocks, and seed production adequate for stand maintenance
- Vegetative mosaic, vegetative corridors for wildlife, and minimal habitat fragmentation

The first RAC indicator ‘good representation of life forms and number of species, specifically plants’, and second RAC indicator ‘good diversity of height, size, and distribution of plants’ were evaluated using the IIRH biotic integrity attribute, frequency and photo plot data. For biotic integrity, all of IIRH assessments were departed from reference (i.e. no plots rated in the none to slight category rating). The slight to moderate departure from one plot was attributed to changes in plant community composition and a decrease in soil stability. The moderate departures from five plots were attributed to changes in plant community type and distribution (reduction or loss of key plant species), reduction of plant vigor, and an increase in annual invasive plant species. The moderate to extreme departure at three sites had similar deviations from those indicators listed under a moderate reduction, however the sites had additional changes in litter cover and a complete loss of at least one functional/structure group. Frequency data revealed similar results, where two

of the seven plots were in an ecological decline due to decrease of perennial grasses and increases in sagebrush or other plants that indicate an ecological decline such as sagebrush, Bailey's greasewood and cheatgrass. Two plots of seven showed increases in ecological improvement. While the other four plots showed a static trend, some of the plots lacked or had very low amounts of Indian ricegrass or more palatable deep rooted perennial grasses including needlegrasses which should be dominant grasses in most of the ecological sites in the allotments. Additionally, in some cases increases in sagebrush cover indicated ecological decline. These data summaries show that most areas evaluated or assessed are declining or in some cases lack representation of life forms and number of species such as perennial grasses which are critical for ecosystem function, quality wildlife habitat, and necessary for cattle grazing. These results also indicate an insufficient diversity of height, size and distribution of plants in the areas assessed or evaluated and conditions most likely mirror these trends throughout the allotment.

Results from PFC and the riparian and wetlands standard can also speak to whether there are a 'good representation of life forms and number of species' and whether the 'number of wood stocks, seed stocks, and seed production adequate for maintenance' in riparian areas as these systems are critical to wildlife habitat in desert ecosystems. Specifically, results showed that 50 percent of sites where PFC was conducted had a decrease in riparian vegetation indicating a reduction in seed stocks and production adequate for maintenance. Additionally, 50 percent of site assessments were seeing an encroachment of upland vegetation indicating a lack of maintenance in riparian vegetation thus indicating a reduction in a 'good representation of life forms and number of species' in these riparian environments as well as a decrease in 'number of wood stocks, seed stocks and seed production adequate for stand maintenance'.

AIM, IIRH, and PFC data were also used to assess the 'vegetative mosaic, vegetative corridors for wildlife, and minimal habitat fragmentation' indicator. In general, the allotments have minimal fragmentation stemming from major roads or other human disturbances aside from fencing and power lines in some areas. However, results of the IIRH data analysis showed that most areas assessed were at a moderate to moderate to extreme departure from reference when it came to biotic integrity primarily as a result of changes in plant community composition and losses in functional and structural groups. Moreover, AIM data results for bare ground and canopy gap revealed that 87.5 and 50 percent of plots were not meeting the benchmarks set for these indicators, respectively. These results indicate a reduction in the integrity of these native vegetative mosaics and are likely contributing to localized habitat fragmentation and impacting animal habitat features such as concealment cover. For riparian areas assessed, all except for two sites on the allotment are not meeting PFC. These results show that critical water sources are either nonfunctioning or functioning at risk negatively impacts riparian corridors for many wide-ranging species but especially species that rely on locally sources of water. With respect to plant and wildlife habitat, non-functioning ecosystems or those on the decline can impact a species ability to sustain plant and animal populations, especially as other pressures including drought and heat become more prevalent in the region.

Potential causes for these changes in plant communities and animal habitat include historical livestock grazing, current livestock management, wild horses, climate change and others. Historical overgrazing has impacted many ecosystems in the west and its effects continue to be

observed in the current plant community composition changes in relation to their ecological potential. These changes include a reduction in deep rooted perennial grasses, increases in sagebrush and other shrub cover and increases in invasive species. These trends and conditions have been observed on the allotments. Current or recent grazing management on the allotment may be a factor in the decline and/or stagnation of the community recovery as these desert ecosystems are slow to recovery and consistent use or inadequate distribution may hinder improvement. While AUM use was lower than allotted, utilization levels observed were high in some areas despite these very low numbers of use. Wild horses may be a factor in areas they are known to occur, however, utilization in areas of overlap with HMA did not show heavy use. Finally, climate change is a factor in these observed changes as increasing drought periods and temperatures impact plant growth, composition, and resilience.

Mule Deer

Mule deer habitat was specifically evaluated within the allotments using AIM data in section 5.5.6 A total of 10 AIM plots collected between 2016 and 2020 within mule deer year-round, winter, and agricultural habitat were used to assess and evaluate current mule deer habitat conditions. According to Leckenby et al. (1982), mule deer require several plant communities for survival, but with respect to optimum hiding cover from predators and weather in shrub-steppe rangeland, vegetation heights of 60 centimeter (24 inches) are ideal. In reviewing the woody vegetation height at each of the plots, five of the 10 plots assessed within mule deer habitat did not meet the benchmark values because they contained average woody vegetation heights under 60 centimeters. Plots that did not meet the benchmark may have fallen short of the benchmark due to their ecological potential, while plots that did meet the vegetation benchmark were primarily due to the influence pinyon and juniper trees on plot. These shrub-tree plant communities may provide the thermal and hiding cover but may impede forage opportunities as PJ dominated habitats contain minimal understory plant diversity. Habitats consisting of bitterbrush shrubs are often selected by deer as these areas can provide ideal cover and forage (Pierce et al. 2004). Vegetation in which mule deer can safely move across the landscape for foraging, drinking water, and mating is important to survival. Nonetheless, cover is only one aspect of their habitat needs.

Population trends for the four mule deer herds that overlap with the allotments revealed a decline for all but one herd. NDOW (2021) reports show that declines in the mule deer population in the past decades are due to lack of precipitation and changes in the plant community compositions. Changes in the plant communities as seen in the vegetation data for the allotments likely contribute to the declines in mule deer populations specifically for the herds that overlap with the allotments.

Pronghorn Antelope

Pronghorn antelope habitat was specifically evaluated within the allotments using AIM data in section 5.5.6. Six AIM plots collected between 2019 and 2020 within mule deer year-round habitat were used to assess and evaluate current mule deer habitat conditions. Vegetative cover and height are important components of pronghorn antelope habitat. According to Yoakum et al. (2014) for the purpose of visibility and mobility, pronghorn antelope tend to prefer areas with vegetation heights averaging 25 - 46 centimeters. In reviewing the average woody height at each of the plots in pronghorn habitat, all plots assessed averaged 25 - 46 centimeters meeting the woody vegetation height benchmark. In general, pronghorn antelope also prefer habitat with an average foliar cover of less than 50 percent and an average of other cover (e.g. rock, litter, etc.) greater than 50 percent.

Of the six plots assessed for cover, all plots met the percent foliar cover and other ground cover benchmarks (tables 32 and 33). With respect to these specific habitat attributes, pronghorn antelope habitat within the allotments appears to be in good condition.

With respect to population trends for pronghorn antelope herds that overlap with the allotment areas, NDOW (2021, 2017) report data showed a decline in the herds over the past five years. While the reasons for the decline are not understood, habitat degradation due to grazing by livestock and wild horses, as well as environmental stressors such as climate change that modify habitat are likely a contributing factor for the decline.

Migratory Bird/Birds of Conservation Concern

Migratory birds and birds of conservation concern habitat was evaluated within the allotments primarily using riparian datasets. Although riparian habitats are small in proportion to the uplands, riparian health is very important to migratory bird species dependent on these habitats. Riparian areas are essential habitat for bird species of the arid and semiarid west, including upland birds, waders, shorebirds, raptors, and passerine species. More than half of the 134 species that breed regularly in the Great Basin are associated with riparian areas, including springs and seeps (NRCS 2018). The decline in riparian function is seen as the prominent contributing factor in the decline of western land bird species (NRCS 2018). As discussed above, most sites within the allotments were not meeting proper functioning condition and thus contribute to a decrease in habitat for migratory birds in the area.

Standard 5. Special Status Species Habitat

The special status species habitat RAC standard and the associated indicators were evaluated to determine the appropriate data sources and indicators from which to assess and evaluate whether the standard is being met. Of the data collected, IIRH, select AIM indicators, frequency and photo trend, PFC, and population survey data (table 37) were used to evaluate the special status habitat and its associated RAC indicators.

Table 37: RAC special status species habitat standard and its associated indicators are listed along with data sources and specific indicators used to evaluate the standard.

RAC Standard	RAC Indicators	Data Sources	AIM Data Indicators
(5) Special Status Species Habitat Habitat conditions meet the life cycle requirements of special status species	• Habitat areas are large enough to support viable populations of special status species • Special status plants and animal numbers and ages appear to ensure stable populations • Good diversity of height, size, and distribution of plants • Number of wood stocks, seed stocks, and seed production adequate for maintenance • Vegetative mosaic, vegetative corridors for wildlife, and minimal habitat fragmentation	• IIRH • AIM • Frequency and Photo Plot • PFC • Population Surveys	• Bare Ground • Canopy Gaps • Annual Grass Cover • Vegetation Cover • Vegetation Height

5.5.4 Interpreting Indicators of Rangeland Health

In order to meet standard 5, habitat conditions must meet the life cycle requirements of special status species. IIRH data were one aspect used to assess Standard 5 and are summarized in detail in section 5.1.1. For soil and site stability, 44 percent (four plots) of IIRH assessments for this attribute were departed from reference. For hydrologic function, 100 percent of final ratings for this attribute were departed from reference. For biotic integrity, 100 percent of IIRH assessments were departed from reference.

5.5.5 AIM Data

Indicators including bare ground, annual grass cover and canopy gap cover are used to evaluate special status species habitat. Detailed results for these data can be found in section 5.1.2. Bare ground can be an indicator of reduced vegetation cover and may increase the risk of invasives within a site. With respect to wildlife habitat, it may indicate low forage production available for wildlife species and low-quality wildlife habitat (Pellant et al. 2018). Of the plots with identified benchmarks (n=8), percent bare ground results showed that seven plots (87.5 percent) were not meeting the set benchmarks (table 18). Invasive plant cover is a very important indicator of change in various ecosystems and is associated with a decline in biotic integrity. Invasives may impact species composition and abundance and in turn negatively influence the nutrient cycle and energy flow within a system (Herrick et al. 2005). Of the plots with identified benchmarks (n=8), two plots (25 percent) did not meet the invasive annual grass benchmark. Canopy gap intercept data are used to assesses sites for wind and water erosion potential, susceptibility to weed invasion, and provides information regarding wildlife habitat, such as hiding cover and thermal environment (Herrick et al. 2017). Gaps that are greater than 200 cm are at high risk of erosion (Okin et al. 2009). Canopy gap results for all AIM plots revealed that 50 percent of plots had more than 20 percent of canopy gaps greater than 200 centimeters therefore did not meet the canopy gap

benchmark.

5.5.6 Frequency and Photo Trend

Two methods, the nested quadrat frequency and photo trend method provided additional data informing special status species habitat. Detailed results for these data can be found in sections 5.1.3 and 5.1.4. Frequency data revealed similar results, where two of the seven plots were in an ecological decline due to decrease of perennial grasses and increases in sagebrush or other plants that indicate an ecological decline such as sagebrush, Bailey's greasewood and cheatgrass. Two plots of seven showed increases in ecological improvement. While the other four plots showed a static trend, some of these plots reveal a lack or have very low amounts of Indian ricegrass or more palatable deep rooted perennial grasses and in some cases increases in sagebrush indicating ecological decline. For photo plot data, two plots indicated a decline in conditions, two plots indicated stable conditions and one plot indicated an unknown trend.

5.5.7 Proper Functioning Conditions

Much of the wildlife, including the special status species, in these arid climates are heavily dependent on the natural spring and stream systems despite their rarity within the allotment, thus proper functioning conditions and good water quality are a critical component of quality habitat. Section 5.2.1 lists summary data from PFC assessments conducted on springs and streams within the allotments. Of the 18 PFC assessments conducted between 2018 and 2020, six (33 percent) sites were rated as PFC; one (6 percent) site was rated as FAR with an upward trend; two (11 percent) sites were rated as FAR, trend not apparent; seven (39 percent) sites were rated as FAR with a downward trend; and 2 (11 percent) sites were rated as non-functioning.

5.5.8 Special Status Species - Wildlife Habitat Assessment

The allotments contain a diversity of special status wildlife including reptiles, amphibians, mammals, birds, and invertebrates each with their own unique habitat requirements (Appendix C). The Nevada Department of Wildlife's Wildlife Action Plan (NDOW WAP, 2013) characterized Nevada's vegetative land cover into broad ecological system groups and linked those with 22 key habitat types. Based on this analysis, the dominant key habitat types within the allotments include sagebrush (42 percent), lower montane woodlands and chapparal (31 percent), intermountain cold desert shrub (21 percent), and the other key habitat types (6 percent) (Section 3.7, table 4). Key habitats can be used to infer likely occurrences of special status wildlife species assemblages and associated vegetation that provide life cycle requirements including shelter, forage, and nesting. Many of the special status wildlife species known or having the potential to occur in the four allotments can be found in the WAP, which contains information on their habitat requirements, trends, distribution, and conservation needs. In addition to the data sources evaluated above, specific habitat qualities by species and their habitat conditions were assessed below to determine whether Standard 5 was being met.

The sagebrush key habitat type makes up approximately 42 percent of the allotments. Several

special status wildlife species that are known or likely to occur in the allotments (Appendix C) are dependent on the function of this key habitat type for most of their life cycle needs (NDOW 2013). These species include bi-state sage grouse, pygmy rabbit, sage thrasher, sage sparrow, and Brewer's sparrow. Several other special status wildlife species and birds of conservation concern that may occur on the allotments also use this habitat for one or more aspect of their habitat needs. These species include but are not limited to the logger head shrike, Inyo shrew, pale kangaroo mouse, ferruginous hawk, bald eagle, and desert horned lizard. The distribution of sage thrashers, Brewer's sparrow, and sage sparrows are closely tied to sagebrush as they are heavily dependent on the shrub component for nesting. The herbaceous component of these systems also provides cover and prey for various shrew species amongst others. Furthermore, several predator species, such as the ferruginous hawk, uses these open areas to feed on prey.

The lower montane woodlands key habitat type makes up approximately 31 percent of the allotments. Several special status wildlife species that are known or likely to occur in the allotments (Appendix A, map 11) are dependent on the function of this key habitat type for some aspect of their life cycle needs (NDOW 2013). These include but are not limited to various bat species, black rosy-finch, Great Basin collard lizard, Inyo shrew, mountain quail, and logger head shrike. Aspects of this key habitat type that species depend on include the dominant cover of tree species such as pinyon pine, juniper, mount mahogany that provide thermal cover, nesting, and foraging opportunities, particularly for many bird and bat species.

The intermountain cold desert shrub key habitat type makes up approximately 21 percent of the allotments. Several special status wildlife species that are known or likely to occur on the allotments (Appendix C) are dependent on the function of this key habitat type for some aspect of their life cycle needs (NDOW 2013). These include but are not limited to the long-nosed leopard lizard, pallid pat, logger head shrike, pale kangaroo mouse, burrowing owl, Great Basin collard lizard, bald eagle, ferruginous hawk, and the desert horned lizard. Aspects of this key habitat type that species depend on include the dominant salt desert shrubs that provide cover and protection, sandy soils that facilitate burrowing, and seeds of Indian ricegrass and shadscale provide food.

Bi-State Sage Grouse

The bi-state sage-grouse is a distinct population segment of the greater sage grouse found along the border between Nevada and California. Based on the NDOW bistate sage-grouse habitat layer, there is a total of 47,734 acres of habitat within the four allotments including three leks (Appendix A, map 21) within the Mount Grant population management unit (PMU). Based on a bi-state population trend study by Coates et al. (2020), the bi-state population as a whole did not show evidence of decrease or increase evaluated in various time periods. These results may be attributed to higher annual precipitation in the area that buffers climatic impacts on population cycles as opposed other parts of Nevada where sage grouse trends are decreasing. Specifically for the Mount Grant PMU, population trends were neutral for a ten-year period between 2008-2018, however, longer periods of population trend could not be calculated due to sparse lek counts (Coates et al., 2020). As discussed in the report (Coates et al. 2020), sparse lek counts within the Mount Grant PMU may confound the results and may not adequately represent actual changes in abundance. Potential factors for a neutral trend include relatively fewer anthropogenic disturbances and higher productivity due to climatic influences at the higher elevations of the Mount Grant PMU.

Bi-state-grouse habitat was evaluated using the HAF methodology (Stiver et al. 2015) to determine habitat suitability for BLM-administered lands in the allotments. AIM data were used to complete the HAF assessment for the allotments. Seasonal habitat suitability ratings per data point that fell within the bi-state delineated habitat area within the allotments are summarized and discussed in the following sections.

Lek Habitat Suitability

Four lek sites were present within the allotments located on BLM administered lands. All four leks were rated marginal (table 38, Figure 19, and appendix A, map 10) based on an evaluation of various indicators and their corresponding benchmarks as outlined in Section 3.8.1. Indicators included availability of sagebrush cover, proximity of linear features, proximity of surface disturbance, proximity of tall structures, proximity of low structures and percent conifer cover. All except for one site had suitable proximity to sagebrush cover. Unsuitable PJ cover (n=1), unsuitable proximity to linear features (n=1), proximity to surface disturbance (n=4), and proximity to tall structures (n=3) were primary factors for the marginal rating rather than a suitable rating.

Table 38: Sage Grouse Lek Habitat Suitability Ratings and Rational for the Allotments.
**NDOW provided data*
†Lek Status Definitions:
Active Status: Leks are defined as a traditional display area where two or more male sage-grouse have been observed at least twice in the last 5 years
Pending Status: 2 or more males observed only once in the last 5 years
Inactive Status: 0 or 1 males observed during every visit (minimum 2 visits) in the last 5 years
Historic Status: 0 or 1 male observed during every visit (minimum 5 visits) in the last 30 years
Unknown Status: no other conditions have been met (NDOW 2016)

Lek Name	Allotment	Date Assessed	Dated Last Surveyed*	Status†	Final Suitability Rating	Final Suitability Rating Rational
Baldwin Canyon	Nine Mile	5/15/2019	2020	Pending	Marginal	Suitable sagebrush over and minimal to no PJ cover, however tall structures and surface disturbance in vicinity of lek
Grant 4	Lucky Boy	7/21/2021	2019	Active	Marginal	Marginal sagebrush cover and suitable proximity to linear features however, unsuitable PJ cover and proximity to surface disturbance
Mud Spring	Nine Mile	5/15/2019	2020	Inactive	Marginal	Suitable sagebrush, PJ cover and distance to low

Lek Name	Allotment	Date Assessed	Dated Last Surveyed*	Status†	Final Suitability Rating	Final Suitability Rating Rational
						structures, however, distance to road and surface disturbance is marginal and proximity of nearby powerline is unsuitable
Nine Mile Flat	Nine Mile	5/15/2019	2020	Inactive	Marginal	Suitable sagebrush, PJ cover and distance to low structures, however, distance to road and surface disturbance is marginal and proximity of nearby powerline is unsuitable

Nesting/Early Brood Rearing Habitat Suitability

Fifteen monitoring sites were evaluated for sage-grouse nesting/early brood-rearing habitat suitability within the allotments (appendix A, map 7). The evaluation of each monitoring site was based on various indicators and their corresponding benchmarks as outlined in Section 3.8.1. Indicators included sagebrush canopy cover, sagebrush height, predominant sagebrush shape, perennial grass height, perennial forb height, perennial grass cover, perennial forb cover, preferred forb availability, annual grass cover, total shrub cover, proximity of tall structures, and proximity of conifer trees.

None of the sites were rated suitable, seven sites (47 percent) were rated marginal, and eight sites (53 percent) were rated unsuitable (table 38 and figure 19). Five of the seven marginally rated plots had a low sage ecological site that limited ecological potential with respect to the sagebrush height indicator (table 36). Although height was a limiting factor (either marginal or unsuitable), all of these marginal plots had other factors that led to their marginal suitability rating which included PJ encroachment, limited perennial grass cover, limited sagebrush or total shrub cover, and/or unsuitable forb indicator values. Six of the eight unsuitability rated plots had an ecological site that limited ecological potential which included being a forested site (n=4), a salt desert site (n=1) or a low sagebrush site (n=1). For these sites, lack of adequate sagebrush cover, corresponding height, and PJ cover were a major factor in their unsuitability rating. Annual grass cover, perennial grass cover, unsuitable forb indicators were also factors (table 38) that may be a result of the forested ecological site.

Figure 19: Sage Grouse Nesting/Early Brood Rearing Habitat Suitability Results Summary for the Allotments

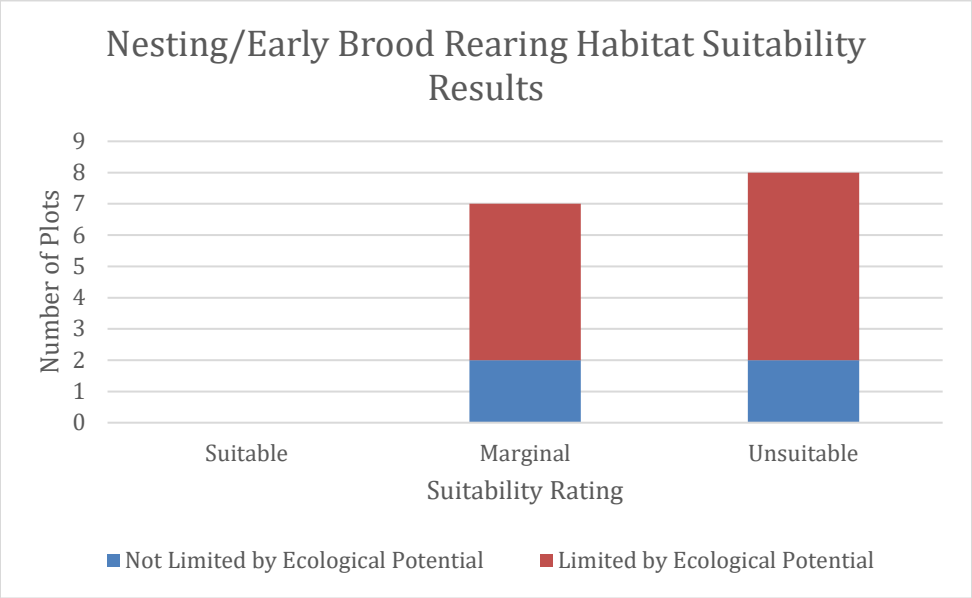


*Table 38: Sage Grouse Nesting/Early Brood Rearing Habitat Suitability Ratings and Rational for the Allotments. *Indicates primary factors in overall suitability rating.*

Allotment	**Date Sampled**	**Plot ID**	**Final Suitability Rating**	**Ecological Potential Limits Suitability**	**Final Suitability Rating Rational**
East Walker	8/24/2016	CC-PJ-208	Unsuitable	Yes, forested site	Lack of sagebrush cover, and unsuitable forb and PJ cover
East Walker	7/12/2017	CC-BlackLowSage-036	Unsuitable	Yes, salt desert site	Lack of Sagebrush cover and height and unsuitable forb and annual grass cover
East Walker	9/20/2020	EW Site-1	Unsuitable	Yes, forested site	Lack of sagebrush cover and marginal sagebrush height; unsuitable forb indicators, PJ cover, and annual grass cover
East Walker	9/21/2020	EW Site-7	Marginal	Yes, low sagebrush site	Suitable sagebrush cover and perennial grass cover and height; sagebrush height marginal and

Allotment	Date Sampled	Plot ID	Final Suitability Rating	Ecological Potential Limits Suitability	Final Suitability Rating Rational
					unsuitable forb indicators
Lucky Boy	9/19/2020	LB Site-4	Unsuitable	Yes, forested site	Lack of sagebrush cover and height; unsuitable forb, perennial grass, PJ, and total shrub cover
Lucky Boy	9/19/2020	LB Site-1	Unsuitable	No	Lack of sagebrush cover and unsuitable forb, perennial grass, annual grass, and PJ cover
Nine Mile	6/5/2014	201432212043 04B1	Marginal	Yes, low sagebrush site	Suitable sagebrush cover; marginal perennial grass cover and shrub cover; unsuitable PJ and sagebrush height
Nine Mile	6/5/2014	201432212043 04B2	Marginal	Yes, low sagebrush site	Suitable sagebrush cover; marginal total shrub cover; unsuitable PJ and sagebrush height
Nine Mile	6/27/2016	CC-BlackLowSage-030	Unsuitable	Yes, low sagebrush site	Unsuitable sagebrush cover and height; unsuitable perennial grass and forb cover; unsuitable PJ cover
Nine Mile	7/1/2018	CC-PJ-198	Unsuitable	Yes, forested site	Unsuitable sagebrush, forb, and PJ cover
Nine Mile	7/27/2019	CC-BlackLowSage-058	Marginal	Unknown	Unsuitable sagebrush cover; suitable sagebrush height and forb availability; marginal total shrub cover
Nine Mile	7/27/2019	CC-WySage-261	Marginal	No	Unsuitable sagebrush and total shrub cover; suitable sagebrush height; suitable

Allotment	Date Sampled	Plot ID	Final Suitability Rating	Ecological Potential Limits Suitability	Final Suitability Rating Rational
					perennial grass cover and height
Nine Mile	7/8/2020	NM Site-1	Marginal	Yes, low sagebrush site	Suitable sagebrush cover and perennial grass height; marginal perennial grass cover and sagebrush height; unsuitable forb indicators
Nine Mile	7/9/2020	NM Site-2	Marginal	Yes, low sagebrush site	Marginal sagebrush cover and height; suitable perennial grass cover and height; unsuitable forb indicators
Nine Mile	7/10/2020	NM Site-4	Unsuitable	No	Unsuitable sagebrush cover; marginal sagebrush height; unsuitable total shrub cover; unsuitable forb and perennial grass indicators

Upland Summer/Late Brood Rearing Habitat Suitability

Fifteen monitoring sites were evaluated for sage-grouse upland summer/late brood-rearing habitat suitability within the allotments (appendix A, map 8). No sites were rated suitable, ten (67 percent) of the sites were rated marginal, five (33 percent) were rated unsuitable (table 39 and figure 20). Six of the ten marginally rated plots had a low sage ecological site that limited ecological potential which included being a forested site (n=2) or a low sagebrush site (n=4) (table 39). Four of the sites that had a marginal rating also had a low sagebrush ecological site which influenced their suitability rating; however, these plots also had other indicators that led to their marginal suitability rating including marginal or unsuitable sagebrush cover, perennial grass cover/height, and/or perennial forb cover/height (table 39). All plots that had an unsuitable rating had an ecological site that limited ecological potential, which included being a forested site (n=3), a salt desert site (n=1) or a low sagebrush site (n=1). For these sites, lack of adequate sagebrush cover and corresponding height were major factors in their unsuitability rating. Annual grass cover, perennial grass cover, unsuitable forb indicators were also factors (table 39) that may be a result of the forested ecological site.

Figure 20: Dominant ecological sites on the four allotments.

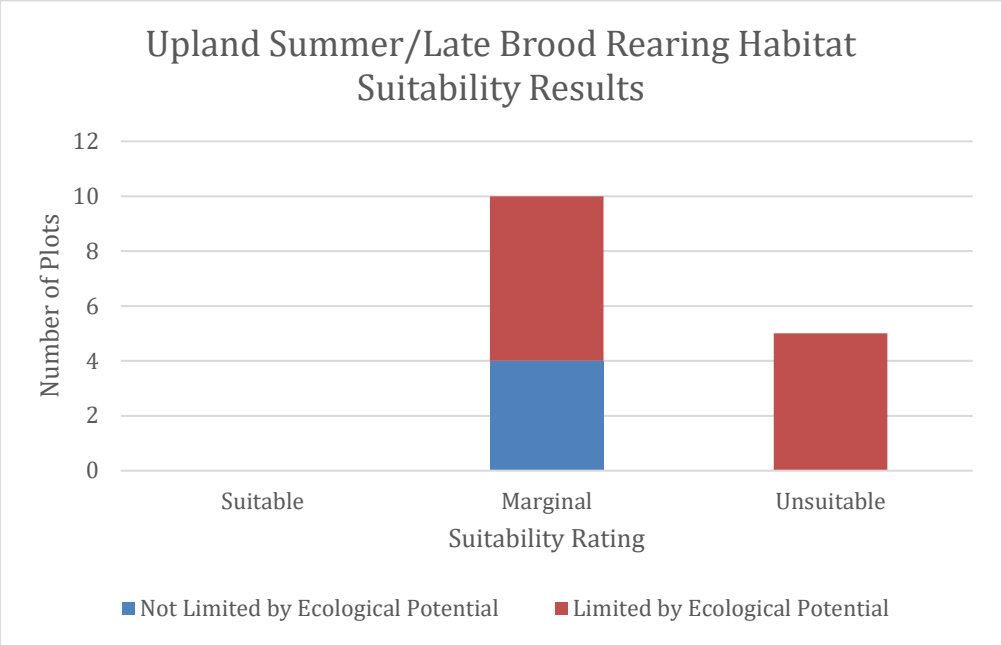


Table 39: ***Sage Grouse Upland Summer/Late Brood Rearing Habitat Suitability Ratings and Rational for the Allotments.***
**Indicates primary factors in overall suitability rating.*

Allotment	Date Sampled	Plot ID	Final Suitability Rating	Ecological Potential Limits Suitability	Final Suitability Rating Rational*
East Walker	8/24/2016	CC-PJ-208	Unsuitable	Yes, forested site	Unsuitable sagebrush cover, and height; marginal forb and perennial grass cover
East Walker	7/12/20217	CC-BlackLowSage-036	Unsuitable	Yes, salt desert site	Lack of sagebrush cover and height and unsuitable forb and annual grass cover
East Walker	9/20/2020	EW Site-1	Unsuitable	Yes, forested site	Lack of sagebrush cover and marginal sagebrush height; unsuitable forb cover
East Walker	9/21/2020	EW Site-7	Marginal	Yes, low sagebrush site	Marginal sagebrush cover and height; marginal perennial grass and forb cover

Allotment	Date Sampled	Plot ID	Final Suitability Rating	Ecological Potential Limits Suitability	Final Suitability Rating Rational*
Lucky Boy	9/19/2020	LB Site-1	Marginal	No	Marginal sagebrush cover and suitable height; suitable perennial grass cover; unsuitable perennial grass and forb cover
Lucky Boy	9/19/2020	LB Site-4	Unsuitable	Yes, forested site	Lack of sagebrush cover and height; marginal perennial forb and grass cover
Nine Mile	6/5/2014	20143221204304B1	Marginal	Yes, low sagebrush site	Suitable sagebrush cover; unsuitable sagebrush height and perennial grass and forb cover
Nine Mile	6/5/2014	20143221204304B2	Marginal	Yes, low sagebrush site	Suitable sagebrush cover; unsuitable sagebrush height and perennial grass and forb cover
Nine Mile	6/27/2016	CC-BlackLowSage-030	Unsuitable	Yes, low sagebrush site	Unsuitable sagebrush cover and marginal height; unsuitable perennial grass and forb cover
Nine Mile	7/1/2018	CC-PJ-198	Marginal	Yes, forested site	Marginal sagebrush cover and height; unsuitable perennial grass and forb cover
Nine Mile	7/27/2019	CC-BlackLowSage-058	Marginal	Unknown	Marginal sagebrush cover; suitable sagebrush height; unsuitable perennial grass and forb cover
Nine Mile	7/27/2019	CC-WySage-261	Marginal	No	Unsuitable sagebrush; suitable sagebrush height; suitable perennial grass and forb cover

Allotment	Date Sampled	Plot ID	Final Suitability Rating	Ecological Potential Limits Suitability	Final Suitability Rating Rational*
Nine Mile	7/8/2020	NM Site-1	Marginal	Yes, low sagebrush site	Suitable sagebrush cover and perennial grass and forb cover; marginal sagebrush height
Nine Mile	7/9/2020	NM Site-2	Marginal	Yes, low sagebrush site	Marginal sagebrush cover and height; marginal perennial grass and forb cover and height
Nine Mile	7/10/2020	NM Site-4	Marginal	No	Marginal sagebrush cover and height; unsuitable forb and perennial grass indicators

Riparian Summer/Late Brood Rearing Habitat Suitability

From 2018-2020, a total of 18 assessments were completed between 2018 and 2020. Individual results of the riparian assessments as they pertain to the HAF assessment are shown in table 38 and all PFC results are summarized in section 5.2.1. Of the 18 riparian areas assessed for PFC, 10 riparian areas fell within the bistate sage grouse habitat boundaries. These sites were also evaluated for sage-grouse riparian summer/late brood-rearing habitat suitability utilizing the HAF protocol. Two of the sites assessed were rated suitable based on their proper functioning PFC rating, availability of adjacent sagebrush and preferred forb availability. A total of six assessments were rated marginal based on their functional at-risk PFC rating and less than suitable adjacent sagebrush cover and limited preferred forb availability. Two riparian assessments were rated as unsuitable due to their non-functional PFC rating and less than suitable adjacent sagebrush cover and limited preferred forb availability (table 40 and figure 21).

Figure 21: Sage Grouse Upland Summer/Late Brood Rearing Habitat Suitability Results Summary for the Allotments.

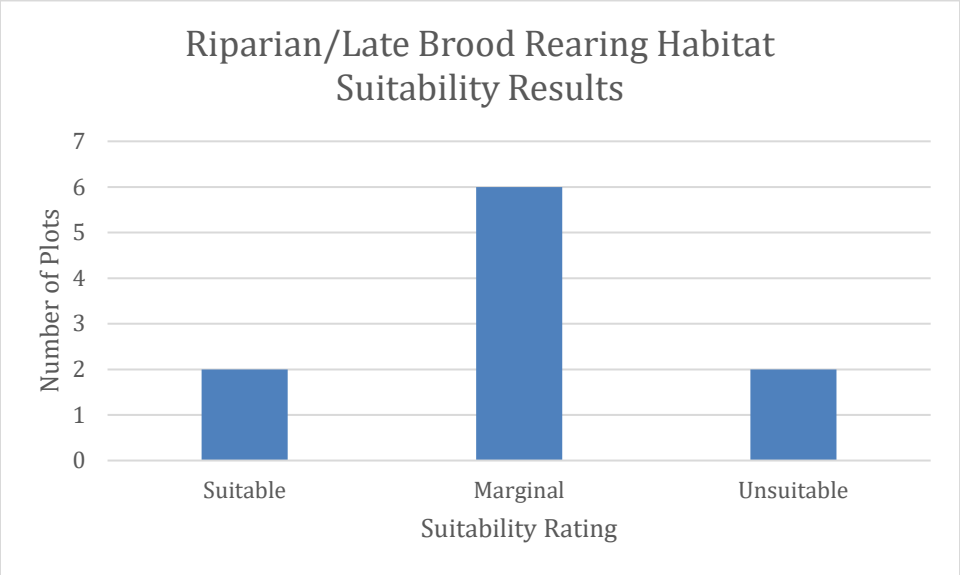


Table 40: Sage Grouse Riparian Summer/Late Brood Rearing Habitat Suitability Ratings and Rational for the Allotments.

Allotment	**Date Sampled**	**Name of Site or Reach and Type**	**Acres/ Miles**	**Final Suitability Rating**	**Final Suitability Rating Rational***
East Walker	11/16/2018	Rattlesnake Creek Headwaters (Lentic)	1.2 ac	Unsuitable	Non-functioning PFC rating; low species richness; marginal adjacent sagebrush cover; moderate PJ cover
East Walker	6/25/2019	Rattlesnake Spring (Lentic)	0.25 ac	Suitable	Properly functioning PFC rating; suitable preferred forb cover; moderate adjacent cover
Lucky Boy	11/19/2018	Lapon Canyon Creek – Lower (Lotic)	0.41 mi	Marginal	Functioning at risk (upward) PFC rating; no available adjacent sagebrush cover; marginal preferred forb availability
Lucky Boy	11/19/2018	Lapon Canyon	0.7 mi	Marginal	Properly functioning PFC rating; no available adjacent

Allotment	Date Sampled	Name of Site or Reach and Type	Acres/ Miles	Final Suitability Rating	Final Suitability Rating Rational*
		Creek – Upper (Lotic)			sagebrush cover; no preferred forb availability. Site potential limits suitability.
Lucky Boy	7/23/2019	Baldwin Canyon Headwaters -Exclosure (Lentic)	0.19 ac	Suitable	Properly functioning PFC rating; suitable preferred forb cover and adjacent sagebrush cover
Lucky Boy	7/1/2019	Lapon Meadows - Upper Exclosure (Lentic)	0.38 ac	Marginal	Functioning at risk (downward) PFC rating; suitable preferred forb cover and adjacent sagebrush cover
Lucky Boy	7/1/2019	Lapon Meadows - Lower Exclosure (Lentic)	0.31 ac	Marginal	Functioning at risk (downward) PFC rating; suitable preferred forb cover and adjacent sagebrush cover
Lucky Boy	11/20/2018	TV Canyon Creek - Upper (Lotic)	0.76 mi	Marginal	Functioning at risk (downward) PFC rating; marginal understory species richness and adjacent sagebrush cover
Nine Mile	11/19/2018	Baldwin Canyon Creek (Lotic)	0.44 mi	Marginal	Functioning at risk (downward) PFC rating; marginal preferred forb availability and adjacent sagebrush cover
Nine Mile	6/25/2019	Granite Spring (Lentic)	0.46 ac	Unsuitable	Non-functioning PFC rating; marginal adjacent sagebrush cover and low species richness

Winter Habitat Suitability

Fifteen monitoring sites were evaluated for sage-grouse winter habitat suitability within the allotments (appendix A, map 8). Five (33 percent) of the sites were rated suitable, six (40 percent) were rated marginal, and four (27 percent) were rated unsuitable (table 41 and figure 22). Four of the six plots rated as marginal had an ecological site that limited ecological potential which

included being a forested site (n=1) or a low sagebrush site (n=3) (table 41). Although height was a limiting factor (either marginal or unsuitable) for some of these plots, for two of these plots marginal sagebrush cover was also a factor in the final rating. All of the plots rated as unsuitable had an ecological site that limited ecological potential which included being a forested site (n=3) or a salt desert site (n=1) (table 41). For these sites, lack of adequate sagebrush cover and corresponding height were major factors in their unsuitability rating.

Figure 22: Sage Grouse Winter Habitat Suitability Results Summary for the Allotments.

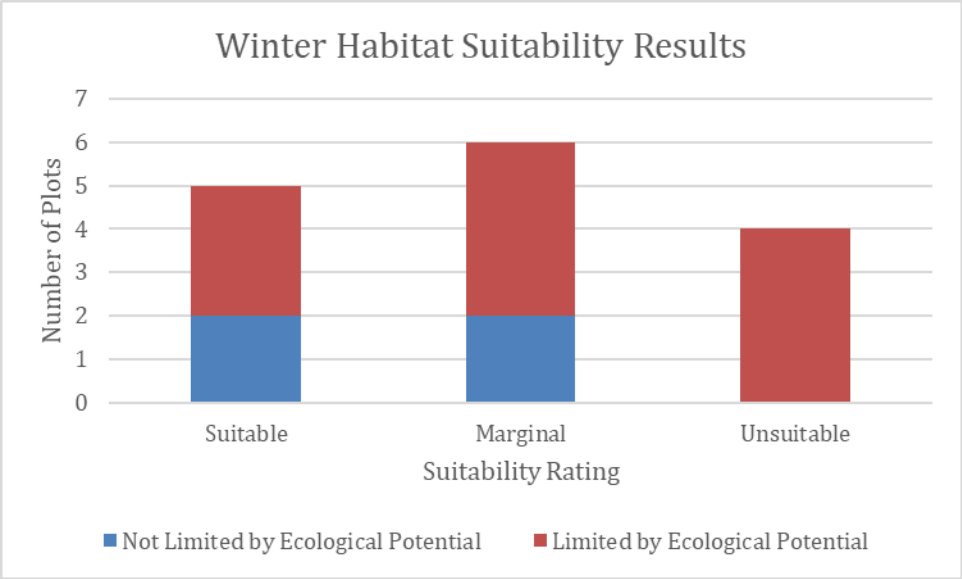


Table 41: Sage Grouse Winter Habitat Suitability Ratings and Rational for the Allotments.

Allotment	**Date Sampled**	**Plot ID**	**Final Suitability Rating**	**Ecological Potential Limits Suitability**	**Final Suitability Rating Rational***
East Walker	8/24/2016	CC-PJ-208	Unsuitable	Yes, forested site	Unsuitable sagebrush cover
East Walker	7/12/2017	CC-BlackLowSage-036	Unsuitable	Yes, salt desert site	Lack of sagebrush cover and height
East Walker	9/20/2020	EW Site-1	Marginal	Yes, forested site	Marginal sagebrush cover and suitable sagebrush height
East Walker	9/21/2020	EW Site-7	Suitable	Yes, low sagebrush site	Suitable sagebrush cover and marginal sagebrush height

Allotment	Date Sampled	Plot ID	Final Suitability Rating	Ecological Potential Limits Suitability	Final Suitability Rating Rational*
Lucky Boy	9/19/2020	LB Site-1	Marginal	No	Marginal sagebrush cover and suitable sagebrush height
Lucky Boy	9/19/2020	LB Site-4	Unsuitable	Yes, forested site	Lack of sagebrush cover and height
Nine Mile	6/5/2014	20143221204304B1	Marginal	Yes, low sagebrush site	Suitable sagebrush cover and marginal sagebrush height
Nine Mile	6/5/2014	20143221204304B2	Marginal	Yes, low sagebrush site	Suitable sagebrush cover and marginal sagebrush height
Nine Mile	6/27/2016	CC-BlackLowSage-030	Marginal	Yes, low sagebrush site	Marginal sagebrush cover and suitable sagebrush height
Nine Mile	7/1/2018	CC-PJ-198	Unsuitable	Yes, forested site	Lack of sagebrush cover and marginal height; PJ cover
Nine Mile	7/27/2019	CC-BlackLowSage-058	Suitable	Unknown	Suitable sagebrush cover and height
Nine Mile	7/27/2019	CC-WySage-261	Marginal	No	Marginal sagebrush cover and suitable sagebrush height
Nine Mile	7/8/2020	NM Site-1	Suitable	Yes, low sagebrush site	Suitable sagebrush cover and height
Nine Mile	7/9/2020	NM Site-2	Suitable	Yes, low sagebrush site	Suitable sagebrush cover and height
Nine Mile	7/10/2020	NM Site-4	Suitable	No	Suitable sagebrush cover and height

Bats

Based on NDOW occurrence data, 11 species are known to have occurred or have the potential to occur within the allotments. These species include western red bat, silver-haired bat, Mexican free-tailed bat, hoary bat, Townsend's big-eared bat, long-eared myotis, fringed myotis, spotted bat, western small footed myotis, little brown bat, and canyon bat also known as the western pipistrelle. Little population information is known for most bat species within the area; therefore, most trends are unknown. Based on the bat species risk assessment in the Revised Nevada Bat Conservation

Plan (Bradley et al., 2006), of the 11 species that are known or could occur on the allotments, three species have a high level for population/habitats at risk, seven species have a moderate level for populations/habitats at risk, and one species has a low level for populations/habitats at risk. Species with the high level of populations or habitat at risk are either imperiled or at a high risk of imperilment; those with a moderate level lack information to adequately assess the species; and those with a low level have overall stable populations. Water sources, including stock tanks and natural springs are a critical source for drinking and foraging for bat species.

Sensitive Bird Species/Birds of Conservation Concern

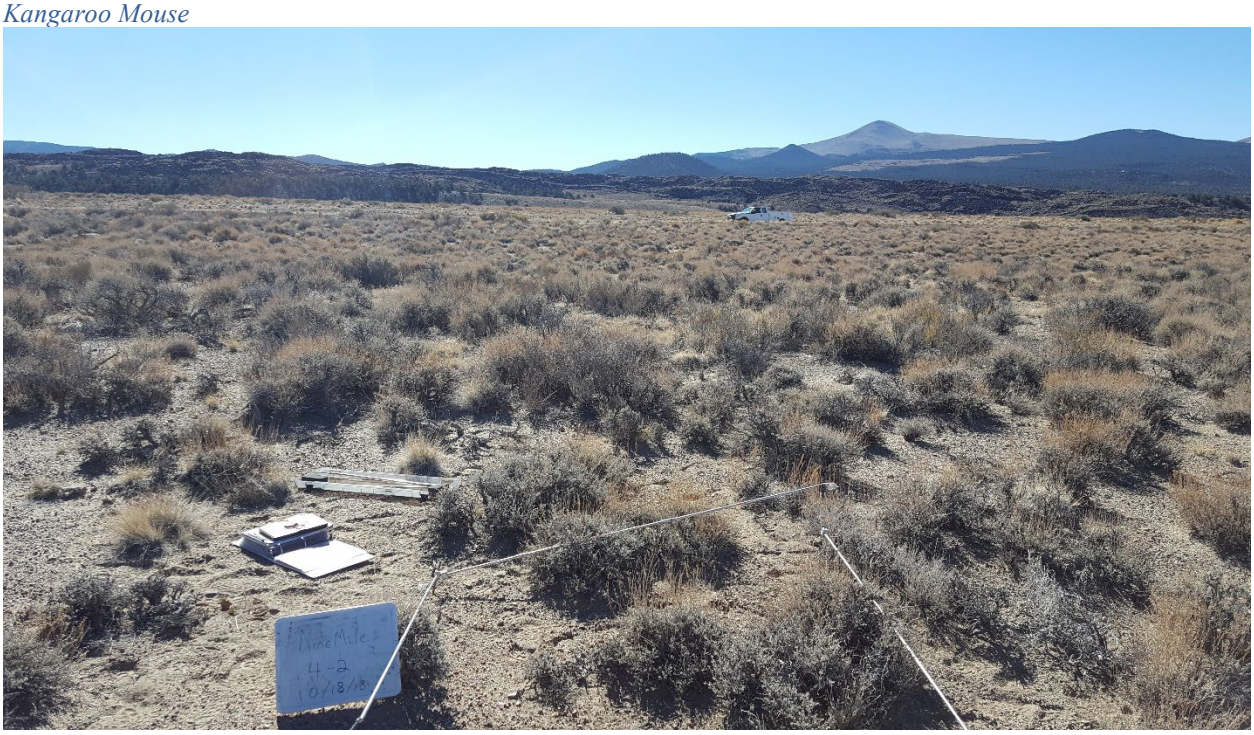
BCC and/or sensitive bird species known to occur on the allotments include bi-state sage-grouse (*Centrocercus urophasianus*), bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), ferruginous hawk (*Buteo regalis*), peregrine falcon (*Falco peregrinus*), Lewis's woodpecker (*Melanerpes lewis*), Great Basin willow flycatcher (*Empidonax traillii adastus*), loggerhead shrike (*Lanius ludovicianus*), Northern goshawk (*Accipiter gentilis*), pinyon jay (*Gymnorhinus cyanocephalus),* sage thrasher (*Oreoscoptes montanus*), short-eared owl (*Asio flammeus*), Virginia's warbler (*Leiothlypis virginiae*), green-tailed towhee (*Pipilo chlorurus*), brewer's sparrow (*Spizella breweri*), sage sparrow (*Artemisiospiza nevadensis*), black rosy-finch (*Leucosticte atrata*), Western burrowing owl (*Athene cunicularia*), mountain quail (*Oreortyx pictus*), and swainson's hawk (*Buteo swainsoni*). Populations of these migratory birds are dependent on nesting and foraging conditions, which are directly related to plant community health. Typically, the breeding season is when these species are most sensitive to disturbance, which generally occurs from March 1-August 31.

5.5.9 Additional Sensitive Animal Species

- Fletcher Dark Kangaroo Mouse (*Microdipodops megachephalus nasutus*) is a rodent classified as a BLM sensitive species with potential to occur on the four allotments based on historical data. This species is a sand-obligate desert species, long recognized to be taxonomically different than other populations of kangaroo mice (Hafner et al., 2006).

The Fletcher dark kangaroo mouse has been observed at three different locations on the four allotments. The most recent of these was in 1992 on the Nine Mile allotment. The closest vegetation monitoring plot to this observation was a trend photo plot, site NM 4-2 which is 0.9 miles southwest of the observation site (Photo 43). No cheatgrass was recorded at this site, but the perennial grass bottlebrush squirreltail was recorded and the site was dominated by Lahontan sagebrush. Photo documentation of the site appears to support the sandy ecological site characteristics required by the species.

Photo 43: Photo trend plot NM 4-2 showing some of the sandy habitat characteristics favored by the Fletcher Dark Kangaroo Mouse



- Inyo Shrew (*Sorex tenellus*) is a rodent classified as a BLM sensitive species with potential to occur on the four allotments based on historical data. This shrew is among the smallest of North American insectivores. Most records of this species are found in montane sites, although other sightings in more arid lower elevations suggest a broad ecological tolerance (Hoffman and Owen, 1980).

A historical observation of this species in 1939, placed this species on the East Walker allotment, south of the River Allotment-South Pasture. The nearest upland data was recorded in a photo trend plot southeast of this site 2.5 miles away. The non-specific habitat requirements of this species in combination with the antiquity of this observation, lend the habitat evaluation of this species more towards the allotment level analyses.

- Wongs Pyrg (*Pyrgulopsis wongi*) is a snail species classified as a BLM sensitive species with potential to occur on the four allotments based on historical data. This species is an aquatic mollusk inhabiting springs.

An observation in 1991 of this aquatic mollusk was taken at Fletcher Spring on the Nine Mile allotment. A PFC evaluation of this species in fall of 2018 rated it as Proper Functioning Conditioning (Photo 44). This riparian area was expanding and potentially creating more square feet of habitat as it grows.

Figure 71: Robust and vigorous riparian plants at Fletcher Spring in the fall of 2018, rated at Proper Functioning Conditioning. This spring is known habitat for Wongs Pyrg a BLM sensitive species

- Canyon Bat/Western Pipistrelle (Parastrellus hesperus) a BLM sensitive species, is a small (less than 4 grams) species of the desert southwest. This bat prefers arid canyons and dry shrub lands near water and rarely roosts in human-made structures

Two observations in 1934 and 1949 of this bat were recorded on the allotments. One observation was close to Fletcher Spring described above in relation to the Wongs Pyrg spring snail. A second observation placed this species on the East Walker allotment, south of the River Allotment South Pasture. Given the diverse habitat needs of bats, this analysis lends itself towards allotment level rather than site specific, but with an emphasis on riparian areas. In addition to the Fletcher Spring PFC assessment, two other lotic assessments were conducted on the East Walker River on the River allotment. These assessments revealed a final rating of Proper Functioning Conditioning and Functional At Risk – Trend Not Apparent for the North pasture and south pasture respectively.

- American Pika (*Ochotona princeps*) is a rodent classified as a BLM sensitive species. American Pika are high elevation species with narrow tolerances for summer heat (Yandow et al., 2015). Populations of American Pika are restricted to alpine environments.

American Pika were last recorded on the Lucky Boy allotment in 1947, the closest observation taken at a high elevation was the Lucky Boy Frequency site LB-03 described above in regards to the Bodie Hills Rockcress. This plot was assessed above 9,000 feet and reflects some of the alpine characteristics of even higher sites on Mount Grant and Corey Peak. This site contained an adequate diversity of forbs when read in the spring; it also had a healthy and sustainable population of perennial grasses including needlegrass species and bottlebrush squirreltail. Evaluation of this species and its habitat lends itself more towards long-term climate trends.

5.5.10 Habitat features specific to BLM sensitive species

The following sensitive plant species have been found to occur or are thought to occur, based on habitat characteristics within the four allotments.

- Alexander's buckwheat (*Eriogonum alexanderae*) Light colored clay outcrops, hillsides, and badlands in the shadcale, sagebrush, and pinyon-juniper zones.
- Bodie Hills draba (*Cusickiella quadricostata*) Great Basin shrub, pinyon and juniper woodland; clay or rocky soils; elevations from 6,200 to 8,500 feet above sea level
- Bodie Hills rockcress (*Boechera bodiensis*) is classified as sensitive by the BLM, its habitat is dry, open, rocky, high or north-facing slopes or exposed summits of granitic or rhyolitic material, on moisture accumulating microsites in sagebrush associations within the pinyon-juniper and mountain sagebrush zones.
- Mono County phacelia (*Phacelia monoensis*) is classified as sensitive by the BLM, its habitat is alkaline, barren or sparsely vegetated grayish, brownish, or reddish shrink-swell clays of mostly andesitic origin, on various slopes and aspects, mostly on stabilized or low-intensity artificial or natural disturbances. It is most abundant on road berms that cross such soils, less frequently on naturally eroding badlands or apparently undisturbed soil, in the Pinyon-Juniper and mountain sagebrush zones.
- Wassuk Beardtongue (*Penstemon rubicundus*) is classified as sensitive by the BLM, its habitat is open, rocky to gravelly soils on perched tufa shores, steep decomposed granite slopes, rocky drainage bottoms, and roadsides or other recovering disturbances with enhanced runoff, locally abundant on recent burns, in the pinyon-juniper, sagebrush, and upper mixed-shrub and shadscale zones.

Known locations of Alexander's buckwheat are found on the borders of the Ninemile and East Walker allotments on BLM lands and additional occurrences are likely within the allotments but have not yet been identified. Throughout the Nine Mile allotment, livestock utilization patterns show light usage in areas where habitat for the species is likely to be found. The most recent wild horse census data from 2020 did not show that horses are found within areas where this plant species is known to occur. The wild horse census surveys did not occur within the eastern and southern portion of the Nine Mile or the entirety of the Lucky Boy allotment, as this plant species is adapted to light utilization by wildlife, slight to moderate impacts to the plant are expected under a light livestock utilization scenario. There is a relatively small portion of the East Walker allotment which is mapped as high to severe utilization due to livestock and wild horse use. Any plant species within this area could be severely impacted as well. No occurrences are known to exist within this area but surveys are planned to determine the presence or absence of this species.

Bodie Hills draba is not known within the allotment but there are known locations, the nearest of which is 0.7 miles south of the Lucky Boy allotment border on BLM land. As the allotment has suitable habitat for this species, it is likely to occur in the allotment but just not documented at this point in time. The most recent livestock utilization patterns show moderate and heavy usage in areas where the plant species may be found. The most recent wild horse census data from 2020 did not show that horses are found within areas where this plant species is known to occur. As this plant species is adapted to light utilization by wildlife, moderate to heavy utilization impacts

to the plant are expected under a moderate or heavy utilization scenario. No occurrences are known to exist within this area but surveys are planned to determine the presence or absence of this species.

Bodie Hills rockcress is known to occur at one location in the northern portion of the Lucky Boy allotment. A second location is on DOD lands, 0.5 miles from the allotment boarder. As the allotment has suitable habitat for this species, it is likely to occur in other locations within the allotment but just not documented at this point in time. Livestock utilization patterns show light usage in areas closest to the areas where the plant species is found. The most recent wild horse census data from 2020 did not show that horses are found within areas where this plant species is known to occur. As this plant species is adapted to light utilization by wildlife, slight to moderate impacts to the plant are expected under a light utilization scenario. Further surveys are needed to better understand the condition of this plant within the allotments.

Mono County phacelia is not known to occur within the allotments but is found on specialized soils to the northwest and south of the allotments on BLM and USFS lands. This species is not expected to have habitat within large portions of the allotment as it is confined to small special soil types. Further surveys are needed to determine if this species is within the allotments.

Wassuk Beardtongue is found primarily in the upper elevations of the Wassuk Mountain on land managed by the Department of Defense (DOD). The grazing allotments fall outside of DOD lands and are not grazed by BLM-permitted livestock. For the locations of Wassuk beardtongue that are located on BLM lands, those locations fall outside of the allotment boundaries. The most recent wild horse census data from 2020 did not show that horses are found within areas where this plant species is known to occur. As this plant species is adapted to light utilization by wildlife, slight to moderate impacts to the plant are expected in areas without livestock or wild horse use.

5.5.11 Evaluation of Standard 5

Evaluation Finding
☐ Achieving the standard
☐ Not achieving the standard, but making significant progress toward achieving the standard
☒ Not achieving the standard

5.5.12 Rationale for Evaluation Finding

In reviewing the field monitoring data presented in sections 5.6.2 through 5.6.5 along with final evaluations for Standards 1, 2, and 4 as they pertain to the special status species habitat standard, BLM has concluded that Standard 5 is not achieving the standard primarily due to declines in upland and riparian vegetation communities, as observed in datasets considered in the assessment, which directly influence special status species habitat. To assess whether habitat conditions meet the life cycle requirements of special status species, the IDT assessed the results of the available datasets to evaluate each of the special status species habitat RAC indicators listed below:

Special Status Species Habitat Standard: Habitat conditions meet the life cycle requirements of

special status species.

- Habitat areas are large enough to support viable populations of special status species
- Special status plant and animal numbers and ages appear to ensure stable populations
- Good diversity of height, size and distribution of plants
- Number of wood stocks, seed stocks, and seed production adequate for stand maintenance
- Vegetative mosaic, vegetative corridors for wildlife, and minimal habitat fragmentation

The first RAC indicator - 'habitat areas are large enough to support viable populations of special status species' - cannot be adequately assessed since some species depending on their ranges might necessitate larger areas than others. Moreover, population trend data is limited or non-existent for most special status species. Population trend, however, will be discussed in subsections below to the extent possible. As a result, other RAC indicators along with species specific habitat assessments will predominate the evaluation and are discussed in detail below.

The third RAC indicator 'good diversity of height, size, and distribution of plants' were assessed using the IIRH biotic integrity attribute, frequency and photo plot data. For biotic integrity, all of IIRH assessments were departed from reference (i.e. no plots rated in the none to slight category rating). The slight to moderate departure from one plot was attributed to some changes in plant community composition and a decrease in soil stability. The moderate departures from five plots were attributed to changes in plant community type and distribution (reduction or loss of key plant species), reduction of plant vigor, and an increase in annual invasive plant species. The moderate to extreme departure at three sites had similar deviations from those indicators listed under a moderate reduction, however the sites had additional changes in litter cover and a complete loss of at least one functional/structure group. Frequency data revealed similar results, where two of the seven plots were in an ecological decline due to decrease of perennial grasses and increases in sagebrush or other plants that indicate an ecological decline such as sagebrush, Bailey's greasewood and cheatgrass. Two plots of seven showed increases in ecological improvement. While the other four plots showed a static trend, some of these plots reveal a lack or have very low amounts of Indian ricegrass or more palatable deep rooted perennial grasses and in some cases increases in sagebrush indicating ecological decline. These data summaries show that most areas evaluated or assessed are declining or in some cases lack representation of life forms and number of species such as perennial grasses. These data also indicate an insufficient diversity of height, size and distribution of native plants, particularly perennial grasses, in the areas assessed and most likely throughout the allotment.

Results from PFC and the riparian and wetlands standard can also speak to whether there are a 'good representation of life forms and number of species' and whether the 'number of wood stocks, seed stocks, and seed production adequate for maintenance' in riparian areas as these systems are critical to wildlife habitat in desert ecosystems. Specifically, results showed that 50 percent of sites that were assessed for PFC had a decrease in riparian vegetation indicating a reduction in seed stocks and production adequate for maintenance. Additionally, 50 percent of site assessments were seeing an encroachment of upland vegetation indicating a lack of maintenance in riparian vegetation thus indicating a reduction in a 'good representation of life forms and number of species' in these riparian environments as well as a decrease in 'number of wood stocks, seed stocks and seed production adequate for stand maintenance'.

AIM, IIRH, and PFC data were also used to assess the 'vegetative mosaic, vegetative corridors for wildlife, and minimal habitat fragmentation' indicator. In general, the allotments have minimal fragmentation stemming from major roads or other human disturbances aside from fencing and power lines in some areas. However, results of the IIRH data analysis showed that most areas assessed were at a moderate to moderate to extreme departure from reference when it came to biotic integrity primarily as a result of changes in plant community composition and losses in functional and structural groups. Moreover, AIM data results for bare ground and canopy gap revealed that 87.5 and 50 percent of plots were not meeting the benchmarks set for these indicators, respectively. These results indicate a reduction in the integrity of these native vegetative mosaics and are likely contributing to localized habitat fragmentation and impacting animal habitat factors such as concealment cover. For riparian areas, except for two sites, most sites on the allotment are not meeting PFC. These results indicate that many critical water sources are either nonfunctioning or functioning at risk which negatively impact general habitat for many wide-ranging special status species but especially for special status species that rely on locally sources of water. With respect to plant and wildlife habitat, non-functioning ecosystems or those on the decline can impact a species ability to sustain plant and animal special status species populations, especially as other pressures including drought and heat become more prevalent in the region.

Sensitive Species Wildlife Habitat Evaluation

The allotments contain a diversity of special status wildlife including reptiles, amphibians, mammals, birds, and invertebrates each with their own unique habitat requirements (Appendix C). Based on the NDOW WAP land cover analysis, the dominant key habitat types within the allotments include sagebrush (42 percent), lower montane woodlands and chapparal (31 percent), intermountain cold desert shrub (21 percent), and the other key habitat types (6 percent) (Section 3.7, table 4). Key habitats can be used to infer likely occurrences of special status wildlife species assemblages and associated vegetation that provide shelter, forage, and nesting.

The sagebrush key habitat type is the dominant habitat in the allotments. Understory, particularly native bunch grasses and forbs, has decreased and shrub and pinyon juniper cover has increased in comparison to pre-settlement conditions (NDOW 2013). This is often a result of heavy grazing that occurred prior to the implementation of grazing land management policy. Similar conditions were observed on the allotments as described in the vegetation evaluation above. Particularly there is a reduction or absence of needle grasses and other grasses in general, and an increase in pinyon juniper in some areas of the allotments. These changes in plant community composition for this critical key habitat type results in decreased availability of habitat needs including nesting and escape cover and food sources. Specifically, the loss of native grass and forb understory reduces the food sources for species including sage grouse, pale kangaroo mouse, and arthropod communities, which in turn are food sources for other species such as the desert horned lizard, Inyo shrew, sage thrasher, Brewer's sparrow and others. A reduction in these insectivorous dependent species also affect the food sources for predators such as the ferruginous hawk and bald eagle. Declines in the populations for sagebrush dependent species are projected due to these changes in plant community composition and are fueled by climate change and grazing impacts amongst others.

The second dominant key habitat type in the allotments is the lower montane woodlands. This

habitat seems in relatively stable condition within the allotments if not expanding, however, stand densification can be an issue (NDOW 2013). Given the steep and mostly inaccessible terrain for this habitat type, livestock are rarely found in this habitat type. Species that rely on this habitat for one aspect of their life cycle maybe more impacted by the degradation of other habitat types that they are dependent on such as sagebrush or riparian areas, particularly bat and bird species as discussed in the subsections below.

The last dominant key habitat type in the allotments is the intermountain cold desert shrub. Changes in plant community composition because of historical grazing resulted in reductions of Indian ricegrass and the introduction of invasive species such as Halogeton and Russian thistle (NDOW 2014). The reduction or absence of native perennial grasses such as Indian rice grass was observed on the allotments making this habitat type more vulnerable to invasive species and fire. The minimal or lack of understory vegetation observed in the assessment data has similar impacts to those of the sagebrush key habitat: loss in forage and nesting opportunities for species dependent on this habitat. Because this key habitat type is slow to regenerate after disturbances and restoration of these areas can be costly and their success rates low, careful land management actions are necessary in maintaining this habitat.

Potential causes for these changes in plant communities and animal habitat include historical livestock grazing, current livestock management, wild horses, climate change and others. Historical overgrazing has impacted many ecosystems in the west and its effects continue to be observed in the current plant community composition changes in relation to their ecological potential. These changes include a reduction in deep rooted perennial grasses, increases in sagebrush and other shrub cover and increases in invasive species. These trends and conditions have been observed on the allotments. Current or recent grazing management on the allotment may be a factor in the decline and/or stagnation of the community recovery as these desert ecosystems are slow to recover and consistent grazing use or inadequate livestock distribution may hinder improvement. While AUM use was lower than allotted, utilization levels observed were high in some areas despite these very low numbers of use. Wild horses may be a factor in areas they are known to occur, however, utilization in areas of overlap with the HMA did not show heavy use. Finally, climate change is a factor in these observed changes as increasing drought periods and temperatures impact plant growth, composition, and resilience.

Bi-State Sage Grouse

A large portion of the allotments is comprised of bi-state sage-grouse habitat. AIM and landscape monitoring framework (LMF) data were used to evaluate each seasonal habitat types to complete the allotment scale (site scale) HAF assessment. Details on the evaluation can be found in section 5.6.3. Overall sage grouse habitat was rated as marginal for reasons indicated below.

Four leks are present in the allotments, one lek is considered active, two of the leks are considered inactive, and one is pending. All four leks were rated as marginal; therefore, the overall lekking habitat on the allotments is being rated as marginal. The main reasons for the marginal suitability ratings were due, depending on the site, to the proximity of pinyon juniper, distance to roads, surface disturbances and tall structures near the sites. Pinyon-juniper encroachment is an ongoing

ecological concern throughout the Great Basin as well as on the allotments. Sage-grouse need sagebrush dominated ecosystems and are considered indicator species of these ecosystems (Coates et al. 2017). Coates et al. (2017) found that sage-grouse avoidance in sparse PJ cover (<10 percent) was variable, but in general they strongly avoided areas with dense PJ cover (>10 percent); however, there was a higher risk of mortality in the sparsely PJ covered areas. The proximity of tall structures and establishment of pinyon juniper nearby provide perching opportunities for predators and the changes in plant community composition reduces important sage-grouse habitat indicators such as sagebrush, perennial grass, and forb cover. Moreover, these potential perches for predators such as ravens and other large birds of prey reduce the quality of these lekking areas and subsequently contribute to declining sage grouse populations.

Nesting success is critically important to sage-grouse population viability. Sage-grouse require a large continuous area of sagebrush habitat as well as a substantial understory of grasses and forbs for their nesting and early brood-rearing habitat. Both of these components are important because the chicks need protection from predators and access to food without exposing themselves. A grazing management strategy that promotes adequate cover (measured as grass height) and abundance of perennial grasses and forbs is necessary for productive sage-grouse nesting and brood-rearing habitat. Nesting/early brood-rearing habitat in the allotments was rated as overall marginal as seven sites were rated as marginal and eight sites evaluated were rated as non-suitable. Marginally rated sites mostly contained marginal sagebrush height as well as other factors that marginalized the rating including PJ encroachment, limited perennial grass cover, limited sagebrush or total shrub cover, and/or unsuitable forb indicator values. For unsuitable sites, lack of adequate sagebrush cover, corresponding height and PJ cover were major factors in the final rating, however most unsuitable rated plots did not have the ecological potential for sage grouse habitat. Upland summer/late brood rearing habitat was rated as overall marginal as 10 sites were rated as marginal and five sites were rated as unsuitable. Marginally rated sites mostly contained marginal sagebrush height as well as other factors that marginalized the rating including marginal or unsuitable sagebrush cover, perennial grass cover/height, and/or perennial forb cover/height. For unsuitable sites, ecological potential was a major factor in the site not meeting suitability due to low sagebrush cover and height.

Functioning riparian systems provide essential components of sage-grouse habitat and foraging needs, such as forb availability for food and grasses for cover. During late brood rearing, the hen and brood will move out of their nesting habitat to follow the availability of forbs and insects. They will either move to areas higher in elevation where conditions are moister or to areas where water collects. They can frequently be seen in agricultural fields, wet meadows, and riparian areas adjacent to sagebrush cover. Fall habitat for sage-grouse can vary greatly. Sage-grouse will continue using wet meadows, riparian areas and irrigated fields until their food source of forbs dries up or is killed by frost. During this period their diet will change back to predominantly sagebrush and the birds will move to areas where that is available. Riparian summer/late brood-rearing habitat was rated as marginal overall as all but two riparian areas assessed were rated as marginal due to most plots being rated as functional at-risk. Additionally, the riparian and wetland resources standard is also not being achieved for the reasons indicated in section 5.3.

Sage-grouse spend the winter in sagebrush dominated landscapes where they rely almost exclusively on sagebrush for both forage and shelter. The habitat they choose is dependent on snow depth, elevation, and aspect. Sage-grouse tend to prefer south and southwest facing aspects and very gentle slopes. They can often be seen on windswept ridges, draws, or any location that has significant sagebrush available above the snow. Winter habitat in the allotments was overall rated as marginal due to most plots rated as marginal. Most plots were lacking the adequate sagebrush height necessary for suitable winter habitat for the sage-grouse. For most plots, sagebrush height may have not been adequate due to the potential of the ecological site, which is conducive to short statured sagebrush species.

The Mount Grant PMU bi-state sage grouse population trend for the past ten years has been neutral, and the bi-state sage grouse population as a whole reflects the same trend. Moderate suitability of habitat in the allotments are likely contributing to these trends. The allotments to some extent 'are large enough to support viable populations' of bi-state sage grouse and also 'appear to ensure stable populations. However, changes seen in vegetation composition within the allotment such as increasing PJ cover and declines in perennial grass cover as well as changes in climate may negatively affect the populations in the area if management changes to address these issues are not implemented.

Bats

Results from the frequency and photo plots along with the IIRH assessments for AIM plots assessed within the allotments show similar trends: departures from reference state when assessing biotic integrity. These biotic changes can negatively impact other aspects of an ecosystem including the wildlife species that rely on them including bat species. Additionally standard 2, Riparian and Wetland Resources, was not achieved on the allotments due to most springs being rated as functional-at-risk (section 5.3.2). Of the springs that were assessed, approximately 66 percent were rated as functional-at-risk and non-functional due to bank shearing and trampling, a reduction in riparian vegetation, encroachment of upland vegetation, and other causes. With respect to population trends, bat trend information is not readily known and cannot be evaluated at this time.

Although riparian habitats are small in proportion to the uplands, natural springs that are unaltered and not degraded by overuse are a critical component to bat habitat (Bradley 2006). All except one bat species that occur on the allotments may be impacted by water impoundments or degradation of riparian habitats (NDOW 2013). Bats tend to concentrate their activities around water resources, in some cases up to 40 times greater than in upland areas (Grindal and Bringham 1999). Thus, alterations to springs for livestock use and declines in springs due to impacts such as overgrazing can negatively impact bats by reducing not only water availability, but the amount of vegetation in which they can forage over. Bats, with exceptionally narrow requirements for water sources, are especially at risk when water is in short supply. Studies of bat physiology have documented water loss of up to 50 percent of body weight in a single day. Even the most desert-adapted bat species periodically need water, and the loss of a single source can threaten the survival of local populations (Taylor 2007). Riparian assessment results suggest that most water sources across the allotments not in proper functioning condition and thus may negatively impact bat species habitat based on their critical need for functioning water sources as described above. Additionally,

changes seen in the upland habitat can negatively impact foraging for bat species as most rely on food sources including moths, beetles and other insects that are inextricably linked to functioning native habitats.

Sensitive Bird Species

Populations for many of the sensitive bird species that are known or have the potential to occur on the allotments are declining (NDOW 2014). Sensitive bird species, including but not limited to the Brewer's sparrow, sage sparrow and sage thrasher, are vulnerable to loss, degradation, and fragmentation of habitat due to invasive plants, expansion of pinyon-juniper woodland into sagebrush, and unsustainable livestock grazing (NDOW 2013). The decline in perennial grasses, an increase in less stable soils, an expansion of pinyon juniper and an increase in canopy gap seen in the allotment data may decrease the ecosystem's resistance to invasive annuals and indicate a decline in biotic integrity further impacting sensitive bird species habitat. Moreover, degradation of riparian areas, as seen on the allotments, are also impacting many sensitive bird species that have the potential or are known to occur on the grazing allotments. Grazing impacts can inadvertently lead to losses of bird species from predation by reducing vegetative cover (Gregg et al. 1994) and changing plant community composition. Livestock trampling can also destroy nests and degrade riparian habitat necessary for the resilience and life cycles of these bird species (Wuerthner 2020).

Sensitive Plant Species

Throughout the allotments, livestock utilization patterns show light usage in areas where habitat for sensitive plant species are likely to be found. For the most part, recent wild horse census data from 2020 did not show that wild horses are active within areas where sensitive plant species are known to occur. As these plant species are adapted to light utilization by wildlife, slight to moderate impacts to sensitive plants are expected under a light livestock utilization scenario. For the small areas that did experience moderate to high utilization levels the sensitive plant species are impacted more severely. Additional surveys and studies are needed to understand what mitigation measures would help ensure plants in heavily utilized areas can be protected to allow for recovery. These trends represent the niche and microsite habitats for rare plants and may not represent the overall trends for vegetation on the allotments. However, if the general plant community is not in good condition, such as evidenced by data presented in standard four, then it is likely that the poor condition would reflect the condition of rare plants on the allotments as well.

6.0 Interdisciplinary Team Members

Table 41: List of interdisciplinary team members, title, and specialty.

Resource Specialist/Name	Title	Specialty
Mark Mazza	Rangeland Management Specialist	Project Lead/Livestock Grazing/Vegetation/Noxious Weeds
Melanie Cota	Wildlife Biologist	Wildlife/Sensitive animal species
Dean Tonenna	Botanist	Botany/Sensitive plant species
Michelle Stropky	Hydrologist	Soil science/Hydrology
John Axtell	Wild Horse and Burro Specialist	Wild Horse and Burro
Cassandra Rivas	Natural Resource Specialist	AIM Data Management

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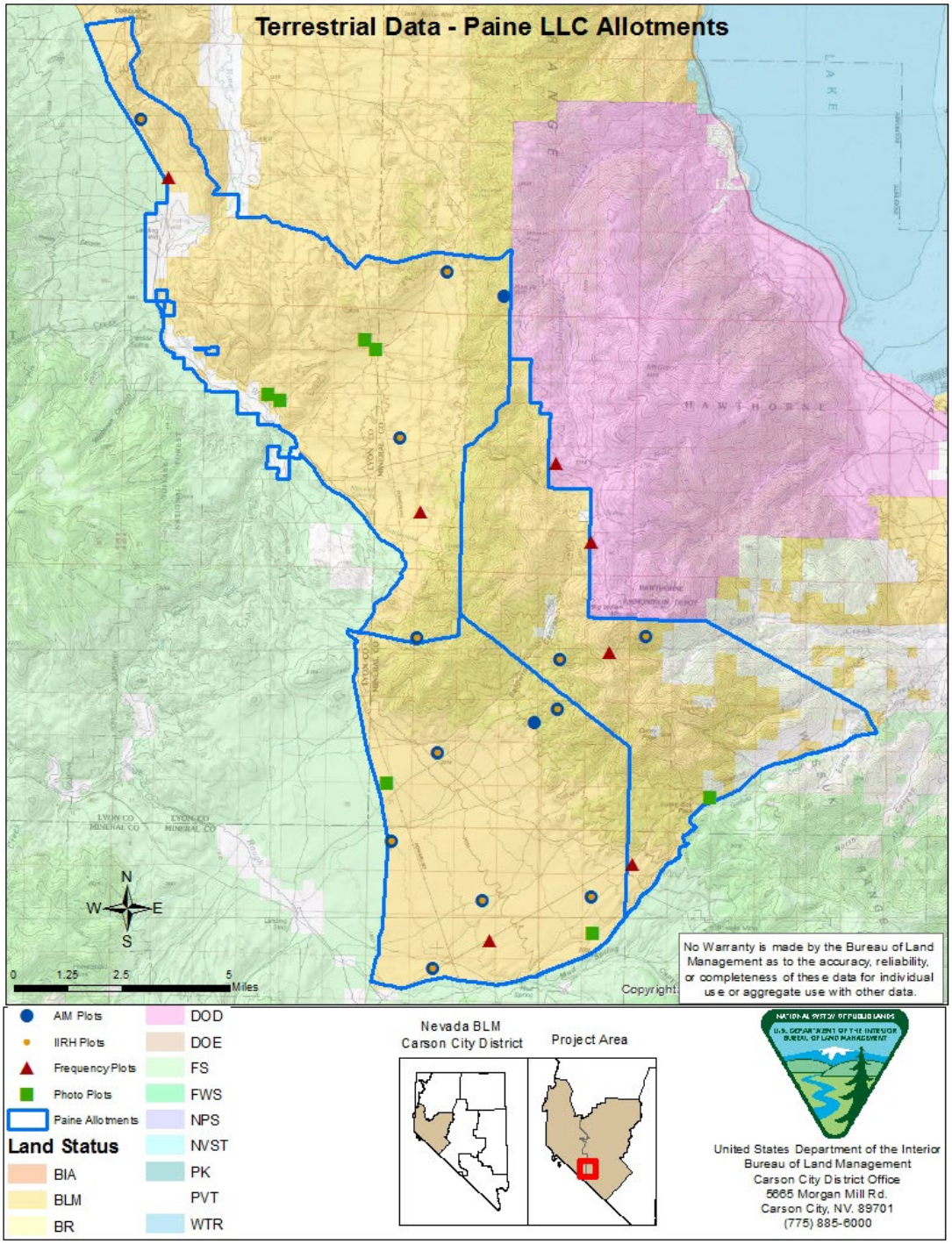
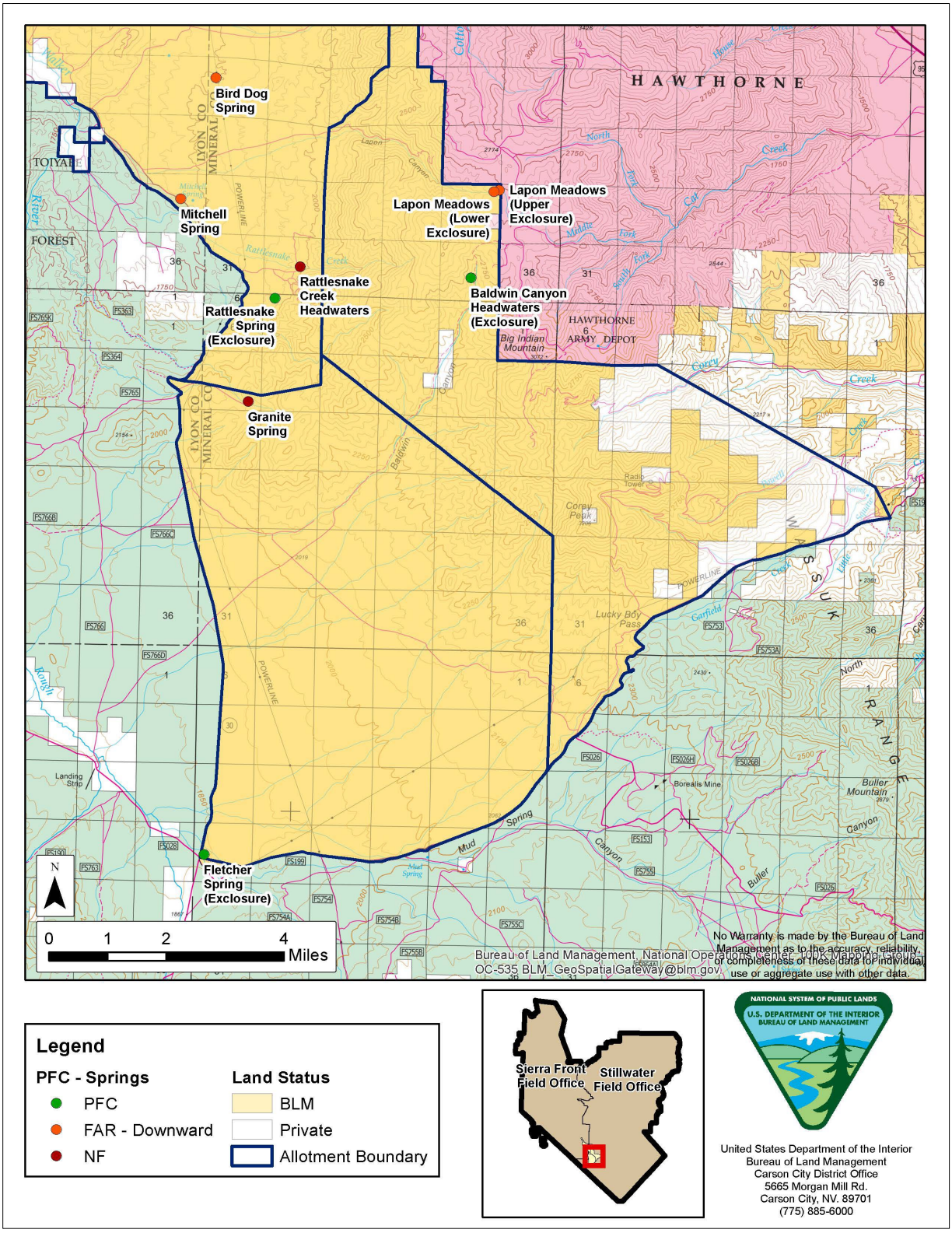
8.0 Appendices

8.1 Appendix A – MAPS

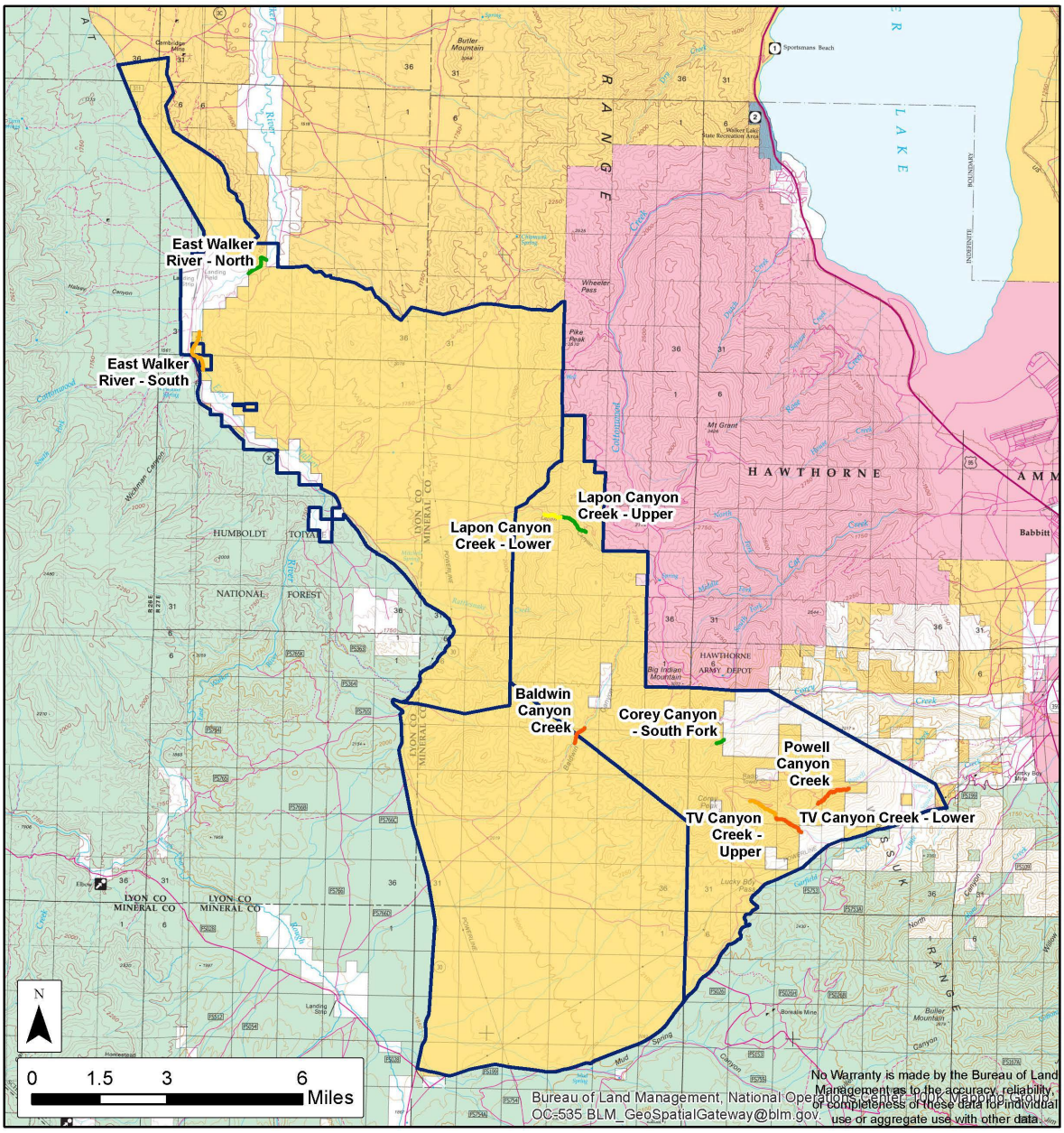
8.1 Map 1 Terrestrial Data



8.2 Map 2 – PFC Springs Map



8.3 Map 3 – PFC Streams



Legend

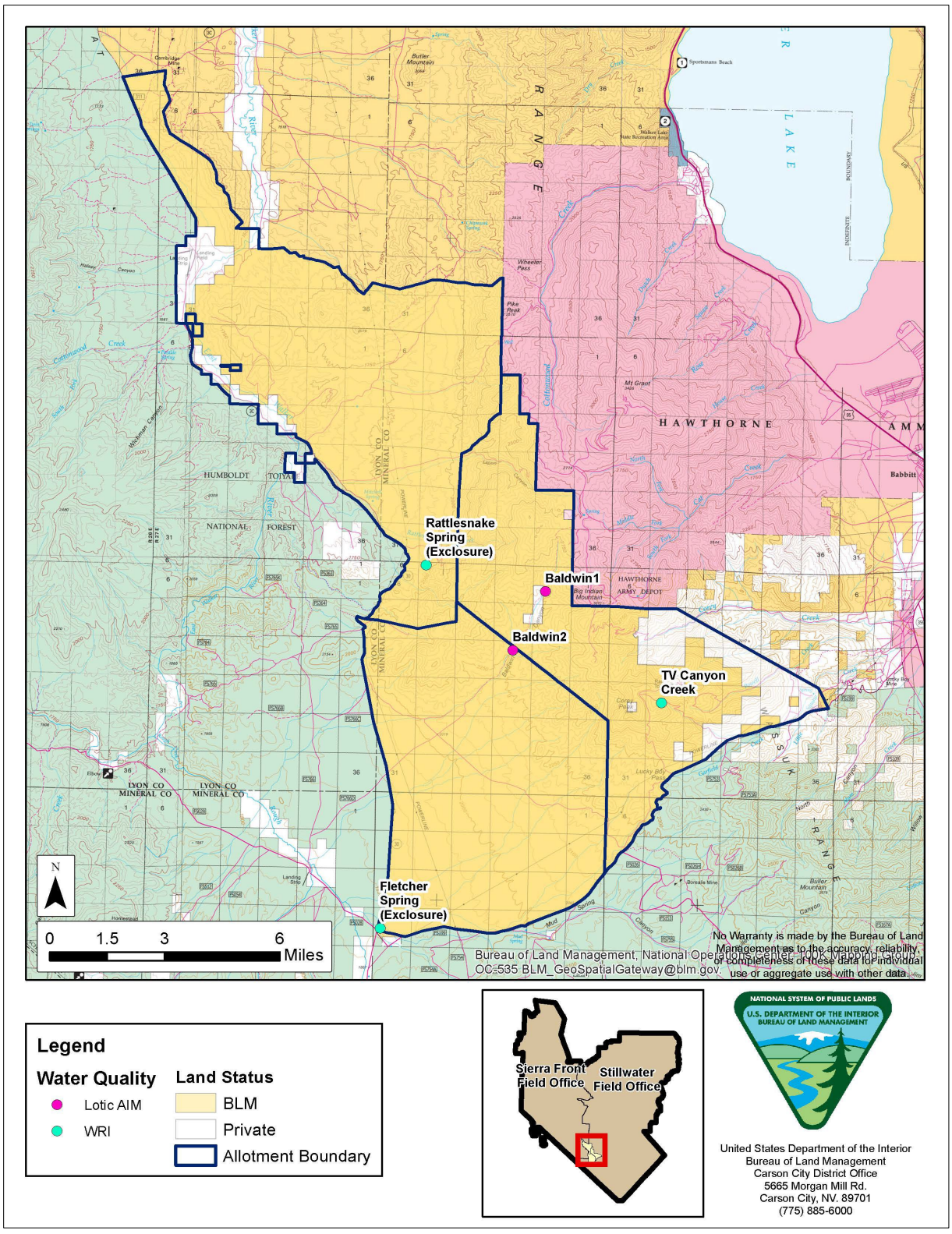
PFC - Streams
- PFC
- FAR - Upward
- FAR - Not Apparent
- FAR - Downward

Land Status
- BLM
- Private
- Allotment Boundary

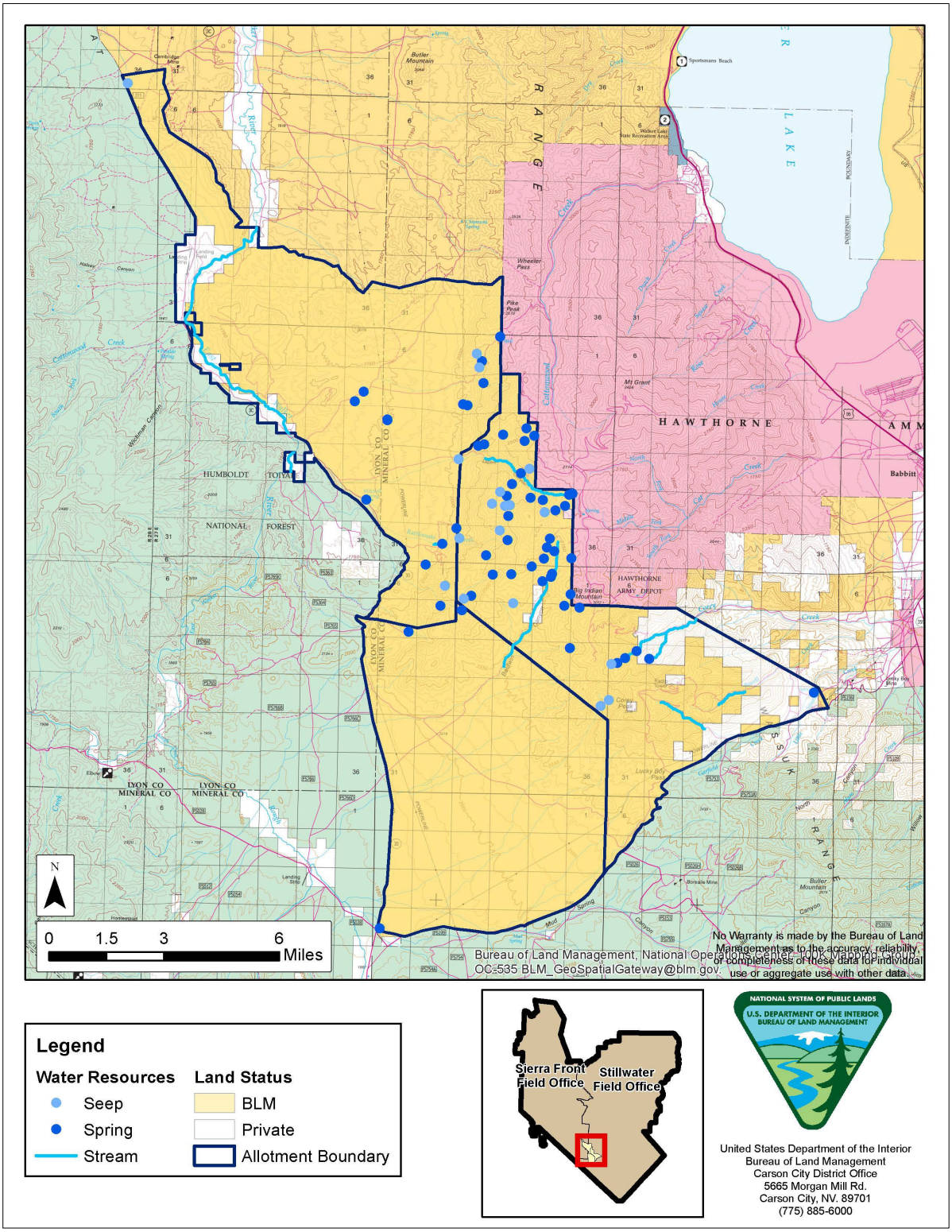
NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

United States Department of the Interior
Bureau of Land Management
Carson City District Office
5665 Morgan Mill Rd.
Carson City, NV. 89701
(775) 885-6000

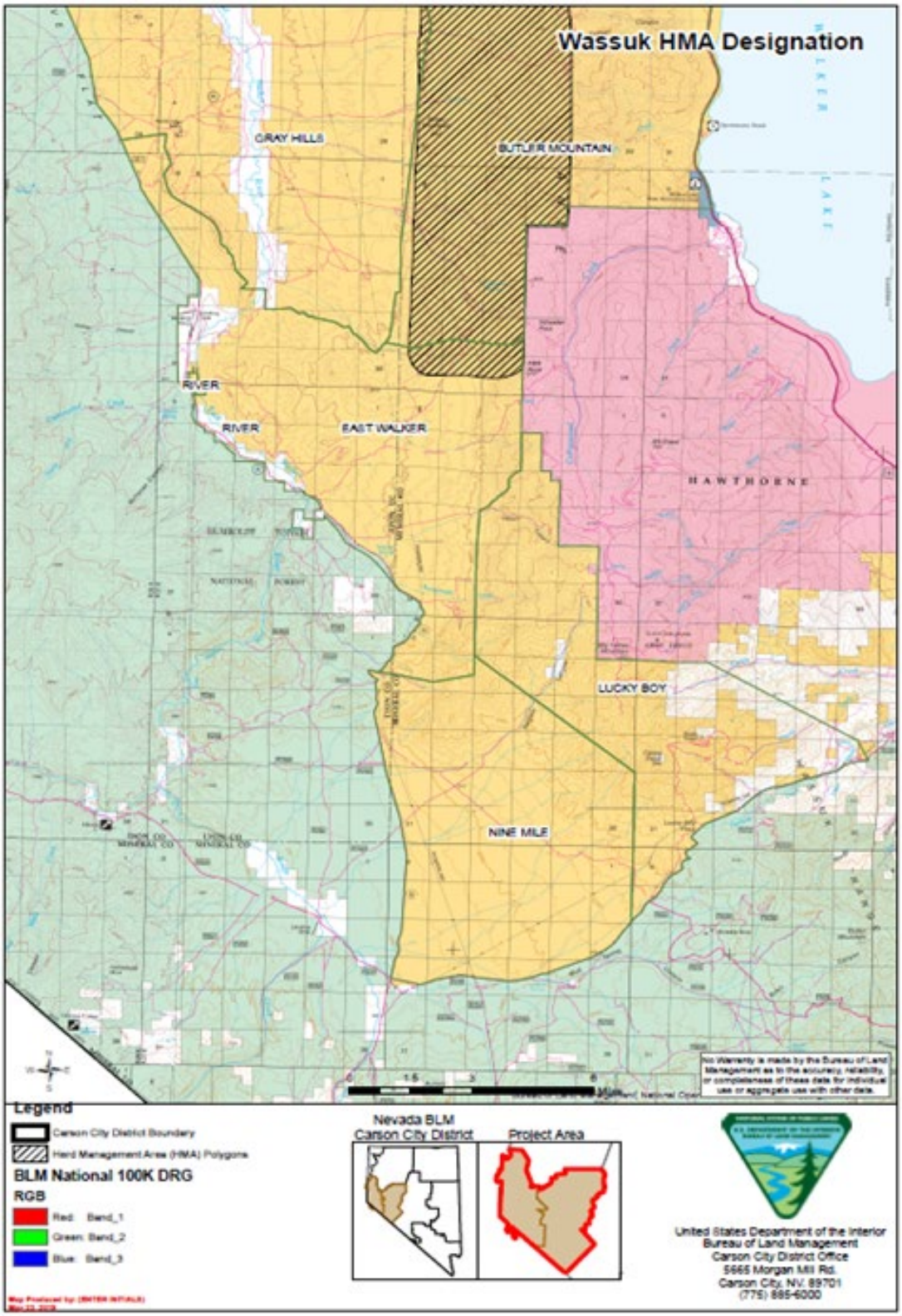
8.1 Map 4 – AIM Lotic and Water Resource Inventory



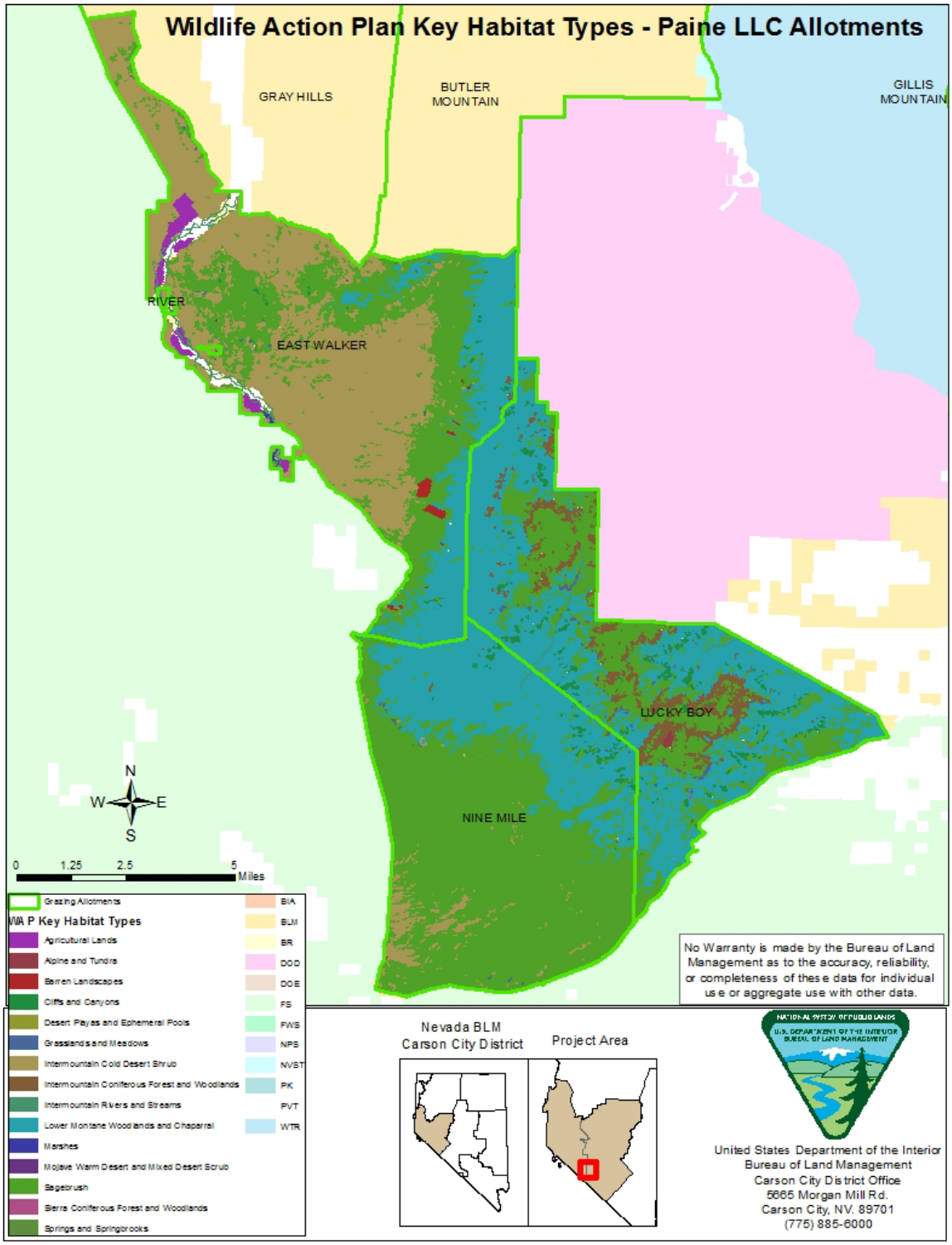
8.1 Map 5 – All Water Sources Map



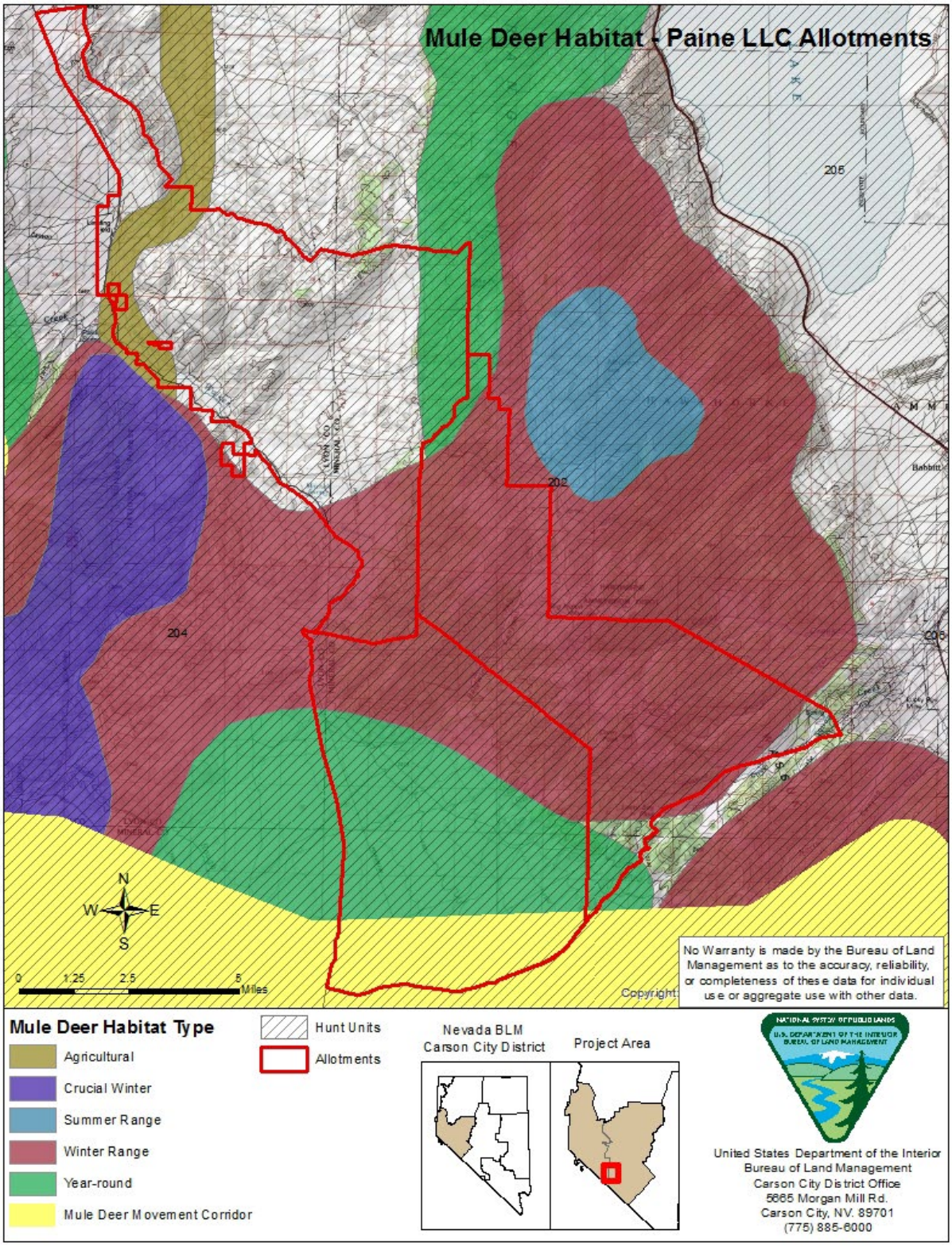
8.1 Map 6 – Wassuk HMA



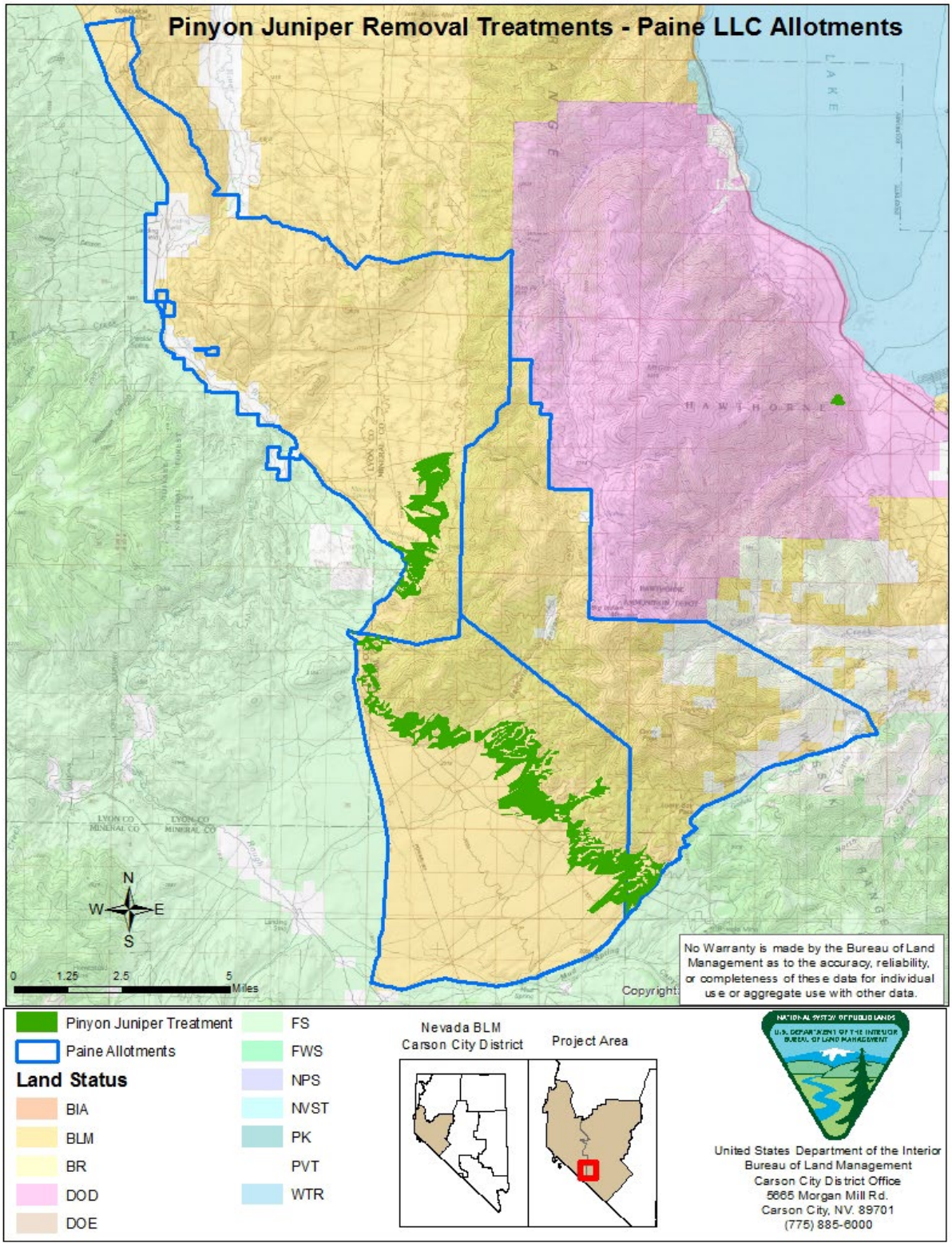
8.1 Map 7 – Wildlife Action Plan Key Habitat Types



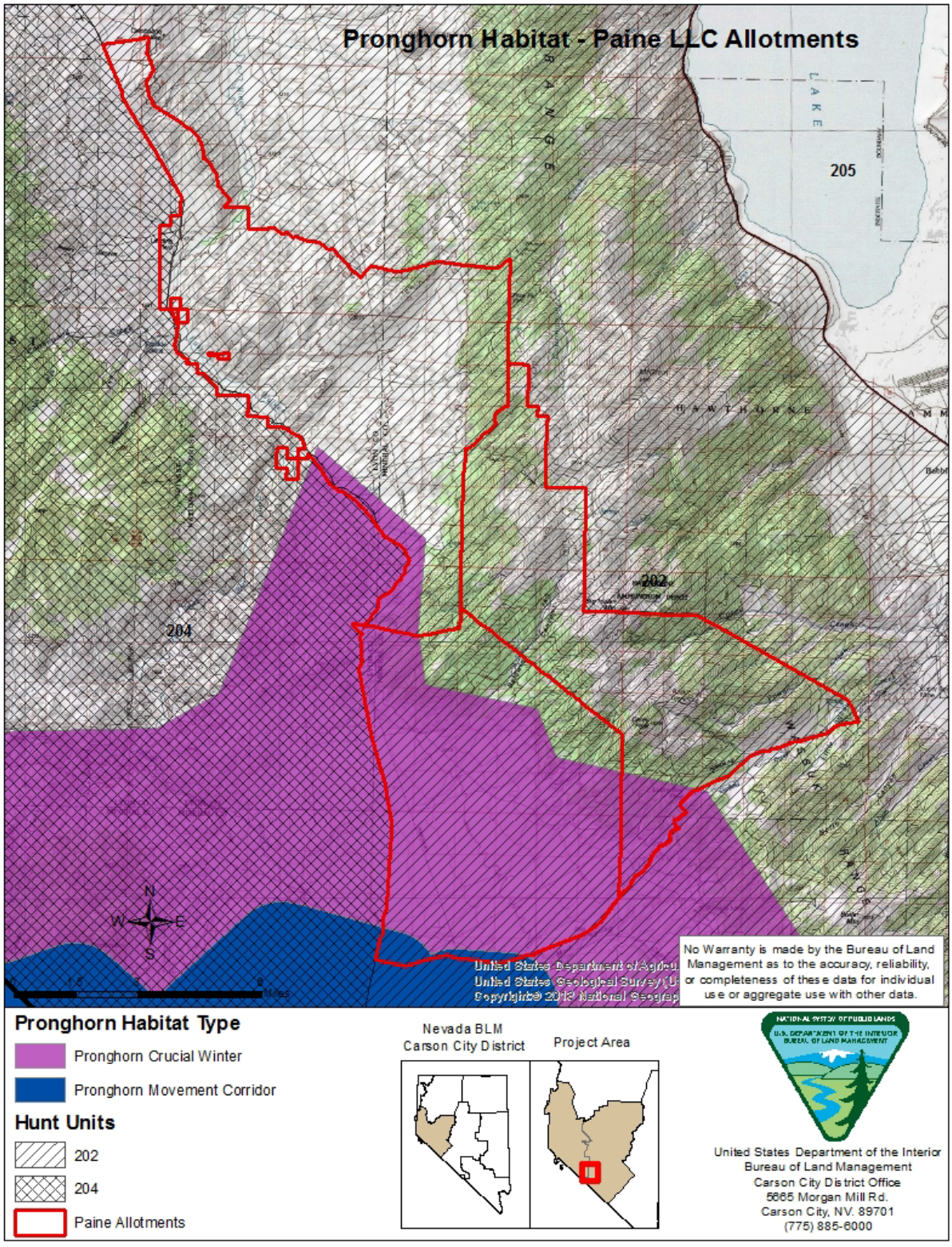
8.1 Map 8 – Mule Deer Habitat



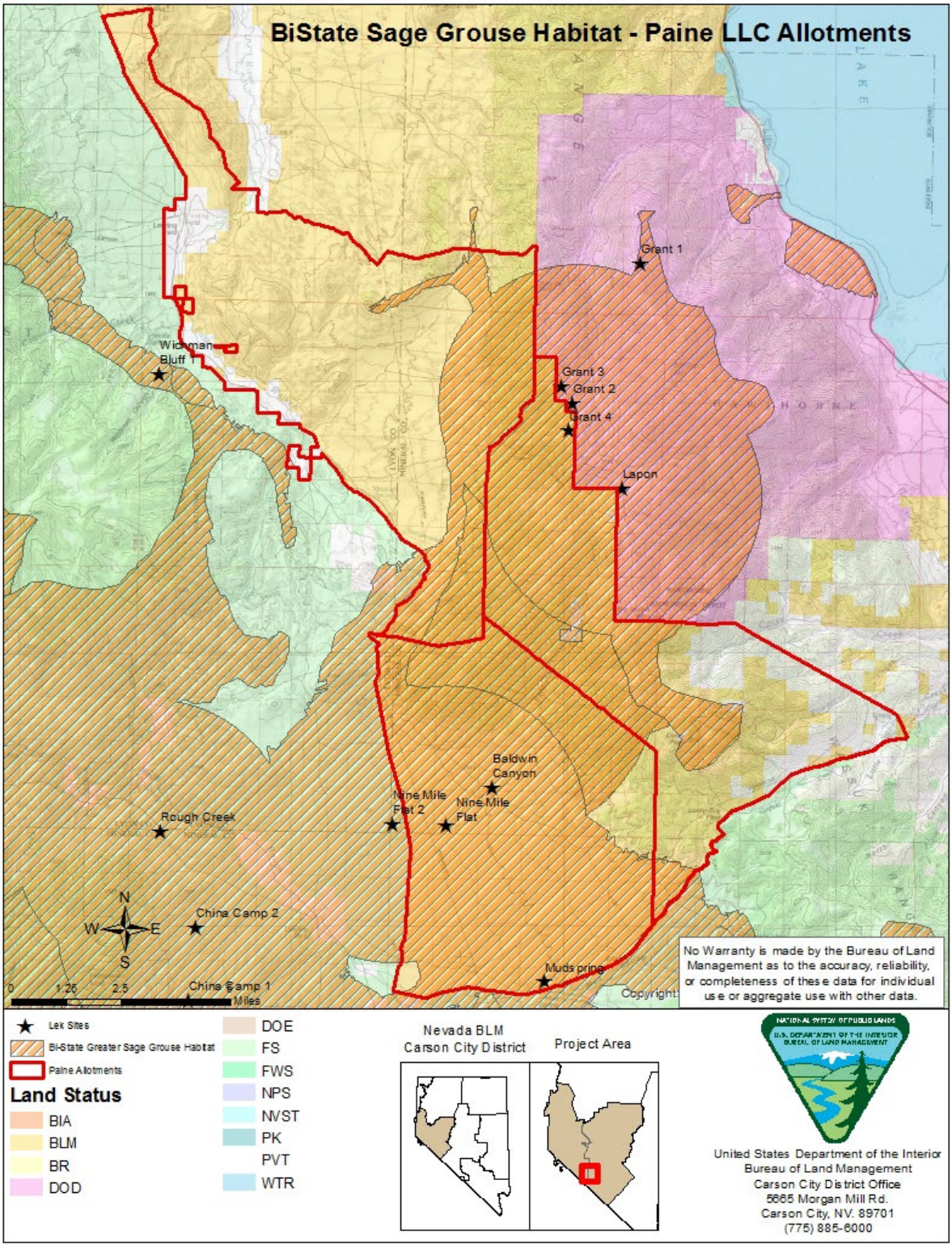
8.2 Map 9 – Pinyon Juniper Treatments



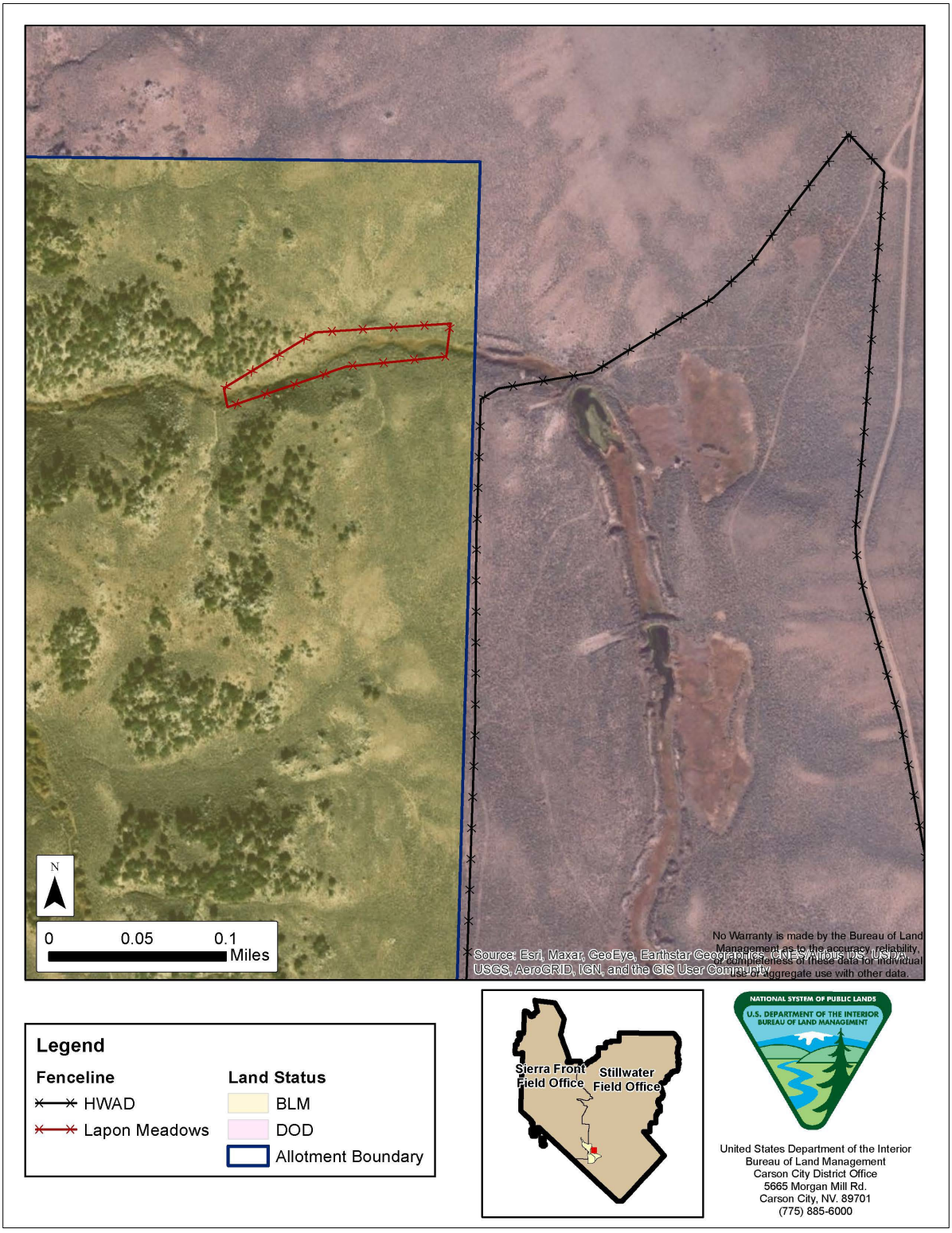
8.3 Map 10 – Pronghorn Habitat



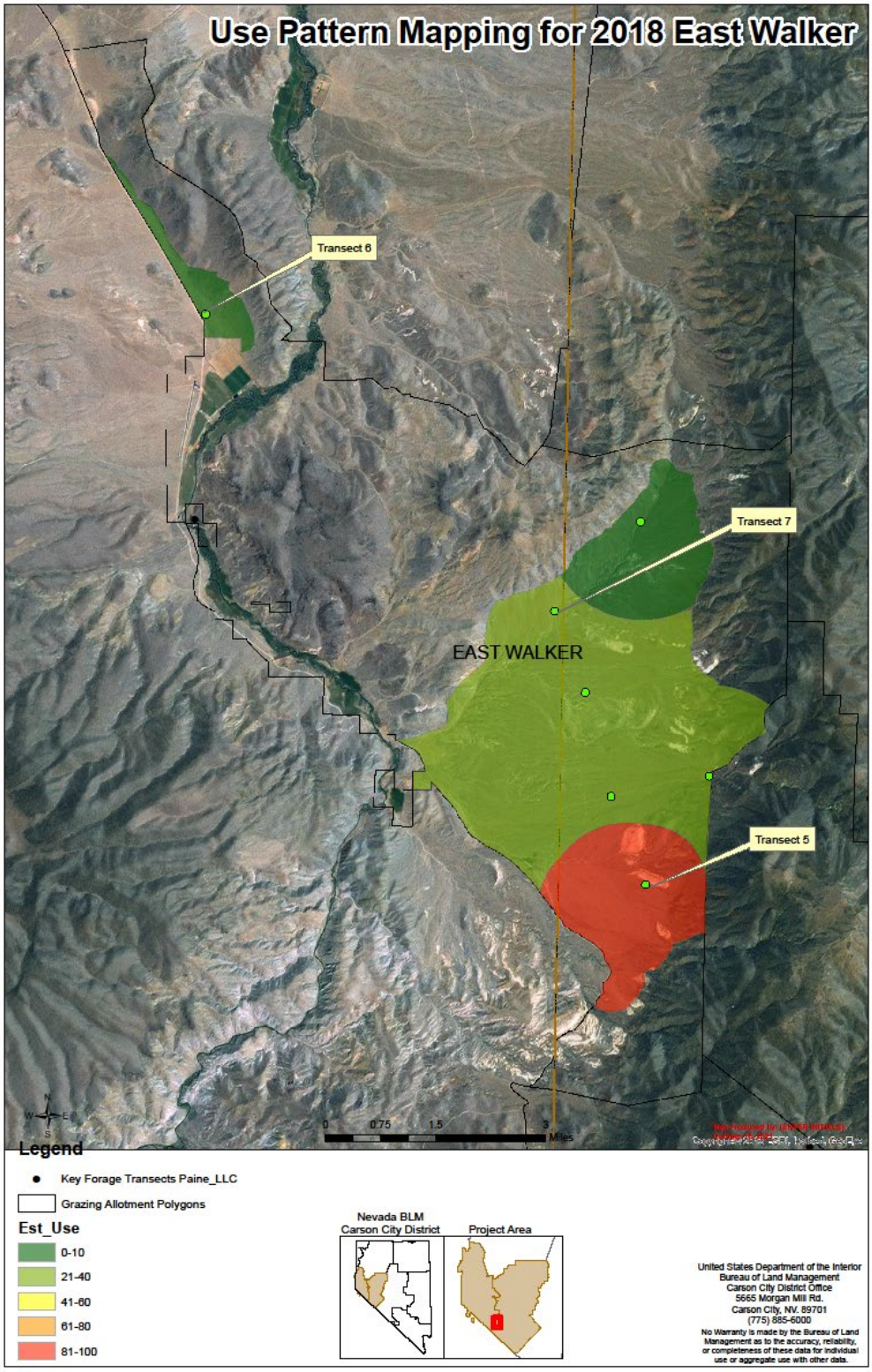
8.4 Map 11 – BSSG Habitat



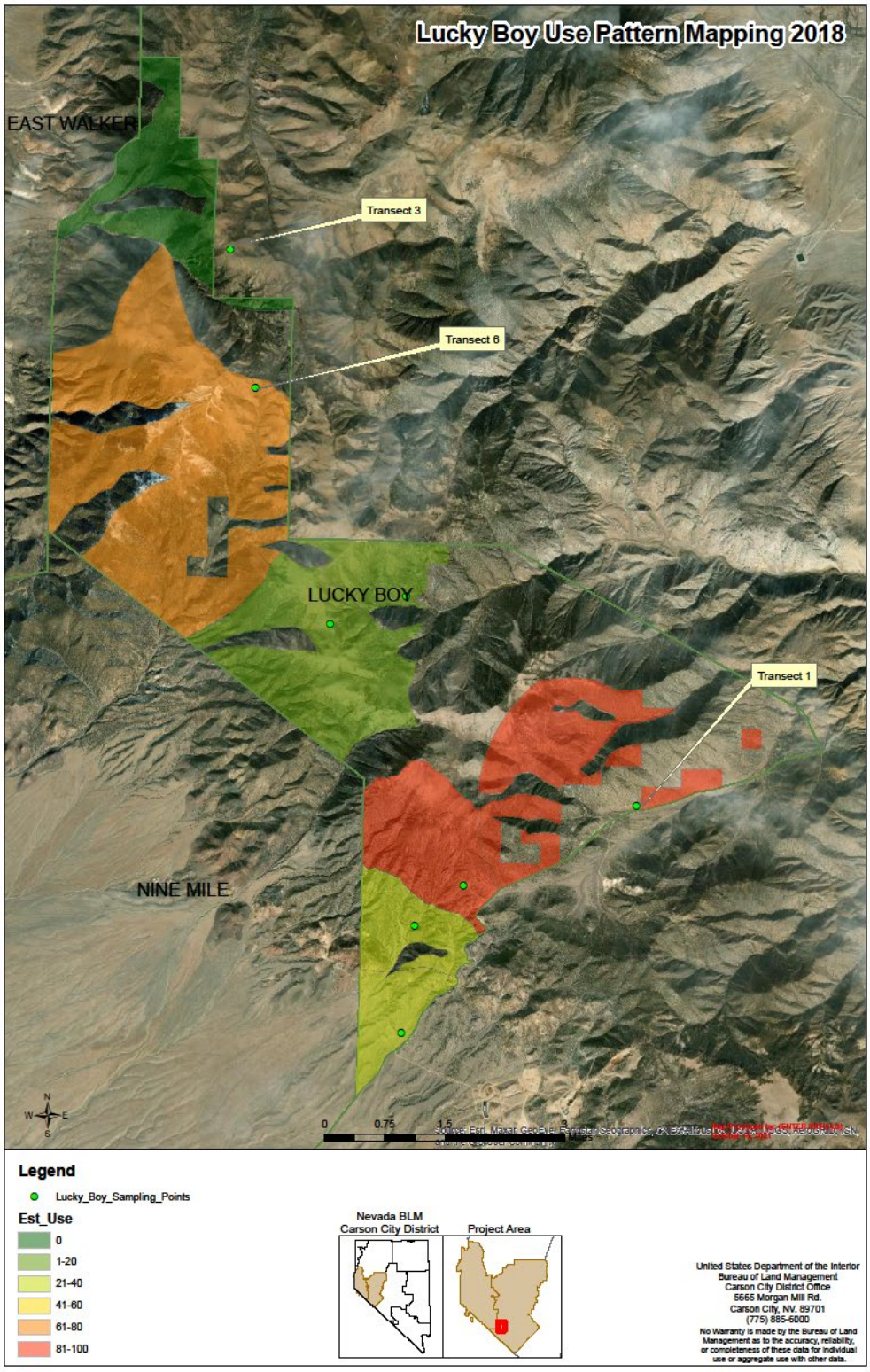
8.5 Map 12 – Lapon Meadows Exclosure Map



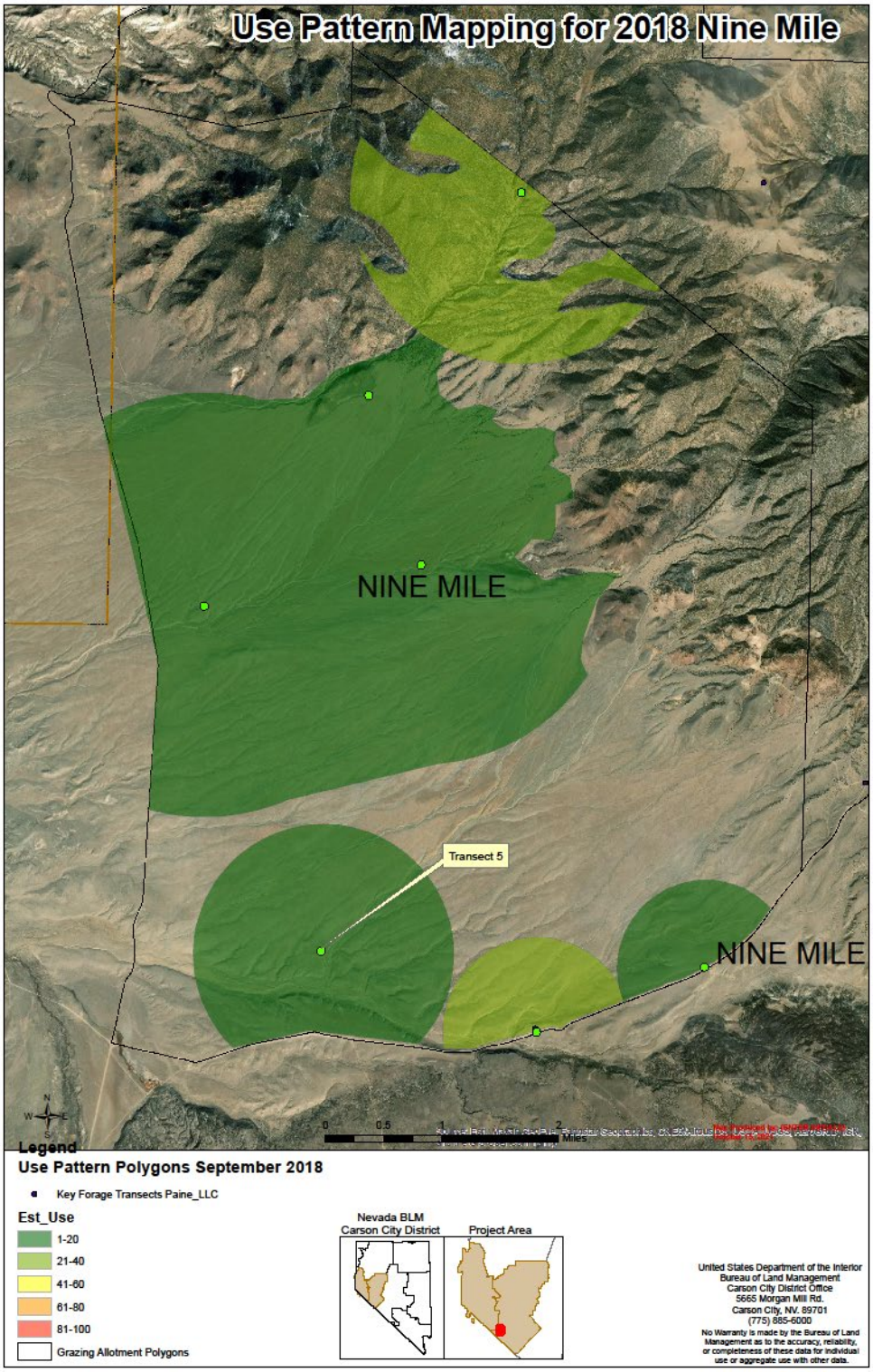
8.6 Map 13 – Use Pattern Map East Walker Allotment



8.7 Map 14 – Use Pattern Map Lucky Boy Allotment



8.8 Map 15 – Use Pattern Map Nine Mile Allotment



8.9 Appendix B - Monitoring Design by DRG

Table 41: East Walker Monitoring design – planned samples highlighted in green, oversamples in white

FID	xcoord	ycoord	stratum	panel	DRG_Modal_	EcoGroup_d	Modal_Site	Modal_ID	All_Sites_	Easting	Northing
0	335390.7514	4260687.198	26 19	1	PIMO/ARTRV/ACSP12	26 19	PIMO WSG: 0R0602	R026XY060NV	PIMO WSG: 1R0601, PIMO WSG: 1R0601, PIMO WSG: 0R0602, PIMO WSG: 0R0601, PIMO WSG	335391	4260687
1	336685.6948	4261704.79	26 19	OverSamp	PIMO/ARTRV/ACSP12	26 19	PIMO WSG: 0R0602	R026XY060NV	PIMO WSG: 1R0601, PIMO WSG: 1R0601, PIMO WSG: 0R0602, PIMO WSG: 0R0601, PIMO WSG	336686	4261705
2	338558.7942	4272938.828	26 19	OverSamp	PIMO/ARTRV/ACSP12	26 19	PIMO WSG: 0R0602	R026XY060NV	PIMO WSG: 1R0601, PIMO WSG: 1R0601, PIMO WSG: 0R0602, PIMO WSG: 0R0601, PIMO WSG	338559	4272939
3	325027.1854	4280065.031	27 14	1	ATCO-SAVEB/ACHY	27 14	Gravelly Loam 4-8	R027XY018NV	Loamy 4-8, Loamy Slope 5-8, Coarse Gravelly Loam 3-5, South Slope 4-8, Stony Slo	325027	4280065
4	331195.5105	4268764.602	27 14	OverSamp	ATCO-SAVEB/ACHY	27 14	Gravelly Loam 4-8	R027XY018NV	Loamy 4-8, Loamy Slope 5-8, Coarse Gravelly Loam 3-5, South Slope 4-8, Stony Slo	331196	4268765
5	334843.7004	4270327.049	27 14	OverSamp	ATCO-SAVEB/ACHY	27 14	Gravelly Loam 4-8	R027XY018NV	Loamy 4-8, Loamy Slope 5-8, Coarse Gravelly Loam 3-5, South Slope 4-8, Stony Slo	334844	4270327
6	336536.6036	4274365.257	27 5	1	ARAR8/ACTH7	27 5	Cobbly Claypan 8-10	R027XY049NV	N/A	336537	4274365
7	332854.5897	4272262.723	27 5	OverSamp	ARAR8/ACTH7	27 5	Cobbly Claypan 8-10	R027XY049NV	N/A	332855	4272263
8	334783.7901	4265315.559	27 5	OverSamp	ARAR8/ACTH7	27 5	Cobbly Claypan 8-10	R027XY049NV	N/A	334784	4265316

Table 42: Nine Mile Monitoring design – planned samples highlighted in green, oversamples in white

FID	xcoord	ycoord	stratum	panel	DRG_Modal_	EcoGroup_d	Modal_Site	Modal_ID	All_Sites_	Easting
0	336179	4256368	27 5	1	ARAR8/	27 5	Cobbly	R027XY	N/A	336179
1	341903	4250990	27 5	OverSa	ARAR8/	27 5	Cobbly	R027XY	N/A	341903
2	335590	4255722	27 5	OverSa	ARAR8/	27 5	Cobbly	R027XY	N/A	335590
3	337854	4250884	29 3	1	MLRA	29 3				337854
4	334814	4250908	29 3	OverSa	MLRA	29 3				334814
5	342027	4250259	29 3	OverSa	MLRA	29 3				342027

Table 43: Lucky Boy Monitoring design – planned samples highlighted in green, oversamples in white

FID	xcoord	ycoord	stratum	panel	DRG_Modal_	EcoGroup_d	Modal_Site	Modal_ID	All_Sites_	Easting	Northing
0	343947.873	4260750.461	26 13	1	ARTRV/ACOCO	26 13	Loamy Slope 14+	R026XY038NV	Mountain Shoulders 16+, Mountain Loam 16+, Ashy Pocket, Ashy Slope 14-16, Deep L	343948	4260750
1	341336.4436	4259521.455	26 13	OverSamp	ARTRV/ACOCO	26 13	Loamy Slope 14+	R026XY038NV	Mountain Shoulders 16+, Mountain Loam 16+, Ashy Pocket, Ashy Slope 14-16, Deep L	341336	4259521
2	345725.0053	4255750.343	26 13	OverSamp	ARTRV/ACOCO	26 13	Loamy Slope 14+	R026XY038NV	Mountain Shoulders 16+, Mountain Loam 16+, Ashy Pocket, Ashy Slope 14-16, Deep L	345725	4255750
3	340743.0437	4259875.596	26 19	1	PIMO/ARTRV/ACSP12	26 19	PIMO WSG: 0R0602	R026XY060NV	PIMO WSG: 1R0601, PIMO WSG: 1R0601, PIMO WSG: 0R0602, PIMO WSG: 0R0601, PIMO WSG	340743	4259876
4	338320.7456	4263888.62	26 19	OverSamp	PIMO/ARTRV/ACSP12	26 19	PIMO WSG: 0R0602	R026XY060NV	PIMO WSG: 1R0601, PIMO WSG: 1R0601, PIMO WSG: 0R0602, PIMO WSG: 0R0601, PIMO WSG	338321	4263889
5	348034.3439	4257546.888	26 19	OverSamp	PIMO/ARTRV/ACSP12	26 19	PIMO WSG: 0R0602	R026XY060NV	PIMO WSG: 1R0601, PIMO WSG: 1R0601, PIMO WSG: 0R0602, PIMO WSG: 0R0601, PIMO WSG	348034	4257547

Table 44: River Allotment Monitoring design – planned samples highlighted in green, oversamples in white

FID	xcoord	ycoord	stratum	panel	DRG_Modal_	EcoGroup_d	Modal_Site	Modal_ID	All_Sites_	Easting	Northing
0	325837.8578	4273341.395	27 14	1	ATCO-SAVEB/ACHY	27 14	Gravelly Loam 4-8	R027XY018NV	Loamy 4-8, Loamy Slope 5-8, Coarse Gravelly Loam 3-5, South Slope 4-8, Stony Slo	325838	4273341
1	325816.2781	4273550.2	27 14	OverSamp	ATCO-SAVEB/ACHY	27 14	Gravelly Loam 4-8	R027XY018NV	Loamy 4-8, Loamy Slope 5-8, Coarse Gravelly Loam 3-5, South Slope 4-8, Stony Slo	325816	4273550
2	327579.403	4271361.431	27 14	OverSamp	ATCO-SAVEB/ACHY	27 14	Gravelly Loam 4-8	R027XY018NV	Loamy 4-8, Loamy Slope 5-8, Coarse Gravelly Loam 3-5, South Slope 4-8, Stony Slo	327579	4271361
3	326155.1828	4272841.623	27 Other	1	consist of riparian or aspen ESDs	27 Other	N/A	N/A	Wetland, Wet Meadow 4-8, Wet Meadow 8-12, Moist Floodplain, POFR2/LETR5	326155	4272842
4	326043.5007	4273113.112	27 Other	OverSamp	consist of riparian or aspen ESDs	27 Other	N/A	N/A	Wetland, Wet Meadow 4-8, Wet Meadow 8-12, Moist Floodplain, POFR2/LETR5	326044	4273113
5	326116.1437	4272775.742	27 Other	OverSamp	consist of riparian or aspen ESDs	27 Other	N/A	N/A	Wetland, Wet Meadow 4-8, Wet Meadow 8-12, Moist Floodplain, POFR2/LETR5	326116	4272776

8.10 Appendix C – Special Status Species

Table 45: Birds of Conservation Concern in the Great Basin Region 9 (2021).
**Known or has the potential to occur.*

Species	Notes
American Avocet (*Recurvirostra americana*)	Breeds in northeast to western NV; migrant throughout the state. Habitat includes lowland marshes, mudflats, ponds, alkaline lakes and estuaries. Not likely present in allotments due to lack of habitat.
American White Pelican (*Pelecanus erythrorhynchos*)*	Breeds in northwestern NV; migrant throughout the state. Habitat includes primarily rivers, lakes, reservoirs, estuaries, and marshes. May occur along Walker River within the allotments boundary.
Bendire's Thrasher (*Toxostoma bendirei*)	Range restricted in Joshua tree transitional zones in the Mojave Desert. Not likely present in allotments due to lack of habitat.
Black Rosy-Finch (*Leucosticte atrata*)*	Listed as a BLM sensitive species. A non-breeding resident utilizing barren, rocky or grassy areas and cliffs among glaciers or beyond timberline. Winters in open country, mountain meadows, high deserts. Potentially present in allotments during the winter.
Black Swift (*Cypseloides niger*)	Mainly a passage migrant in southwestern Nevada. Nests in behind or next to waterfalls in wet cliffs. Not likely present in allotments due to lack of habitat.
Black Tern (*Chlidonias niger surinamensis*)*	Migrant throughout Nevada. Breeds in marshes, rivers, lake shores, or in wet meadows typically in sites with mixture of emergent vegetation and open water. Breeding species likely in allotments.
Bobolink (*Dolichonyx oryzivorus*)	Breeds in northeastern Nevada associated with the upper Humboldt, Little Humboldt, and Owyhee and Bruneau River drainages. Not likely present in allotments due to lack of habitat.
Brewer's Sparrow (*Spizella breweri*)*	Listed as a BLM sensitive species. A breeding resident strongly associated with sagebrush over most of its range, in areas with scattered shrubs and short grass. Breeding species likely in allotments.
Broad-tailed Hummingbird (*Selasphorus platycercus*)*	Found in mountain meadows and forests that include pinyon juniper and other types. Migration occurs in semi-open mountainous habitats. Breeding may occur in allotments.
California Gull (*Larus californicus*)	Migration throughout Nevada. Habitat includes seacoasts, lakes, farms, urban centers. Some wintering inland near lakes and rivers. Not likely present in allotments due to lack of habitat.
Calliope Hummingbird (*Selasphorus calliope*)	A breeding resident in open shrubby montane forest, mountain meadows, second growth, and willow and alder thickets. Not likely present in allotments due to lack of habitat.
Clark's Grebe (*Aechmophorus clarkii*)	Migrates throughout Nevada. Not likely present in allotments due to lack of habitat.
Cassin's Finch (*Haemorhous cassinii*)*	Found throughout Nevada except for Mojave Desert region. Habitat consists of open coniferous forest; migration and winter also in deciduous woodland, second growth, scrub, brushy areas partly open situations with scattered trees. Likely present in allotments.
Cassia Crossbill (*Loxia sinesciuris)*	Found only in southern Idaho. Not likely present in allotments due to lack of habitat.
Evening Grosbeak (*Coccothraustes vespertinus*)	Habitat mainly in conifer and mixed forests. Not likely present in allotments due to lack of habitat.
Flammulated Owl (*Psiloscops flammeolus*)	Listed as BLM sensitive species. A breeding resident in montane forest, usually open conifer forests containing pine, with some brush or saplings. Not likely present in allotments due to lack of habitat.

Species	Notes
Forster's Tern (*Sterna forsteri*)	Habitat includes marshes, lakes, bays, beaches but any waters during winter migration. Not likely present in allotments due to lack of habitat.
Franklin's Gull (*Leucophaeus pipixcan*)	Migration throughout Nevada. Habitat includes prairies, inland marshes, and in winter, coasts and the ocean. Not likely present in allotments due to lack of habitat.
Lesser Yellowlegs (Tringa flavipes)	Migration throughout Nevada. Habitat includes marshes, shores, ponds, coastal estuaries. Not likely present in allotments due to lack of habitat.
Lewis's Woodpecker (*Melanerpes lewis*)*	Listed as a BLM sensitive species. In Nevada this species is most strongly associated with deciduous riparian woodlands dominated by aspen or cottonwood. It is no longer known to breed in the valley-bottom riparian woodlands where they are thought to have historically occurred. Migratory species likely in allotments.
Long-eared Owl (*Asio otus*)*	Range found throughout Nevada. Habitat includes woodlands and conifer groves with open habitat for hunting. May occur in the allotments.
Northern Harrier (*Circus hudsonius*)	Found throughout northern Nevada in marshes, fields, and prairies. Not likely present in allotments due to lack of habitat.
Olive-sided Flycatcher (*Contopus cooperi*)	Breeds in conifers forest in Sierra Nevada and some central ranges in Nevada. Habitat includes forest, woodland, and open situations with scattered trees with snags present. Not likely present in allotments due to lack of habitat.
Pectoral Sandpiper (*Calidris melanotos*)	Migration is not common in Nevada. Habitat consists of marshes, lake shores, prairie pools, mudflats. Not likely present in allotments due to lack of habitat.
Pinyon Jay (*Gymnorhinus cyanocephalus*)*	Listed as a BLM sensitive species. A permanent resident in pinyon-juniper woodland, less frequently pine; in nonbreeding season, also occurs in scrub oak and sagebrush. Likely present in the allotments.
Red Knot (pacific) (*Calidris canutus roselaari*)	Migrant throughout Nevada. Breeds in marshes, rivers, lake shores, or in wet meadows typically in sites with mixture of emergent vegetation and open water. Breeding species likely in allotments.
Rufous Hummingbird (*Selasphorus rufus*)	Migrant throughout Nevada. Found in open situations where flowers are present. Not likely to occur in the allotments due to lack of habitat.
Sage Thrasher (*Oreoscoptes montanus*)*	Listed as a BLM sensitive species. A breeding resident in sagebrush plains, primarily in arid or semi-arid habitats. Breeding species likely in allotments.
Short-eared Owl (*Asio flammeus flammeus*)*	Listed as a BLM sensitive species. Habitat includes fresh and saltwater marshes, grassy plains, old fields, river valleys, meadows, and open woodland. Likely present in the allotments.
Virginia's Warbler (*Oreothlypis virginiae*)*	A breeding resident in arid montane woodland, oak thickets, pinyon-juniper, coniferous scrub, and chaparral in brushy steep mountain slopes within or near dry coniferous woodlands. Potential breeding in allotments where habitat exists.
Western Grebe (*Aechmophorus occidentalis*)	Breeding is common throughout Nevada. Habitat includes lakes, ocean, bays, marshes. Not likely to occur in the allotments due to lack of habitat.
Western Snowy Plover (*Charadrius nivosus nivosus*)	Listed as a BLM sensitive species. Habitat includes sand beaches and dry salt flats, reservoirs and ponds. A breeding species mainly in the Lahontan Valley. Not likely to occur in the allotments due to lack of habitat.
Willet (*Tringa semipalmata*)	Breeding common in northwestern Nevada. Habitat includes marshes, wet meadows, mudflats and beaches. Not likely to occur in the allotments due to lack of habitat.
Yellow Rail (*Coturnicops noveboracensis*)	Mainly a winter migrant. Secretive marsh bird associated with wetlands. Not likely to occur in allotments due to lack of habitat.

Sources: NDOW (2013), Audobon Society (2022)

Table 46: BLM Sensitive Species List Specific to the Carson City District Office
**Has the potential to occur.*
***Known to occur or has occurred in the past.*

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
AMPHIBIANS			
Dixie Valley toad	*Anaxyrus williamsi sp. (Bufo williamsi)*	springs, seeps, streams, and similar inundated areas. Presently thought to be endemic to Dixie Valley and potentially a distinct species of western toad	NS-S (S1); NS (GU)
Northern leopard frog*	*Lithobates pipiens*	permanent ponds, swamps, marshes, and slow-moving streams throughout forest, open, and urban areas; normally inhabit water bodies with abundant aquatic vegetation	NDOW (SP); NS-S (S2S3); NS (G5)
Sierra Nevada yellow-legged frog	*Rana sierra*	high elevation, lakes/slow-moving portions of streams; creeks and drainages in the mountains	FWS (E);NS-S (SH); NS (G2)
Western toad	*Anazyrus boreas*	wide variety of habitats ranging from desert springs to mountain wetlands; various upland habitats around ponds, lakes, reservoirs, and slow-moving rivers and streams; sometimes they move up to a few kilometers through uplands; egg laying sites include shallow areas of ponds, lakes, or reservoirs, or pools of slow-moving streams	NS-S (S4); NS (G4)
ARACHNIDS			
Nevada water mite	*Thermacarus nevadensis*	hot springs; distribution and ecology are incomplete	NDOW (EB); NS-S (SH); NS (GH)
BIRDS			
Bald Eagle*	*Haliaeetus leucocephalus*	near lakes, reservoirs, rivers, marshes, and coasts; scattered breeding occurances in Northern Nevada	FWS (DELISTED 2009); NDOW (SE); NS-S (S1B, S3N); NS (G5)
Black Rosy-finch*	*Leucosticte atrata*	breeds in alpine areas, usually near rock piles, and cliffs; winters in open country, including mountain meadows, high deserts, valleys, and plains	NS-S (S3); NS (G4)
Brewer's Sparrow*	*Spizella breweri*	arid sagebrush steppe; winter, occupy sagebrush shrublands similar to the breeding grounds, as well as a range of desert scrub habitats consisting mainly of saltbush and creosote	NDOW (SB); NS-S (S4B); NS (G5)
Burrowing Owl (includes Western Burrowing Owl)*	*Athene cunicularia (A. c. hypugaea Western Burrowing Owl)*	live in open habitats with sparse vegetation such as prairie, pastures, desert or shrubsteppe, and airports. In parts of their range they are closely associated with prairie dogs and ground squirrels, whose burrows they use for nests; Western Burrowing Owls breed throughout Nevada in salt desert scrub, Mojave shrub, and some sagebrush habitat, as well as in agricultural landscapes; winters most frequently in the southern half of Nevada, but has been recorded throughout the state during all months	NS-S (S3B); NS (G4); Western Burrowing Owl NS-S (S3B); NS (G4T4)
Ferruginous hawk*	*Buteo regalis*	preferred habitat arid and semiarid grassland regions; open, level, or rolling prairies; foothills or middle elevation plateaus largely devoid of trees; and cultivated shelterbelts or riparian corridors	NS-S (S2); NS (G4)
Flammulated Owl	*Psiloscops flammeolus*	open pine forest in mountains	NS-S (S4B); NS (G4)
Golden Eagle**	*Aquila chrysaetos*	open country, especially around mountains, hills, and cliffs; use a variety of habitats ranging from arctic to desert, including tundra, shrublands, grasslands,	NS-S (S4); NS (G5)

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
		coniferous forests, farmland, and areas along rivers and streams	
Gray-crowned Rosy-Finch	*Leucostcte tephrocots*	breeds in alpine areas, usually near snow fields or glaciers, talus, rockpiles, and cliffs; winters in open country, including mountain meadows, shrublands, roadsides, towns, cultivated areas, rocky hillsides, and margins of dry ditches	NS-S (S3N); NS (G5)
Great Basin Willow Flycatcher*	*Empidonax traillii adastus*	montane riparian habitat, with some spilloverinto lowland riparian areas; found in both lowland and montane riparian habitats, and occasionally in other inundated areas such as aspen stands or wet meadows; uses the lower Colorado River corridor during migration	USFS (S); NS-S (S1S2); NS (G5T5)
Greater Sage-grouse (including Bi-State DPS)**	*Centrocercus urophasianus*	sagebrush steppe; nest in areas with relatively dense cover from big sagebrush; may use areas with rabbitbrush, greasewood, and grassy areas; leks are located in clear areas such as broad ridgetops, grassy swales, dry lakebeds, and sometimes recently burned areas. chick rearing areas include irrigated pastures, wet meadows, and alfalfa fields, in addition to sagebrush	NDOW (GB); NS-S (S3); NS (G3G4)
least bittern (includes Western Least Bittern)	Ixobrychus exilis; includes Ixobrychus exilis hesperis	habitat consists of tall emergent vegetaton in marshes, primarily freshwater. Prefers marshes with scattered bushes or other woody growth. Forages in shallow water or along banks. Heavy growths of cattail, bulrush, wild rice, burreed, water smartweed, and reeds are favored feeding sites	NS-S (S2B); NS (G5T3T4)
Lewis's Woodpecker*	*Melanerpes lewis*	open pine woodlands, and other areas with scattered trees and snags; unlike other American woodpeckers, it enjoys sitting in the open as opposed to sitting in heavy tree cover	NS-S (S3); NS (G4)
Loggerhead Shrike*	*Lanius ludovicianus*	open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns; frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries; are often seen along mowed roadsides with access to fence lines and utility poles	NDOW (SB); NS-S (S4); NS (G4)
Mountain Quail*	*Oreortyx pictus*	dense brush in wooded foothills and mountains; most common in pine-oak woodland, coniferous forest, and chaparral; sometimes in pinyon-juniper woods or in scrub at lower elevations; may be common in areas of second-growth brush after fires or clearcuts; requires dense low thickets for cover; during hot weather, rarely found more than a mile from water	NDOW (GB); NS-S(S3); NS (G5)
Northern Goshawk*	*Accipiter gentilis*	nest in mature and old-growth forests with more than 60% closed canopy; often build nests near breaks in the canopy, such as a forest trail, jeep road, or opening created by a downed tree, and prefer sites with a creek, pond, or lake nearby; hunt in the forest, along riparian corridors, and in more open habitat, such as the sagebrush steppes	USFS(S); NDOW (SB); NS-S (S2); NS (G5)

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
Peregrine Falcon*	*Falco peregrinus*	breed in open landscapes with cliffs (or skyscrapers) for nest sites; nesting at elevations up to about 12,000 feet, as well as along rivers and coastlines or in cities, ; migration and winter in nearly any open habitat, but with a greater likelihood along barrier islands, mudflats, coastlines, lake edges, and mountain chains	USFS (S); FWS (delisted 1999); NDOW (EB); NS-S (S2); NS (G4)
Pinyon Jay*	*Gymnorhinus cyanocephalus*	pinyon-juniper woodland, sagebrush, scrub oak, and chaparral communities, and sometimes in pine forests; specialized for feeding on pine seeds.	NS-S (S3S4); NS (G5)
Sage Thrasher*	*Oreoscoptes montanus*	breeds exclusively in shrubsteppe habitats; require relatively dense ground cover for concealment, but also some bare ground for foraging and for getting around on their feet, which they often do in preference to flying; use arid or semiarid open country with scattered bushes, grasslands, and open pinyon- juniper woodlands	NDOW (SB); NS-S (S5B); NS (G4)
Sandhill Crane (both Greater and Lesser)	*Antigone canadensis*	breed in open wetland habitats surrounded by shrubs or trees; nest in marshes, bogs, wet meadows, prairies, burned-over aspen stands, and other moist habitats, preferring those with standing water; breeders gravitate toward the edges between wetland and upland habitats, while nonbreeders may prefer open, grassy sites; winter roosting on shallow lakes or rivers at night and spending the day in irrigated croplands, pastures, grasslands, or wetlands	NS-S (S2B, S3M); NS (G5T5)
Short-eared Owl*	*Asio flammeus*	live in large, open areas with low vegetation, including prairie and coastal grasslands, heathlands, meadows, shrubsteppe, savanna, tundra, marshes, dunes, and agricultural areas; winter habitat is similar, but is more likely to include large open areas within woodlots, stubble fields, fresh and saltwater marshes, weedy fields, dumps, gravel pits, rock quarries, and shrub thickets.; if food is plentiful, winter areas often become breeding areas	NS-S (S4); NS (G5)
Swainson's Hawk*	*Buteo swainsoni*	favor open habitats for foraging; hay and alfalfa fields, pastures, grain crops, and row crops, or perched atop adjacent fence posts and overhead sprinkler systems; they rely on scattered stands of trees near agricultural fields and grasslands for nesting sites	NS-S (S2B); NS (G5)
Western Snowy Plover (does not include the protected DPS found along the Pacific Coast)	*Charadrius nivosus nivosus*	barren to sparsely vegetated sand beaches, dry salt flats in lagoons, dredge spoils deposited on beach or dune habitat, levees and flats at salt-evaporation ponds, river bars, along alkaline or saline lakes, reservoirs, and ponds	NS-S (S3B); NS (G3T3)
Western Yellow-billed Cuckoo	*Coccyzus americanus oxidentalis*	use wooded habitat with dense cover and water nearby, including woodlands with low, scrubby, vegetation, overgrown orchards, abandoned farmland, and dense thickets along streams and marshes	USFWS (T); FWS (T); NDOW (SB); NS- S (S1B); NS (G5)
FISH			
cui-ui	*Chasmistes cujus*	found in only one place in the world; Pyramid Lake and the lower Truckee River, all within the Pyramid Lake Paiute Reservation	FWS (E); NDOW (EF); NS-S (S1); NS (G1)

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
Hiko White River springfish	*Crenichthys baileyi grandis*	wetlands with ample aquatic plants; springs and spring brooks; prefers spring heads and quiet waters along outflows; refuge population on public land in Mineral County	FWS (E); NDOW (EF); NS-S (S1); NS (G2T1)
Lahontan cutthroat trout*	*Oncorhynchus clarki henshawi*	found in a wide variety of cold-water habitats including large, terminal, alkaline lakes; alpine lakes; slow, meandering rivers; mountain rivers; and small headwater tributary streams : spawning occurs in streams, generally in riffle areas over gravel substrate; spawning and nursery habitat is characterized by cool water, approximate 1:1 pool-riffle ratio, well-vegetated and stable stream banks, and relatively silt-free rocky substrate in riffle-run areas: fry may move out of spawning tributaries shortly after emergence or may remain in nursery streams for 1- 2 years ; Humboldt cutthroat trout does well in streams with relatively unstable flow and can be found in summer in isolated pools in streambeds; evidently these trout are tolerant of relatively warm water temperatures, and they apparently do well also in relatively turbid, eutrophic reservoirs; introduced populations exist outside of native range	USFS (T); FWS (T); NDOW (GF); NS-S (S3); NS (G4T3)
Mountain whitefish**	*Prosopium williamsoni*	known populatons are restricted to larger Sierra front streams (Truckee,Walker, and Carson). Limited distributon in the Carson River, where suitable habitat runs out near Minden. Also occurs in the Jarbidge, Bruneau, and South Fork and East Fork Owyhee Rivers. Fish require streams with a minimum pool depth of 4 feet in season of least flow.	NDOW (GF); NS-S (S3); NS (G5)* *Naturserve needs to re-evaluate as population in decline for decades)
Railroad Valley springfish	*Crenichthys nevadae*	endemic to Railroad Valley; warm spring pools, outflow streams, and adjacent marshes; able to tolerate high temperatures and low dissolved oxygen	USFS (T); FWS (T); NDOW (SF); NS-S (S2); NS (G2)
MAMMALS			
Allen's chipmunk	*Neotamias senex*	generally prefers mature coniferous forests and chaparral slopes dominated by ponderosa pine, Jefrey pine, sugar pine, black oak, Douglas fr, white fr, red fr, incense cedar, and mountain hemlock. The shrub layer includes buckbrush,manzanita, blackberry, and chinquapin. A study in the Sierra Nevada found that Allen's chipmunk was most abundant in red fr, than in mixed conifers	NS-S (S2S3); NS (G5)
American marten (Pacific marten)	*Martes americana and M. caurina*	primarily found in the Sierra Nevada although there is some recent evidence for occurrence in the Jarbidge Mountains. Occurs in coniferous forest and may use rocky alpine areas. When inactve, they occupy holes in dead or live trees or stumps, abandoned squirrel nests, conifer crowns, rock piles, burrows, or snow cavites. In winter, much of a marten's actvity occurs under the snow, ofen in coarse woody debris	NDOW (FM); NS-S (S2S3); NS (G4G5)
American pika*	*Ochotona princeps*	typical rock-dwelling species; primarily inhabits talus and talus- like formations adjoining a meadow or source of vegetation in cool and moist microclimates ; talus habitat is typically insular or patchy in nature at several spatial resolutions; prefer talus in RIF (rock-ice-feature) formations and with rock diameters of 0.2-1.0 m; may also occur in and anthropogenic habitats such as mine ore	NDOW (PM); NS-S (S2); NS (G5)

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
		dumps or road cuts; occasionally they may live in piles of logs or similar habitat	
American water shrew*	*Sorex palustris*	most abundant along small cold streams with thick overhanging riparian growth; around lakes, ponds, marshes, bogs, and other lentic habitats; normally associated with water, may disperse long distances away from water to establish new territories; nest sites are near water in underground burrows, rafted logs, beaver lodges, and other areas providing shelter	NS-S (S2); NS (G5)
big brown bat	*Eptesicus fuscus*	found throughout the state, from low to high elevations (720 to > 9,800 ft); occurs in a variety of habitats, including pinyon- juniper, blackbrush, creosote, sagebrush, agriculture, and urban habitats; better adapted to human habitation than most species; ROOST HABITAT: Selects a variety of day roosts including caves, trees (e.g., Ponderosa pine, quaking aspen and oaks), mines, buildings and bridges; often night roosts in more open settings in buildings, mines and bridges; roosts in groups up to several hundred; RESIDENT STATUS: year round resident; WINTER STATUS: Hibernates but periodically arouses to actively forage and drink in the winter; characteristics and locations of winter hibernacula in Nevada are completely unknown, and poorly understood throughout this species range	NS-S (S4); NS (G5); WBWG (low)
bighorn sheep (California, desert, Rocky Mtn subspecies)**	*Ovis canadensis spp.*	in alpine meadows, mountain slopes, and foothills. They like areas with rocky slopes that they can climb to evade predators	for desert bighorn sheep USFS (S); NDOW (GM); NS-S (S4); NS (G4T4)
Brazilian (or Mexican) free- tailed bat*	*Tadarida brasiliensis*	found through most of the state, ranging from low desert to high mountain habitats; found in a wide variety of habitats; although predominantly a lower elevation species has been found from 720 to > 11,480 ft in the Sierra Nevada; recent acoustic surveys reveal it is more widespread and common, at least in southern Nevada, than previously thought; current Nevada records indicate this species is distributed between 690- 8,370 ft; ROOST HABITAT: selects a variety of day roosts including cliff faces, mines, caves, buildings, bridges, and hollow trees; although colonies number in the millions in some areas, colonies in Nevada are generally several hundred to several thousand (largest known colonies have been estimated at ca. 70,000- 100,000); some caves may be used as long term transient stopover roosts during migration; some evidence suggests that the colony at Rose Cave arrives in July and departs in mid October; RESIDENT STATUS: summer resident; recent observations susggest pockets of year-round residents in southern Nevada; WINTER STATUS: Migrations of 1140 mi are documented for this species; migrates away from colder regions and winters in areas	NDOW (PM); NS-S (S3S4B); NS (G5): WBWG (low to medium)

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
		with predominantly non-freezing temperatures but has been found to hibernate in northern California; migratory animals appear to be active in the winter range; winter activity has been observed recently in the low desert of southern Nevada;	
California myotis	*Myotis californicus*	found throughout Nevada, primarily at the low and middle elevations (to 6,000 ft), although occasionally found at higher elevations; more common in the southern half of the state; found in a variety of habitats from Lower Sonoran desert scrub to forests; current Nevada records indicate this species is distributed between 680-9,000 ft; ROOST HABITAT: crevice roosting; selects a variety of day roosts including mines, caves, buildings, rock crevices, hollow trees, and under exfoliating bark; night roosts in a wider variety of structures; generally roost singly or in small groups, although some mines in the Mojave Desert shelter colonies of over 100 in both the summer and winter; RESIDENT STATUS: year round resident; WINTER STATUS: hibernates but periodically arouses to actively forage and drink in the winter	NS-S (S4); NS (G5); WBWG (low - medium)
Canyon bat (formerly western pipestrelle)*	*Parastrellus hesperus*	found througout most of the state, primarily in the souther and western protions; most common n low and middle elevation (6,000 ft), although occasionally found at higher elevations (>8,000 ft); lower and upper Sonoran desert habitats of blackbrush, creosote, salt desert shrub and sagebrush, with occasional occurrence in Ponderosa pine and pinyon-juniper, usually in association with rock features such as ganite boulders and canyons; current nevada recores indicate this species is distrubted between 690-8,400 ft; ROOST HABITAT: day roosts primarily in rock crevices but may include mines, caves, or occasionally in buildings and vegetation; generally roost singly or in small groups; RESIDENT STATUS: year round resident; WINTER STATUS: hibernates but periodically arouses to actively forage and drink in water.	NS-S (S4); NS (G5): WBWG (low to medium)
dark kangaroo mouse (includes Desert Valley kangaroo mouse and Fletcher dark kangaroo mouse *M.m. albiventer* and *nasutus*)	*Microdipodops megacephalus ssp.*	dark kangaroo mice prefer loose sands and gravel; found in shadscale scrub, sagebrush scrub, and alkali sink plant communities; may occur in sand dunes near the margins of their range	NSOW (PM); NS-S (S2); NS (G4T2)

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
fringed myotis*	*Myotis thysanodes*	found throughout central and southern Nevada; probably occurs in northern Nevada, as well; found in a wide range of habitats from low desert scrub habitats to high elevation coniferous forests; found from upper elevation creosote bush desert to pinyon-juniper and white fir (7,000 ft) in the White Pine Range; current Nevada records indicate this species is distributed between 1,400-7,000 ft; ROOST HABITAT: day and night roosts in mines, caves, trees, and buildings; maternity colony of approximately 200 individuals was found in a mine in creosote bush scrub in the Mojave Desert; two maternity colonies have recently been found in mine adits on the Nevada Test Site in blackbrush habitat; has been radio tracked to tree hollows, particularly large conifer snags in Oregon and Arizona, and rock crevices in cliff faces in southern California; known hibernacula are generally mines or caves; RESIDENT STATUS: year round resident; WINTER STATUS: hibernates but capable of periodic winter activity	USFS (S); NDOW (PM); NS-S (S2); NS (G4): WBWG (medium to high)
hoary bat*	*Lasiurus cinereus*	distribution patchy known mostly from the capture of single animals while foraging or acoustic records; **roosting locations are not well known**; tree-associated species; found primarily in forested upland habitats, as well as in gallery-forest riparian zones and agriculture habitats; in valley basins in pure stands of Rocky Mountain juniper (Juniperus scopulorum); may occur in park and garden settings in urban areas; current records indicate distributed between 1,870-8,270 ft; ROOST HABITAT: solitary; day roosts in trees, within foliage 10-40 ft above the ground in both coniferous and deciduous trees; unusual roosting situations have been reported in caves, beneath a rock ledge, in a woodpecker hole, and in a squirrel's nest; RESIDENT STATUS: summer resident; been captured at 5,900 ft in Spring Valley, east-central Nevada in Rocky Mtn juniper habitat; captured near Yucca Mountain at 3,250 ft; captured over a well pond (3,250 ft) in Mojave Desert scrub vegetation; captured in a dry wash; recent acoustic and capture surveys in the Muddy River and Meadow Valley Wash drainages documented arrival and continued presence from early April through late May; prolonged presence from March through June was recorded in the upper Moapa Valley; until recently, records from southern Nevada were from the spring; however, two localities at the Nevada Test Site and the Spring Mountains have yielded records in the fall ; records from the northeast span 15 July to 21 August; documented in July at Key Pittman Reservoir and in September in Eagle Valley, Lincoln County; WINTER STATUS: migrates but probably hibernates in parts of its winter range; records are primarily from the spring and fall but migratory patterns in Nevada are not known	NS-S (S3N); NS (G3G4); WBWG (medium)

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
Inyo shrew*	*Sorex tenellus*	habitats include riparian zones and canyon bottoms; rocky mountain habitat in areas with logs, boulders, or sagebrush scrub; and red fir communities; species may be more tolerant of dry habitat than are closely related shrews. In Great Basin National Park, this shrew was found at 3,000 m elevation in habitat dominated by Engelmann spruce	NS-S (S2); NS (G4)
little brown bat*	*Myotis lucifugus*	found primarily throughout the northern part of the state, but little is known of its distribution and abundance.Found primarily at higher elevations and higher latitudes, often associated with coniferous forest; requires a nearby water source; occurrence in Dixie Valley, (4,400) has been documented acoustically: ROOST HABITAT: day roosts in hollow trees, rock outcrops, buildings, and occasionally mines and caves; one of the species most commonly found in human structures; night roosts may be same structures used for day roost but locations nearest the entrance are preferred; hibernacula elsewhere are generally mines or caves; often found in the same roost sites with *Myotis yumanensis* . RESIDENT STATUS: probably a year round resident; WINTER STATUS: hibernates but no hibernating colonies have been found in Nevada. It is suspected that there are elevational movements between summer and winter roosts; no large aggregations of this species, like those known in the eastern U.S. have been found	NS-S (S3); NS (G3); WBWG (low to medium)
long-eared myotis*	*Myotis evotis*	found throughout the state, primarily at the higher elevations associated with coniferous forest; more widespread and common in the northern half of the state; primarily a forest- associated species. In southern Nevada, only found in Ponderosa pine or above; found in pinyon-juniper in the northern portion of Nevada Test Site; in northern Nevada common in pinyon-juniper and above, but also found in sagebrush and desert scrub habitats; current Nevada records indicate this species is distributed between 2,300-10,100 ft; ROOST HABITAT: Day roosts in hollow trees, under exfoliating bark, crevices in small rock outcrops, and occasionally in mines, caves, and buildings; night roosts have been found in caves, mines, and under bridges. Generally roost singly or in small groups; RESIDENT STATUS: year round resident; WINTER STATUS; presumed to be non-migratory and to hibernate locally	NS-S (S4); NS (G5): WBWG (low to medium)
long-legged myotis	*Myotis volans*	found throughout the State but more widespread and common in the northern half; occurs from mid to high elevations. Absent from the low desert; found in pinyon-juniper, Joshua tree woodland, and montane coniferous forest habitats; occasionally found in Mojave and salt desert scrub, and blackbrush, mountainshrub, and sagebrush. Current Nevada records indicate this species is distributed between 930-3,420 m; ROOST HABITAT: day roosts primarily in hollow trees, particularly large diameter snags or live trees with lightning scars; uses rock crevices, caves, mines, and buildings when available; caves and mines may be used for night roosts; hibernacula	NS-S (S4); NS (G4G5); WBWG (low to medium)

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
		elsewhere are generally mines or caves; RESIDENT STATUS: probably a year round resident; WINTER STATUS: hibernates but has the capability of winter activity; it is suspected that there are elevational and latitudinal movements between summer and winter roosts; transient colonies in the spring on the east side of the Sierra Nevada	
Merriam's shrew	*Sorex merriami*	primarily in various grassland habitats, including grasses in sagebrush scrub/pinyon-juniper habitat, and also in mountain- mahogany and mixed woodlands	NS-S (S3); NS (G4)
mountain pocket gopher	*Thomomys monticola*	occur in mountain meadows and rocky slopes in pine, fir, and spruce; in rich moist soil, as well as gravelly or rocky ground. Generally be found on open forest foor and at the edge of meadows and at high alttudes where temperatures are lower than the habitat of other pocket gopher species	NS-S (S3); NS (G5)
northern river otter**	*Lontra canadensis pacifica*	prefer bog lakes with banked shores containing semi-aquatic mammal burrows and lakes with beaver (Castor canadensis) lodges, and they avoid water bodies with gradually sloping shorelines of sand or gravel; during the dry season, will retreat from marshland and move to permanent ponds where water is available and food is more concentrated; habitat features preferred for latrine sites include large conifers, points of land, beaver bank dens and lodges, isthmuses, mouths of permanent streams, or any object that protrudes from the water	NDOW (FM); NS-S (S2); NS (G5TNRQ)
pale kangaroo mouse*	*Microdipodops pallidus*	nearly restricted to fine sands in alkali sink and desert scrub dominated by *Atriplex confertifolia* (shadscale) or *Artemisia tridentata* (big sagebrush); often burrows in areas of soft, windblown sand piled at the bases of shrubs	NDOW (PM); NS-S (S2); NS (G3)
pallid bat	*Antrozous pallidus*	found throughout the state, primarily in the low and middle elevations (5,900 ft), although has been found at over 10,200 ft; variety of habitats from low desert to brushy terrain to coniferous forest and non-coniferous woodlands; in pinyon- juniper, blackbrush, creosote, sagebrush, and salt desert scrub habitats; ROOST SITES: Selects a variety of day roosts including rock outcrops, mines (maternity colonies have been found in geothermally-influenced adits), caves, hollow trees, buildings, and bridges. Night roosts very commonly under bridges, but also caves and mines. Intolerant of roosts in excess of 40° C; RESIDENT STATUS: year round resident WINTER STATUS: hibernates but periodically arouses to actively forage and drink in winter	USFS (S); NDOW (PM); NS-S (S3); NS (G4); WBWG (medium to low)
pocket gopher includes Botta's (Thomomys botae); Fish Spring pocket gopher (T. b. abstrusus) and San Antonio pocket gopher	*Thomomys bottae*	associated with a wide range of vegetaton and soil types. Residents of open habitats and meadows, where soils are deep enough to maintain permanent burrow systems. Two subspecies of priority interest are isolated to two valleys, T. b. abstrusus in Fish Spring valley (also known as Litle Fish Lake Valley) in Nye County, and T. b. curtatus in Big Smoky Valley. A third isolate occurs near Eastgate	Botta's NS-S (SNR); NS (G5); Fish Springs and San Antonio (NS-S (SH); NS (G5TH);

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
(T. b. curatus)			
pygmy rabbit	*Brachylagus idahoensis*	occurs in patches correlating positively to the density of sagebrush; found from the state border in the north to the northern end of Nye and Lincoln Counties in the south and from the state border in the east to Vya, Nevada in the west; still found in most of the higher intermountain regions in the Great Basin Desert of Nevada	USFS (S); NDOW (GM); NS-S (S3); NS (G4)
silver-haired bat*	*Lasionycteris noctivagans*	widely distributed in the state, but confined primarily to forested habitats; found in riparian habitats in the south and in woodland and riparian habitats in the central and northern portions of the state;forest-associated species, more common in mature forests; found primarily at higher latitudes and altitudes; found in coniferous and mixed deciduous/coniferous forests of pinyon juniper, subalpine fir, white fir, limber pine, aspen, cottonwood and willow; usually found at lower elevations in southern Nevada associated with riparian corridors; current Nevada records indicate this species is distributed between 1,570-8,200 ft. ROOST HABITAT: Roosts almost exclusively in trees in summer; maternity roosts are generally in woodpecker hollows and under the loose bark of large diameter snags. They are generally located at least 50 ft above ground; uses multiple roost sites, switching them frequently; small groups and single animals will roost under exfoliating bark; winter roosts include hollow trees, rock crevices, mines, caves, and houses; also has been found roosting under leaf litter; RESIDENT STATUS: Poorly understood; recent August records of seven post-lactating females and fourjuveniles in mixed subalpine fir/limber pine/aspen habitat (Bradley, 2000b) and four lactating females in mixed coniferous/deciduous forest indicates maternity activity in northeast Nevada; WINTER STATUS: Migrates but probably hibernates in some parts of its winter range; migratory patterns not well understood; recent October records of migrating individuals	NS-S (S3B); NS (G3G4); WBWG (medium)
spotted bat*	*Euderma maculatum*	known from only twelve localities, but scattered distribution throughout Nevada;istribution is patchy and linked to availability of cliff roosting-habitat. Recent studies have documented significant activity throughout the summer months in the Muddy River drainage; there are recent high elevation records from the Sierra Nevada in California; found in a wide variety of habitats from low elevation desert scrub to high elevation coniferous forest habitats, including pinyon- juniper, sagebrush, riparian and on urban high-rise (cliff analog) habitats; closely associated with rocky cliffs; current Nevada records indicate this species is distributed between 1770-7,000 ft; ROOST HABITAT: Day roosts primarily in crevices in cliff faces but some indication that mines and caves may occasionally be used, primarily in winter; sas been found	USFS (S); NDOW (TM); NS-S (S2); NS (G4); WBWG (medium to high)

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
		roosting on/in buildings but reliance on such roosts is unclear. Likely roosts singly; RESIDENT STATUS: year round resident; WINTER STATUS: Hibernates but periodically arouses to actively forage and drink in the winter; characteristics and locations of winter hibernacula in Nevada are completely unknown, and poorly understood throughout this species range	
Townsend's big-eared bat*	*Corynorhinus townsendii*	found throughout the state, from low desert to high mountain habitats. Observed foraging in krumholz bristlecone pine as high as 11,500 ft in the Snake Range of eastern White Pine County; distribution is strongly correlated with the availability of caves and abandoned mines; highly associated with caves and mines; found primarily in rural settings from deserts to lower, mid to high-elevation mixed coniferous-deciduous forest. Current Nevada records indicate this species is distributed between 690-11,500 ft primarily in pinyonjuniper-mahogany, white fir, blackbrush, sagebrush, salt desert scrub, agricultural, and occasionally in urban habitats. ROOST SITES: A cavern-dwelling species that uses mines, caves, trees and buildings; very dependent on mines and caves; trees and buildings must offer "cave-like" spaces in order to be suitable.; will night roost in more open settings, including under bridges; **recent studies indicate that use of roosts is variable within seasons and among years, and multiple surveys may be required before use can be documented**.RESIDENT STATUS: year round resident; WINTER STATUS: hibernates in mixed sex aggregations of a few to many hundred; periodically arouses to move to alternate roosts and to actively forage and drink in the winter; hibernation prolonged in colder areas, and intermittent where climate is predominantly non-freezing	USFS (S); NDOW (SM); NS-S (S2); NS (G4); WBWG (high)
western red bat*	*Lasiurus blossevillii*	historically known from only two locations, one of which (Fallon area) yielded additional specimens in 1958; third location near Dyer was documented in September 1999; recent acoustic sampling in the Muddy River drainage in Clark County have yielded records of occurrence in late spring and early summer 2000, and three females and two males were captured between July and September in the same drainage; been detected acoustically in the northern portion of the Nevada Test Site during the summers of 1999 and 2000; two acoustic records were obtained near the Truckee River west of Fernley; aoustic records from two localities in Lincoln County were documented in 2003; found primarily in wooded habitats, including mesquite bosque and cottonwood/willow riparian areas; Current Nevada records indicate this species is distributed between 1,380-6,600 ft; ROOST HABITAT:solitary rooster; day roosts in trees, within the foliage and presumably in leaf litter on the ground; RESIDENT STATUS: thought to be a migrant but may be a summer resident in the Fallon and Muddy River areas; WINTER STATUS: **winter behavior poorly understood**; thought to be migratory in NV, although migratory patterns are not	NDOW (SM); NS-S (S1M); NS (G4); WBWG (high)

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
		well documented. This species is reported to be highly migratory throughout most of its range	
western small-footed myotis*	*Myotis ciliolabrum*	found throughout the state; in the south, primarily found at the middle and higher elevations (> 5,900 ft), although occasionally found at lower elevations; in central and northern part of the State it is more common at valley bottoms (3,400-5,900 ft); inhabits a variety of habitats including desert scrub, grasslands, sagebrush steppe, and blackbrush, greasewood, pinyon-juniper woodlands, pine-fir forests, agriculture, and urban areas; current Nevada records indicate distribution between1,600- 9,000 ft; ROOST HABITAT: roosts have been found in caves, mines, and trees; roosting preferences expected to be similar to those for *Myotis californicus* ; RESIDENT STATUS: year round resident; WINTER STATUS: hibernates; in some areas may tolerate drier and colder hibernacula than some other species; hibernates individually or in large colonies. A large colony (>100 individuals) was found at a depth of 450 ft in an abandoned mine near Eureka	NS-S (S3); NS (G5): WBWG (low to medium)
Yuma myotis	*Myotis yumanensis*	found at least in the southern and western half of the state, primarily at low to middle elevations; recent collection in east central Nevada and a large colony near Rye Patch Reservoir suggests a wider distribution in the state; found in a wide variety of habitats from low to mid-elevations, including sagebrush, salt desert scrub, agriculture, playa, and riparian habitats; one of the species that is most tolerant of human habitation and one of the few that thrives in a relatively urbanized environment; often considered to be a "building" bat, it is also found in heavily forested settings elsewhere; current Nevada records indicate this species is distributed between 1,500-10,900 ft; ROOST HABITAT: day roosts in buildings, trees, mines, caves, bridges, and rock crevices; night roosts usually associated with buildings, bridges, or other man- made structures; RESIDENT STATUS: year round resident; WINTER STATUS: hibernates; no large winter aggregations have been found in Nevada	NS-S (S3S4); NS (G5); WBWG (low to medium)

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
REPTILES			
desert horned lizard (inlcuding nothern and southern subspecies)**	*Phrynosoma platyrhinos (includes P.p. platyrhinos - northern desert horned lizard and P.p. calidiarum - southern horned lizard)*	Typically found in open sandy areas in deserts, chaparral, grassland, often near ant hills. Often seen basking on asphalt roads or low rocks in the morning or afternoon.	NS-S (S4);
Great Basin collared lizard**	*Crotaphytus bicinctores*	occurs mainly in xeric, sparsely vegetated rocky areas, on lluvial fns, lava flows, hillsides, rocky plains, and in canyons; perches atop rocks and hides under rocks and be found from sea level to about 7,500 ft	NS-S (S4); NS (G5)
long-nosed leopard lizard**	*Gambelia wislizenii*	found in sandy and gravelly desert and semidesert areas with scattered shrubs or other low plants (e.g. bunch grass, alkali bush, sagebrush, creosote bush) especially areas with abundant rodent burrows; occurs from sea lvel to approximately 6,000 ft	NS-S (S4); NS (G5)
northern rubber boa*	*Charina bottae*	grassland, meadows and chaparral to deciduous and conifer forests, to high alpine settings	NS-S (S3S4); NS (G5)
Sierra alligator lizard	*Elgaria coerulea palmeri*	found only in the Sierra Nevada and immediately adjacent ranges in the western part of the state. Generally found in cooler, damper places in a variety of forested habitats and montane chaparral. Also found in grassy grown-over areas at margins of woodlands, in clearcuts, near streams, rock outcrops, and talus	NDOW (PR); NS-S (S2S3); NS (G5T4)
Western pond turtle	*Actinmys marmorata*	limited range in western NV in Truckee and Carson Rivers and nearby ponds. This species is found in permanent and intermitent waters of rivers, creeks, small lakes and ponds, marshes, irrigaton ditches, and reservoirs. It is sometimes found in brackish water	NS-S (S2); NS (G3G4)
INSECTS			
Carson wandering skipper	*Pseudocopaeodes eunus obscurus*	salt grass (obligate host plant for larvae) and nearby nectar- producing flowers; salt grass typically is present where its root are inundated with water for short periods	USFWS(E); NS-S (S1); NS (G3G4T1)
Carson Valley silverspot	*Speyeria nokomis carsonensis*	wetland habitats where host plant *Viola nephrophylla* occurs; extremely wet meadow situations, with one o more native or non- native plants that produce nector; may occur along riparian corridors, we lowland meadows including agricultural fields and perennial montane streams	NS-S (S1); NS (G3T1)
Carson Valley wood nymph	*Cercyonis pegala carsonensis*	Douglas, Carson City, and Washoe counties and in the Carson River drainage in Alpine Co., California.	NS-S (S2); NS (G5T1T2)
early blue	*Euphilotes enoptes primavera*	records only exist from Mineral County in the Wassuk Range. Trend unknown considered critically imperiled in Nevada	NS-S (S1); NS (G5T1)
Great Basin small blue	*Philotiella speciosa septentrionalis*	distribution unknown but type locality is from Fort Churchill Road in Lyon County. Trend unknown considered critically imperiled in Nevada	NS-S (S1); NS (G3G4T1)

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
Hardy's aegialian scarab	*Aegialia hardyi*	occurs at Sand Mountain and Blow Sand Mountain	NS-S (S1); NS (G1)
Monarch butterfly	*Danaus plexippus plexippus*	widespread and scattered; requires milkweed (*Asclepiaecae*) or dogbane (*Apocynaceae*) as host plants for larvae; migratory in southern part of state	FWS (PETITIONED 2014); NS-S (SNR); NS (G4T3)
Mono Basin skipper	*Hesperia uncas giulianii*	known only from the Adobe Hills in Mono County, California. Gently rolling hills with sandy substrate	NS-S (S1); NS (G5T1)
Nevada alkali skipperling	*Pseudocopaeodes eunus flavus*	desert salt grass spots on alkali flats	NS-S (S1); NS (G3G4T3)
Reese River Railroad Valley skipper	*Hesperia uncas reeseorum*	Reese River in Lander county and Mason Valley in Lyon county	NS-S (S1); NS (G5T1T2)
Sand Mountain aphodius scarab	*Aphodius sp. 3*	Sand Mountain and Blow Sand Mountain	NS-S (S1?); NS (G1?Q)
Sand Mountain blue	*Euphilotes pallescens arenamontana*	known to exist only at Sand Mountain, a large dune located in Churchill County east of Fallon, Nevada; closely associated with its host plant, the Kearney buckwheat (Eriogonum nummulare) which grows within the dune system. This wild buckwheat is the only food source for the butterfly larvae; this plant also provides nectar for adult butterflies during their emergence	NS-S (S1); NS (G3G4T1)
Sand Mountain pygmy scarab	*Coenonycha pygmaea*	Sand Mountain and Blow Sand Mountain	NS-S (S1); NS (G1?)
Sand Mountain serican scarab	*Serica psammobunus*	occur only at Sand Mountain and the nearby Blowsand Mountains dune systems, Churchill County, Nevada	NS-S (S1); NS (G1)
MOLLUSCS			
California floater	*Anodonta californiensis*	shallow areas of clean, clear lakes, ponds and large rivers. They prefer lower elevations and a soft, silty substrate in which to burrow	NS-S (S1); NS (G3Q)
Dixie Valley pyrg	*Pyrgulopsis dixensis*	Dixie Valley Area	NS-S (S1); NS (G1)
Pyramid Lake pebblesnail	*Fluminicola dalli*	only known from the type locality and a small surrounding area in the northern area of Pyramid Lake	NS-S (SNR); NS (G1)
Virginia Mountains pebblesnail	*Fluminicola virginius*	found in a single spring in the Pyramid Lake Basin, Washoe County	NS-S(S1); NS (G1)
western Lahontan pyrg	*Pyrgulopsis longiglans*	occurs in spirngs and seeps in Humboldt, Washoe and Douglas countries from 4,040 to 6,730 ft.	NS-S (S2S3); NS (G2G3)
Wongs pyrg**	*Pyrgulopsis wongi*	widely distributed in the Owens River drainage, also ranges among basins to the north, south, and east, including Mono Lake basin, Adobe Valley, Owens Valley, and Rose Valley	NS-S (S1); NS (G2)
PLANTS			
Alexander's buckwheat	*Eriogonum alexanderae*	light colored clay outcrops, hillsides, and badlands in the shadcale, sagebrush, and pinyon-juniper zones.	NS-S (S2S3); NS (G5T2T3)
Alkali ivesia	*Ivesia kingii var. kingii*	sagebrush Scrub, Alkali Sink, wetland-riparian; meadows, playas	NS-S (S3); NS (G4)

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
Altered andesite buckwheat	*Eriogonum robustum*	dry, shallow, highly acidic, gravelly clay soils mainly of the Smallcone Series, derived from weathering of hydrothermal sulfide deposits formed in andesite, or sometimes in rhyolitic or granitoid rocks, forming mostly barren yellowish to orange brown patches on ridges, knolls, and steep slopes	USFS (S); NS-S (S2); NS (G2G3)
Altered andesite popcornflower	*Plagiobothrys glomeratus*	dry, shallow, highly acidic (pH 3.3-5.5) gravelly clay soils mainly of the Smallcone Series, derived from weathering of hydrothermal sulfide deposits formed in andesite, or sometimes in rhyolitic or granitoid rocks, forming mostly barren yellowish to orange brown patches on ridges, knolls, and steep slopes on all aspects, on all but the most xeric sites supporting a sparse, stunted relict woodland of yellow pines and pinyon pine	USFS (S); NS-S (S2); NS (G2G3)
Ames milkvetch	*Astragalus pulsiferae* var. *pulsiferae*	sagebrush scrub; northern juniper woodland; mountains and plateaus	NS-S (S1); NS (G4T2)
Beatley buckwheat	*Eriogonum beatleyae*	dry, volcanic outcrops	NS-S (S3); NS (G2Q)
Bodie Hills draba	*Cusickiella quadricostata*	Great Basin scrub, pinyon and juniper woodland; clay or rocky soils; elevations from 6,200 to 8,500 feet above sea level	USFS (S); NS-S (S2); NS (G2)
Bodie Hills rockcress*	*Boechera bodiensis*	dry, open, rocky, high or north-facing slopes or exposed summits of granitic or rhyolitic material, on moistureaccumulating microsites in sagebrush associations within the pinyon-juniper and mountain sagebrush zones	USFS (S); NS-S (S2); NS (G2)
Callaway milkvetch	*Astragalus callithrix*	deep, sandy soil on the valley floor or on dunes in barren openings with *Atriplex, Grayia, Chrysothamnus* , and *Artemisia* ; 1550 - 1710 m	NS-S (S3); NS (G3)
Candelaria blazingstar	*Mentzelia candelariae*	barren, often calcareous, low-competition gravelly or clay soils on weathered volcanic ash deposits, scree slopes, hot spring mounds, washes, or road banks or other recovering disturbances, in the shadscale, mixed-shrub, and sagebrush zones	NS-S (S3?); NS (G3?Q)
Carson Valley monkeyflower	*Erythranthe carsonensis*	open areas of Great Basin sagebrush/bitterbrush scrub in coarse granite soils on gentle to moderate slopes (0-15 percent), usually on N aspects but also occasionally on S-SW aspects. Elevation 1400-1580 m (4600-5200 ft)	NAC (CE); NS-S (S2); NS (G1)
Churchill Narrows buckwheat	*Eriogonum diatomaceum*	dry, relatively barren and undisturbed, white to yellowish tan, clay to silty diatomaceous deposits of the Coal Valley Formation, with a variable volcanic cobble overburden, on rounded knolls, low ridges, slopes, and especially small drainages on all aspects	NAC (CE); NS-S (S1); NS (G1)
Eastwood milkweed	*Asclepias eastwoodiana*	in open areas on a wide variety of basic (pH usually 8 or higher) soils, including calcareous clay knolls, sand, carbonate or basaltic gravels, or shale outcrops, generally barren and lacking competition, frequently in small washes or other moisture- accumulating microsites, in the shadscale, mixed-shrub, sagebrush, and lower pinyon-juniper zones.	USFS (S); NS-S (S2S3); NS (G2Q)

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
Inyo blazing star	*Mentzelia inyoensis*	washes, limestone soils, talus slopes, 2500'-6000', creosote bush scrub, joshua tree and pinyon-juniper woodland, Clark Mts and mountains of northern Mojave Desert	USFS (S); NS-S (S1); NS (G3)
Lahontan Basin buckwheat	*Eriogonum rubricaule*	dry, open, light-colored, strongly alkaline shrink-swell clay soils on bluffs and badlands derived from fluviolacustrine silt, volcanic ash, or diatomite deposits, sometimes perched on dark basaltic slopes, in the shadscale, mixed-shrub, and lower sagebrush zones	NS-S (S3); NS (G3)
Lahontan beardtongue	*Penstemon palmeri* var. *macranthus*	along washes, roadsides, and canyon floors, particularly on carbonate-containing substrates, usually where subsurface moisture is available throughout most of the summer; unknown if restricted to calcareous substrates	NS-S (S2?); NS (G4G5T2?)
Lahontan milkvetch	*Astragalus porrectus*	open, calcareous or alkaline, sandy to gravelly washes, alluvium, or gullies on clay badlands, knolls, or playa edges in the shadscale zone	NS-S (S3?); NS (G3?)
Lavin eggvetch	*Astragalus oophorus* var. *lavinii*	open, dry, relatively barren gravelly clay slopes, knolls, badlands, or outcrops, derived from volcanic ash or carbonate, usually northeast to southeast aspects, openings in pinyon- juniper or sagebrush zones	USFS (S); NS-S (S2); NS (G4T2)
Lemmon buckwheat	*Eriogonum lemmonii*	open, light-colored, sometimes silty or sandy, sometimes gypsiferous shrink-swell clay soils on bluffs and badlands derived from fluviolacustrine silt and volcanic ash deposits in the shadscale zone	NS-S (S3?); NS (G3?)
Long Valley Milkvetch	*Astragalus johannis-howellii*	sandy rhyolitic soils on flats and gentle slopes of mountain sagebrush	NS-S (S2); NS (G2)
Margaret rushy milkvetch	*Astragalus convallarius* var. *margaretiae*	rocky slopes and flats among sagebrush in the pinyon-juniper and sagebrush zones. Endemic to the Pine Nut and Virginia Ranges	NS-S (S2); NS (G5T2)
Masonic Mountain jewelflower	*Streptanthus oliganthus*	rocky sites and talus, from 6,890 to 9,190 feet above sea level	USFS (S); NS-S (S2) NS (G2G3)
Mono County Phacelia*	*Phacelia monoensis*	alkaline, barren or sparsely vegetated grayish, brownish, or reddish shrink-swell clays of mostly andesitic origin, on various slopes and aspects, mostly on stabilized or low-intensity artificial or natural disturbances, most abundant on road berms that cross such soils, less frequently on naturally eroding badlands or apparently undisturbed soil, in the pinyon-juniper and mountain sagebrush zones	USFS (S); NS-S (S3) NS (G3)
Mojave thistle (Virgin River thistle)	*Cirsium mohavense (or C. virginense)*	damp soils around desert springs, streams, and ditches; 1,500 to 9,000 feet elevation; Open, moist, alkaline clay soils of seep and spring areas or gypsum knolls. aquatic or wetland dependent in Nevada	NS-S (SNR); NS (G2G3)
Nevada dune beardtongue	*Penstemon arenarius*	deep, volcanic, sandy soils at elevations of 3,940 to 4,430 feet above mean sea level; common associates include fourwing saltbush, littleleaf horsebrush, and greasewood	USFS (S); NS-S (S2); NS (G2G3)
Nevada suncup	*Camissonia nevadensis*	open, sandy, gravelly, or clay slopes and flats in the salt-desert, shadscale, and lower sagebrush zones	NS-S (S3); NS (G3)
Oryctes	*Oryctes nevadensis*	deep loose sand of stabilized dunes, washes, and valley flats, on various slopes and aspects	NS-S (S3); NS (G3)

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
Pine Nut Mountains mousetails	*Ivesia pityocharis*	seasonally or periodically wet, otherwise moist to dry decomposed granite soils or sod of meadow margins with shallow underlying water table and/or bedrock, associated with springs, moist drainages, or ephemeral ponds, typically on flats or gentle northwest to northeast exposures, but found on all aspects with slopes up to about 20 degrees. Endemic to Pine Nut Mountains	NS-S (S1); NS (G2)
Playa phacelia	*Phacelia inundata*	grows in alkali playas and seasonally inundated areas with clay soils. Aquatic or wetland-dependent in Nevada	NS-S (S2?); NS (G3)
Reese River phacelia	*Phacelia glaberrima*	open, dry to moist, alkaline, nearly barren, sometimes scree- covered, whitish to brownish shrink-swell clay soils derived from fluviolacustrine volcanic ash and tuff deposits, generally on the steeper slopes of low hills, bluffs, and badlands in the shadscale-greasewood, sagebrush, and lower pinyon-juniper zones	NS-S (S3?); NS (G3?)
Sagebrush pygmyleaf	*Loeflingia squarrosa* ssp. *artemisiarum*	sandy soils of desert dunes and flats in Great Basin sagebrush scrub and Mojave desert scrub. It occurs at elevations of 2,300 to 4,000 feet	NS-S (S1S2); NS (G5T2T3)
Sand cholla	*Grusonia pulchella*	sand of dunes, dry-lake borders, river bottoms, washes, valleys, and plains in the desert." Dependent on sand dunes or deep sand in Nevada	NAC (CY); NS-S (S2S3); NS (G4)
Schoolcraft buckwheat	*Eriogonum microthecum* var. *schoolcraftii*	sandy to rocky soil, sagebrush communities, pinyon-juniper woodlands; 4600 -7200 m	NS-S (S1); NS (G5T3)
Shevock bristlemoss	*Orthotrichum shevockii*	Pinyon-juniper woodland, on granitic rocks	USFS (S); NS-S (S1); GS (G3G4)
Sierra Valley mousetails	*Ivesia aperta* var. *aperta*	shallow, vernally saturated, slowly draining, sandy to rocky clay soils derived from mostly andesitic volcanic rock or alluvium on benches and flats in meadows, seeps, intermittent drainages, etc., in the yellowpine, mountain sagebrush, and mountain mahogany zones. Dependent on wetland margin areas in Nevada	USFS (S); NS-S (S1); GS (G2T2)
Smooth dwarf greasebush	*Glossopetalon pungens* var. *glabrum*	crevices of carbonate cliffs and outcrops	USFS (S); NS-S (S1); NS (G2G3T1Q)
Sodaville milkvetch	*Astragalus lentiginosus* var. *sesquimetralis*	moist, open, alkaline hummocks and drainages near cool springs with Distichlis spicata, Sarcobatus vermiculatus, Sporobolus airoides, etc. Aquatic or wetland-dependent in Nevada. Near exhaustive surveys of habitat have revealed only two populations in Nevada; one in Mineral County and the other in Nye County	NAC (CE); NS-S (S1); NS (G5T1)
Steamboat monkeyflower	*Diplacus ovatus (Mimulus ovatus)*	dry to somewhat moist, often barren, loose, sandy to gravelly slopes derived from siliceous sinter deposited by hot springs in the sagebrush zone, or from highly acidic hydrothermally altered andesite or rhyolite deposits; sometimes loose sandy soils on valley floors in openings among sagebrush, sometimes on adjacent roadsides or washes	NS-S (S1S2); NS (G1G2Q)
Tahoe yellowcress	*Rorripa subumbellata*	grows exclusively on the shoreline of Lake Tahoe on the sandy beaches and dunes at the margin of the lake	USFS (S); NAC (CE); NS-S (S1); NS (G1)
Tiehm blazingstar	*Mentzelia tiehmii*	occupies white, alkaline clay badlands and flats	NS-S (S2); NS (G1G2)

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: NV Natural Heritage Program; US Forest Service; NV
Tiehm peppercress	*Stroganowia tiehmii*	dry, open, very rocky clay soils or soil pockets in or near scree, talus, or boulder fields derived from basalt, other volcanic rocks, and/or fluviolacustrine sediments, on gentle to steep slopes of all aspects and topographic positions, but best developed on northeasterly aspects, in the sagebrush, upper shadscale, and lower juniper woodland zones	NS-S (S2); NS (G2)
Tonopah milkvetch	*Astragalus pseudiodanthus*	deep loose sandy soils of stabilized and active dune margins, old beaches, valley floors, or drainages, with Sarcobatus vermiculatus and other salt desert shrub taxa. Dependent on sand dunes or deep sand in Nevada	NS-S (S2); NS (G3Q)
Washoe pine	*Pinus ponderosa* ssp. *washoensis*	mountain slopes with lodgepole pine, western white pine, ponderosa pine, and California red fir	NAC (CY); NS-S (S1); NS (G3Q)
Wassuk beardtongue*	*Penstemon rubicundus*	open, rocky to gravelly soils on perched tufa shores, steep decomposed granite slopes, rocky drainage bottoms, and roadsides or other recovering disturbances with enhanced runoff, locally abundant on recent burns, in the pinyon-juniper, sagebrush, and upper mixed-shrub and shadscale zones	USFS (S); NS-S (S3); NS (G2G3)
Watson spinecup	*Oxytheca watsonii*	dry, open, loose and/or lightly disturbed, often calcareous, sandy soils of washes, roadsides, alluvial fans, and valley bottoms, in salt desert shrub communities	NS-S (S3?); NS (G3?)
Webber ivesia	*Ivesia webberi*	shallow shrink-swell clay soils with a gravelly surface layer over volcanic, generally andesitic bedrock, on midelevation benches and flats. Known in Nevada from the Pine Nut and Carson ranges and Peavine Mountain	FWS (T); USFS (S); NAC (CE); NS-S (S2); NS (G2)
Whitebark Pine	*Pinus albicaulis*	subalpine and timberline zones; grows in cold, snowy, and generally moist climates; on semiarid ranges it is most common on cold, moist sites, whereas it is most common on warm, dry sites on moist ranges; common on ridges and near timberline, where trees are exposed to strong, desiccating winds	FWS(C); USFS (S); NS-S (S3); NS (G3G4)
Williams combleaf	*Polyctenium williamsiae*	relatively barren sandy to sandy-clay or mud margins and bottoms of non-alkaline seasonal lakes perched over volcanic bedrock in the sagebrush, pinyon-juniper, and mountain sagebrush zones	USFS (S); NAC (CE); NS-S (S2); NS (G2Q)
Windloving buckwheat	*Eriogonum anemophilum*	high elevations on dry, exposed, relatively barren and undisturbed, gravelly, limestone or volcanic ridges and ridgeline knolls, on outcrops or shallow rocky soils over bedrock. At low elevations on dry, relatively barren and undisturbed knolls and slopes of light-colored, platy volcanic tuff weathered to form stiff clay soils	NS-S (S3); NS (G2G3)

8.11 Appendix D – Contributing Factors – Summary of Proper Functioning Condition Assessments

a. **Bank shearing/sloughing and trampling due to livestock.** Riparian and wetland soils are highly susceptible to degradation from excessive or concentrated hoof action by heavy hooved animals such as livestock and wild horses. Soils found in wetlands and riparian areas tend to have higher silt and clay content, which increases their ability to store water in available pore spaces. These soils also tend to have higher organic matter content, which also increases their ability to retain water. Organic matter, silt and clay

content affects both the texture and structure of a soil and plays an important role in water holding capacity (soil saturation) that supports wetland plant species, as well as the stability of banks and the soil surface in lotic and lentic systems. The structural integrity of wetland-riparian soils can be compromised as livestock utilize water sources and their hooves break down the soil surface, shearing off streambanks while they forage for wetland vegetation and consume water. Soil compaction occurs as the weight imparted on the soil by an animal decreases the amount of pore space between soil particles. This results in reduced infiltration rates and water holding capacity as soil pore spaces are lost. Reduced infiltration leads to surface runoff and erosion as water cannot infiltrate into the soil. Compaction thus leads to cover depletion as soil saturation becomes insufficient to support maintenance or recovery of wetland plant species. Vegetative cover is important to protect the soil surface from erosion, as root masses provide bank stability and dissipate wind and wave energies to reduce soil loss. Roots also provide pathways for water to infiltrate into the soil. With a reduction in vegetation, water infiltration and soil saturation are further reduced. Soil exposed on sheared or sloughed banks can also affect the water quality of a wetland-riparian system by increasing sedimentation into the water, thus reducing the biotic productivity of an aquatic environment. By reducing the water-holding capacity of a soil and decreasing the infiltration rates, available subsurface and surface water is decreased and cannot be retained within the system. This further leads to loss of water and protective vegetative cover and reduces functionality and extent of a wetland or riparian area. Bank shearing of streams is commonly observed at access points where livestock go to open areas (or areas where vegetation is less dense) to access water. These areas present easy access to the stream and tend to receive more active and continued use by livestock. As a result, bank shearing, soil compaction and erosion is greater than that of other areas along the stream bank (reach) where vegetation or topography may limit access and use. In contrast soil sloughing, compaction, and erosion is typically consistent throughout a spring system (wet meadow) as livestock graze and drink. Areas where vegetation is scarce and bare ground is present are most susceptible to sloughing and soil degradation.

b. Channelization and excessive vertical and/or lateral stream movement.
Channelization and vertical/lateral movement of a stream can reduce riparian function by a loss in channel sinuosity and width/depth ratio as well as modifying riparian vegetation types and amounts along stream banks (riparian zone). Maintaining channel morphology that is appropriate to stream type is important to dissipate high-energy flows and reduce soil loss by erosion. Channelization alters channel morphology and the connectivity to floodplains which is critical for productivity, nutrient cycling, flood control, and biodiversity. When streams become channelized, the channel capacity increases and the stream length is shortened. This results in movement of greater volumes of water at higher velocities, further eroding and deepening the stream channel (incision). This leads to a hydrologic disconnection between the stream and adjacent floodplains, which alters functional processes of these lotic systems. When vertical and lateral movement (sinuosity) of the stream channel is compromised erosion and deposition is not in balance within the system. Streams become less sinuous and are more susceptible to incision and erosion. These channels tend to relocate, have a high degree of bank erosion along

straight channel segments, have a loss of overbank deposition to maintain floodplains, do not support riparian vegetation, form gullies, and dewater the alluvial aquifer and lower the adjacent water table which could allow for encroachment of upland vegetation. Both channelization and vertical/lateral channel movement can also increase the occurrence of downslope flooding as the stream gradient changes over time. Down cutting and incision of streams can also increase erosion and downstream sedimentation, as well as alter flow and reduce localized soil saturation by changing the width-depth ratio of the stream channel; all of which can lead to a decrease in riparian vegetation vigor and reproduction.

The formation of lotic features in a wetland system (lentic channelization) can also reduce riparian function by altering surface and sub-surface water movement and modifying riparian vegetation within the wetland area, especially along the perimeter's edge. Channelization of lentic systems typically occurs from increased utilization by livestock and/or wild horses. As soil structure breaks down and compaction increases from trampling, surface runoff increases. Water will typically follow the lowest elevation path down-slope and begin to create channels of flow between trampled and compacted areas. During high-flow events, erosion increases and allows for further channel development. Similar to lotic systems, channel formation in a wetland is typically related to the slope, topography, and parent material present as well as the duration and frequency of utilization within the area. Channelization can develop at a faster rate in higher sloped lentic areas (e.g. hillslope springs) versus low elevation wetlands and meadows. However, the development of channels in either case can be detrimental to lentic systems as water flow patterns change resulting in changes to vegetation and morphology. If channel development continues, in some cases lentic systems can alter to lotic systems.

c. **Decreased amount of riparian vegetation (herbaceous and/or woody species) due to overgrazing, channelization, erosion, and/or incision.** Wetlands and riparian areas are relatively small areas however they tend to be highly productive with a wide range of wetland plant species (riparian vegetation). Overgrazing of wetland-riparian areas has resulted in a reduction of riparian vegetation as concentrated utilization reduces vegetative productivity and reproduction. Channelization, excessive erosion, and incision have also resulted in a loss of riparian vegetation due to imbalances within these lentic and lotic systems. In many of the streams and springs assessed, there is a lack of desired species required for adequate diversification, sediment filtering, and stabilization. A reduction in riparian vegetation tends to occur in open/unprotected areas where livestock and wild horses have easy access to preferred riparian forage and water along stream reaches. Springs, however, tend to experience grazing throughout the extent of the vegetated area or meadow system. Channelization and incision tends to occur in areas where soil is more susceptible to erosion, either where protective vegetation has decreased or structures/range improvements have failed. A decrease in riparian vegetation in a wetland-riparian area has similar results to those described in contributing factors a and b. Herbaceous species, such as obligate and facultative wetland plants, aid in reducing percent bare ground cover; captures and filters fine sediment to improve water quality; aids in point bar and floodplain formation; stabilizes banks to reduce

shearing and sloughing of soils; and provides protective cover to dissipate energy from overland flow, thus reducing soil loss and erosion. Woody species, such as aspen and willow, aid in stabilizing banks and soil during higher energy flow events; provide shade cover for regulating water temperature; improve habitat for aquatic species; and provide downed woody material which helps to dissipate energy to reduce erosion and soil loss. Ramifications of excessive or concentrated herbage removal by grazing and physical damage from trampling, channelization and erosion/incision can include reduced dissipation of stream energy; increased bare soil and soil loss through accelerated erosion; and stream channel and/or spring bank degradation resulting in reduced floodplain recharge, a lowered water table, and/or subsequently reduced riparian community size.

d. **Range improvements or structures in disrepair or not functioning.** Range improvements and riparian structures are useful aids in enhancing or improving spring and stream functioning condition, riparian ecosystems, livestock grazing management, improving watershed conditions, and enhancing wildlife habitat. Infrastructure, such as riparian protection (exclosure) fencing, spring boxes, and troughs can aid in the management and distribution of livestock, which increases the effectiveness of riparian-wetland site restoration, recovery and maintenance. Additionally, structures such as culverts and dams can benefit stream function by dissipating energy and aid in sediment disbursement (floodplain development). When range improvements are in disrepair this can negatively impact wetlands and riparian areas by allowing livestock and wild horses access to sensitive areas. Congregation and concentrated use may increase bank degradation, soil compaction sedimentation and erosion; and affect surface and subsurface flow patterns. When structures are not functioning properly, this can lead to energy imbalances and result in stream blowouts which removes vegetation and causes stream channelization or incision. Culverts aid in passage of flow and dams assist with energy disbursement of stream flow to help capture sediment and improve floodplain development. When culverts or dams are impaired (such as being blocked by sediment and debris) this can have a negative impact to aquatic species and the natural function of stream flow. In addition, when culverts and dams are put in place without proper consideration of stream type, these structures could adversely impact stream function when they fail. Non-functioning culverts and dams may lead to localized surface runoff, alter sedimentation rates and point bar development, and impact stream flow. Maintaining range improvements and structures in good working order is essential to improving stream and spring function.

e. Encroachment of upland vegetation. Encroachment of upland vegetation (such as Utah juniper, Pinyon pine and rabbitbrush) indicates a loss of subsurface water flow to a riparian-wetland system. Upland plants grow in unsaturated to limited saturated soil conditions and their presence within a riparian or wetland system can indicate a reduction of water holding capacity, or that the overall system is not receiving adequate subsurface water to maintain hydrologic function within the system. Pinyon and juniper trees also typically utilize larger quantities of water for growth and reproduction and therefore can outcompete riparian plants for water and nutrient resources. This can aid in the removal

of water supplied into a system and thus further reduce functioning condition of a riparian-wetland area. Encroachment of upland vegetation is common is riparian areas where there has been riparian vegetation removal, bank trampling, channelization, excessive erosion, and stream channel incision.

f. **Road encroachment and upland watershed degradation contributing to a decline in wetland-riparian function.** Road encroachment and trailing can negatively impact spring and stream function by altering surface flow and increasing soil and vegetation loss. Upland watershed degradation, such as upslope reduction in key species, increased bare ground, formation of water features (rills, gullies, and pedestalling), and/or P-J encroachment can also impact streams and springs by altering surface/subsurface flow, reducing subsurface water availability, and increasing erosion and sedimentation downslope. Road encroachment and road crossings can increase erosion and sedimentation, as well as alter surface flow and increase surface runoff; all of which may result in a removal of water to the system. This may cause some sections of the stream or spring to dry out as other areas receive more water from the change in surface flow patterns. Road encroachment also alters sinuosity, bank stability and floodplain development of lotic systems. Trailing from livestock and wild horses can result in reduction of protective vegetation and an increase in bare ground directly where the trailing forms. Trailing is common along fence lines (such as exclosure fencing) however trailing is also observed along stream reaches and in/around springs and meadows. Excessive trailing can increase localized sediment load into open waters, leading to indirect impacts to water quality, which could affect riparian-wetland vegetative growth. Overall, the impacts from roads, trailing, and upland watershed degradation ultimately affect the potential expansion of riparian and wetland areas by decreasing soil saturation and limiting vegetative and hydrologic function of lentic and lotic systems.