Conservation Strategy for Greater Sage-grouse (*Centrocercus urophasianus*) in the Buffalo-Skedaddle Population Management Unit

Northeast California Sage-grouse Working Group

November 2021

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Acronyms and Abbreviations

AGFO	Applegate Field Office
AIM	Assessment, Inventory, and Monitoring
AML	Appropriate Management Level
ARMPA	Approved Resource Management Plan Amendment
ARS	Agricultural Research Service
BLM	Bureau of Land Management
CDFW	California Department of Fish and Wildlife
COT	Conservation Objectives Team
CPT	Conservation Planning Tool
EA	Environmental Assessment
EIS	Environmental Impact Statement
ELFO	Eagle Lake Field Office
ESA	Endangered Species Act
FIAT	Fire and Invasives Assessment Tool
GHMA	General Habitat Management Area
GRSG	Greater Sage-grouse
HAF	Habitat Assessment Framework
HMA	Herd Management Area
IAE	Institute for Applied Ecology
LHA	Land Health Assessment
LMF	Landscape Monitoring Framework
LPPA	Lek Population Planning Area
LUPA	Land Use Plan Amendment
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NGO	Non-governmental Organization
NOC	National Operations Center
NRCS	Natural Resources Conservation Service
NRI	National Resources Inventory
OHMA	Other Habitat Management Area
PFC	Proper Functioning Condition
PHMA	Priority Habitat Management Area
PMU	Population Management Unit
PPA	Project Planning Area
RAC	Resource Advisory Council
RMP	Resource Management Plan
RMPA	Resource Management Plan Amendment
ROD	Record of Decision
UNR	University of Nevada, Reno
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

Common and Scientific Names of Plant Species in this Report

Common Name	Scientific Name
alfalfa	*Medicago sativa*
antelope bitterbrush	*Purshia tridentata*
aspen	*Populus tremuloides*
basin big sagebrush	*Artemisia tridentata ssp. tridentata*
big sagebrush	*Artemisia tridentata*
bluebunch wheatgrass	*Pseudoroegneria spicata*
bottlebrush squirreltail	*Elymus elymoides*
Canada thistle	*Cirsium arvense*
cheatgrass	*Bromus tectorum*
curl-leaf mountain mahogany	*Cercocarpus ledifolius*
Great Basin wild rye	*Leymus cinereus*
juniper	*Juniperus occidentalis*
Lahontan sagebrush	*Artemisia arbuscula ssp. longicaulis*
low or little sagebrush	*Artemisia arbuscula ssp. arbuscula*
Mediterranean sage	*Salvia aethiopis*
medusahead	*Taeniatherum caput-medusae*
mountain big sagebrush	*Artemisia tridentata ssp. vaseyana*
perennial pepperweed	*Lepidium latifolium*
rabbitbrush	*Chrysothamnus spp., Ericameria spp.*
rattlesnake chess	*Bromus briziformis*
rush	*Juncus spp.*
Russian knapweed	*Rhaponticum repens*
sagebrush	*Artemisia spp.*
Sandberg's bluegrass	*Poa secunda*
Scotch thistle	*Onopordum acanthium*
sedge	*Carex spp.*
silver sage	*Artemisia cana*
willow	*Salix spp.*
Wyoming big sagebrush	*Artemisia tridentata ssp. wyomingensis*

Executive Summary

Greater Sage-grouse *(Centrocercus urophasianus,* hereafter GRSG) is a sagebrush obligate species found primarily in the Great Basin. This Buffalo-Skedaddle Conservation Strategy updates the previous conservation strategy completed in 2006 (Armentrout et al. 2006). Key changes reflected in this document include new science-based knowledge related to sagebrush habitat; updated conservation action items; updated GRSG population trends; and changes in habitat condition, particularly those resulting from the 2012 Rush Fire. The Buffalo-Skedaddle Population Management Unit (PMU) covers a large portion of Lassen County in northeastern California, as well as a portion of Washoe County in northwestern Nevada and a small portion of Modoc County, California (Figure 1).

The collective mission of the Buffalo-Skedaddle Sage-grouse Working Group is to develop and implement effective conservation and land management strategies that provide long-term conservation of GRSG, sagebrush ecosystems, and working rural landscapes. The working group uses a collaborative process that capitalizes on collective knowledge and experience to achieve meaningful, longer-lasting outcomes. Respecting and incorporating on-the-ground experience is a priority, as well as the utilization and dissemination of new science-based information.

This conservation strategy provides an overview of habitat conditions, objectives, and priorities that will guide conservation planning and project implementation within the Buffalo-Skedaddle PMU. This document also reflects and recognizes the value of the ongoing collaborative effort of stakeholders, including government agencies, non-governmental organizations (NGO), and private landowners. The following is a list of agencies and organizations that have been involved with the group in recent years: Bureau of Land Management, National Resources Conservation Service, Point Blue, US Fish and Wildlife Service, California Department of Fish and Wildlife, University of California Cooperative Extension, Nevada Department of Wildlife, California Deer Association, Lassen County, Lassen Land and Trails Trust, and the Nevada Sagebrush Ecosystem Program.

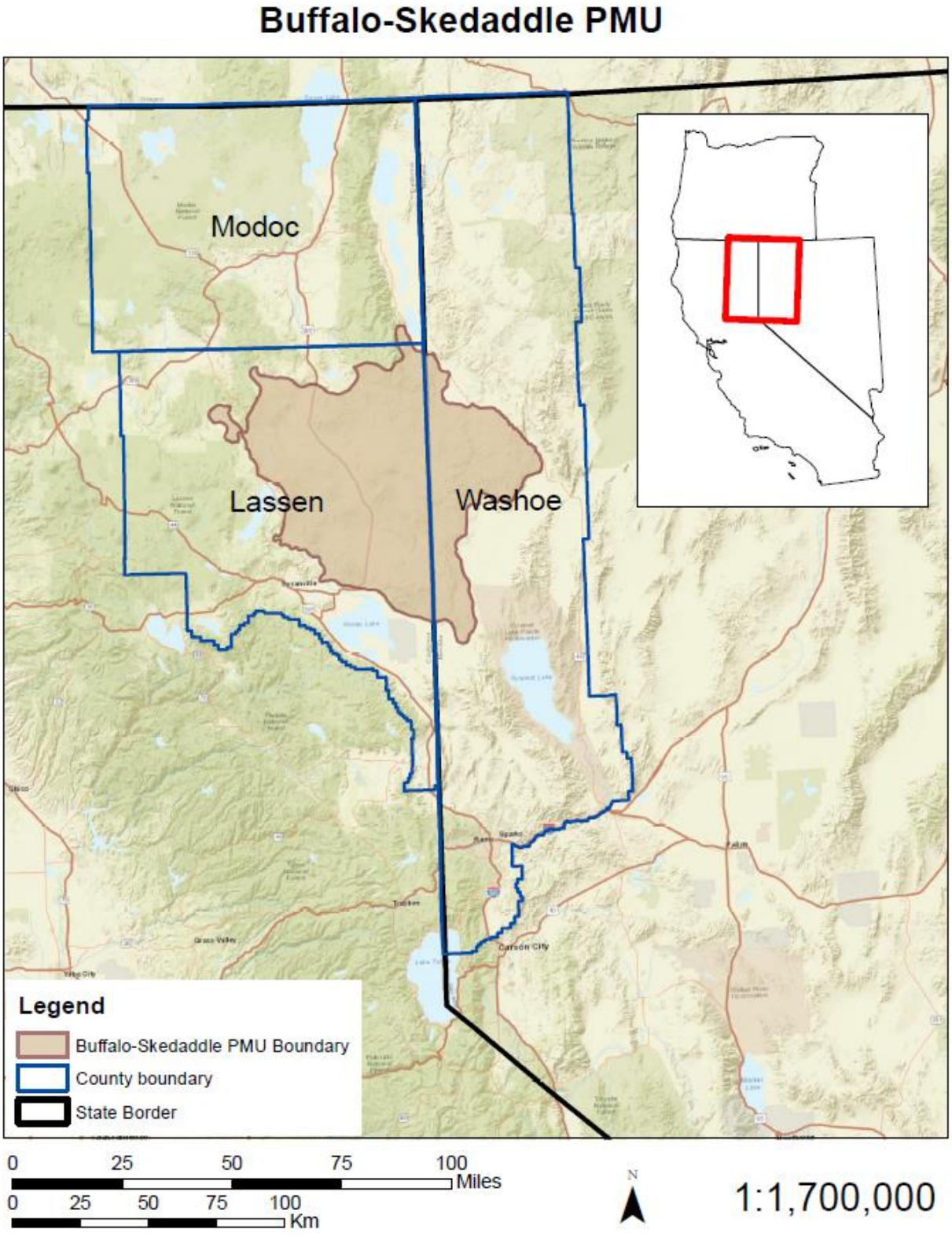

Figure 1. Map of Buffalo-Skedaddle PMU.

Conservation Strategy Goals

GRSG Conservation Goals in the Buffalo-Skedaddle PMU

1. Remove Western Juniper (*Juniperus occidentalis*) in GRSG habitat, prioritizing removal near leks and brood-rearing areas on both public and private land
2. Restore burned areas
3. Reduce the chances of large wildfires
4. Restore degraded streams and meadows within GRSG brood-rearing habitat
5. Improve livestock grazing management for sagebrush ecosystem resilience
6. Treat noxious and invasive weeds that threaten GRSG habitat
7. Where possible, remove or reduce anthropogenic subsidies that attract GRSG predators such as trash, roadkill, and tall structures
8. Continue researching new techniques and locally adapted solutions, and report on results

Background

History of the Buffalo-Skedaddle Sage-grouse Working Group

By the end of the 1990's, GRSG were becoming an important issue in the Great Basin. Across their range, sage-grouse experienced declines ranging from 45%-80% since the 1950s (Braun 1998) with declines from 1985 to 1995, averaging 33% (Connelly and Braun 1997). With the population decline, it was evident that GRSG were going to be the focal species to represent broader concerns about sagebrush habitat and rangeland health, as historic declines in the GRSG population are largely attributed to human-induced reduction in sagebrush habitats (Braun 1998; Schroeder et al. 1999). The first sub-populations of GRSG were petitioned for listing under the Endangered Species Act (ESA) in 1999 – 2000, and the first range-wide petition was in 2002.

Initially, GRSG populations in northeastern California were included as part of a Nevada plan to develop GRSG conservation strategies in delineated sub-regions across the state. However, to successfully engage stakeholders in California, a local conservation planning process was needed. California Department of Fish and Wildlife (CDFW), the Bureau of Land Management (BLM), and other stakeholders believed a local planning group was necessary for the increased participation of landowners, livestock grazing permittees, NGOs, and local government. The Buffalo-Skedaddle Sage-grouse Working Group was established in 2001 and still meets regularly in Susanville to organize conservation efforts for GRSG within the Buffalo-Skedaddle PMU. Conservation of GRSG is necessary to prevent their listing as threatened or endangered under the ESA. In the event that a listing did occur, local recovery efforts would be guided by the Buffalo-Skedaddle Conservation Strategy, the first being written in 2006.

At that time, the general understanding of the GRSG life cycle and basic ecology was not as widely understood by resource managers as today. While there were strong disagreements about causes and effects of GRSG population decline, there was also a lot of shared learning along the way. Key issues

centered on the perceived bottlenecks of the GRSG reproduction cycle, including pre-nesting hen nutrition, nesting habitat quality and selection, nesting cover, chick survival, and the role of predators in nest and chick mortality. Several researchers and wildlife/resource managers, often from Oregon and Nevada, discussed these issues at local workshops hosted by the University of California (UC) Cooperative Extension.

Several key players deserve recognition in moving the local conservation strategy forward during those early years. Frank Hall (retired CDFW) and the late Don Armentrout (retired BLM) drafted much of the original text of the conservation strategy. Paul Roush (retired BLM) provided an important broader perspective to what was happening with GRSG management across the west, particularly on public lands. Jack Hanson provided effective leadership from both a livestock producer perspective and later as a Lassen County Supervisor during much of the conservation strategy planning process. Several years of meetings, discussions, and editing came to fruition with the completion of the original Buffalo-Skedaddle Conservation Strategy in 2006.

History of Endangered Species Act and Greater Sage-grouse

At the time the original Buffalo-Skedaddle Conservation Strategy was completed and signed, between 1999 and 2005, there were six petitions to the US Fish and Wildlife Service (USFWS) to list GRSG. The responses to these petitions and the outcomes of ensuing lawsuits and court settlements are detailed in the USFWS's 2010 finding. The USFWS issued its 12-month finding for petitions to list the GRSG as threatened or endangered (75 Federal Register 13910, March 23, 2010; USFWS 2010a). In that finding, the USFWS concluded that the GRSG was "warranted, but precluded" for listing as a threatened or endangered species. This meant that the species warranted the protection of the Endangered Species Act (ESA) but that listing the species at that time was precluded by the need to address higher priority species first. At that time, the species was officially considered a Candidate Species but did not receive statutory protection under the ESA.

During the 2010 finding, the USFWS reviewed the status of and threats to the GRSG in relation to the five listing factors provided in Section 4(a)(1) of the ESA. The USFWS determined that Factor A, "the present or threatened destruction, modification, or curtailment of the habitat or range of the GRSG," and Factor D, "the inadequacy of existing regulatory mechanisms," posed "a significant threat to the GRSG now and in the foreseeable future" (USFWS 2010a). The USFWS identified the principal regulatory mechanisms for the BLM as conservation measures in Resource Management Plans (RMPs).

On September 22, 2015, the USFWS announced its listing decision for the GRSG as "not warranted". The USFWS determined that the bird does not face the risk of extinction now or in the foreseeable future and therefore does not need protection under the ESA. The USFWS reached this decision after, in part, considering the unprecedented, landscape-scale conservation effort by the BLM and Forest Service to amend or revise 98 land use plans across the western United States to reduce threats to the species and its habitat. The GRSG is currently a BLM Sensitive Species, and a CDFW Species of Special Concern. Individual state game agencies will continue to be responsible for managing the GRSG populations in their states and continue to collaborate with land owners/managers and federal agencies to conserve and restore habitat.

Hunting

All hunting in California is administered under the authority of CDFW, while hunting in Nevada is administered by the Nevada Department of Wildlife (NDOW). In response to the impact on the GRSG population and habitat due to the 2012 Rush Fire, drought, and other related factors, hunting is not currently permitted for GRSG within the California portion of the Buffalo-Skedaddle PMU. The permit quota is zero, with the most recent hunting season being in 2011. After the Rush Fire in 2012, the California Fish and Game Commission voted to reduce the hunting quota to zero, and the quota has been zero since that action. Prior to 2012, hunting permits were limited to quotas established using annual population counts. One of the benefits of this hunt was the population data obtained by CDFW using sex and age ratios from GRSG wings submitted by successful hunters. CDFW stopped collecting wing data around 2010, and since hunting has ceased, this wing data is no longer available for the California portion of the Buffalo-Skedaddle PMU.

As a result of the Rush Fire, NDOW also closed the GRSG hunt within the Nevada portion of the Buffalo-Skedaddle PMU. After allowing the habitat and population to recover from the fire, NDOW re-instituted their nine-day GRSG hunt season in 2015. In 2021, NDOW reduced the GRSG hunting season from a nine-day hunt to a two-day hunt as a result of lek attendance. Nevada residents have a daily limit of two birds per hunter, however the season is closed to nonresident hunters. NDOW estimates that approximately 20 birds are harvested annually within the PMU. Each season, NDOW collects wings from successful hunters and uses them to derive age and sex ratios for the population. In 2020, NDOW collected wings from 20 harvested birds, which yielded a 1.14 chick/hen ratio and a 0.82 male to female ratio. With the shortened 2021 hunt season, NDOW expects fewer birds will be harvested from the Buffalo-Skedaddle PMU this year.

BLM Resource Management Plan Amendment and Greater Sage-grouse

The original Nevada and Northeastern California Greater Sage-grouse Approved Resource Management Plan Amendment (ARMPA; BLM 2015a) was signed by the Nevada and California BLM State Directors on September 15, 2015. This document applies to the Nevada and Northeastern California Sub-regional Planning Area of the ARMPA, which includes the Buffalo-Skedaddle PMU, and amends the 2008 Eagle Lake RMP and Alturas and Surprise (now Applegate and Surprise Field Station) RMPs. The ARMPA identifies and incorporates measures to conserve, enhance, and restore GRSG habitat by avoiding, minimizing, and compensating for unavoidable impacts of threats (BLM 2015a).

In 2016, the Trump Administration came into office and began a process to review and revise the 2015 RMPs. The review was completed in 2017, and on October 11, 2017, following the direction in Secretarial Order 3353, the BLM issued a Notice of Intent to amend the Resource Management Plans for all field offices within GRSG range (as amended in 2015) to bring these plans in alignment with the individual state agencies' GRSG management plans and conservation strategies. On May 4, 2018, the BLM Nevada and California released a Draft Resource Management Plan Amendment and Environmental Impact Statement (Draft RMPA/EIS) which considered the potential impacts of the No-Action Alternative and the Management Alignment Alternative (Preferred Alternative). The Draft

RMPA/EIS was sent out for a 90-day public comment period, which resulted in 595 substantive comments. On December 10, 2018, the BLM Nevada and California released the Proposed Resource Management Amendment and Final Environmental Impact Statement (Proposed RMPA/FEIS) for a 30-day protest period and a 60-day Governor's Consistency Review. A total of 14 protest letters were received. After much consideration and adjustment, the BLM approved the Proposed RMPA as the Approved RMPA that will guide management of GRSG habitat on BLM-managed lands in Nevada and northeastern California, consistent with the State of Nevada's Greater Sage-grouse Conservation Plan and conservation strategies implemented by the California Department of Fish and Wildlife. The Record of Decision (ROD) and Approved RMPA were signed by the Nevada and California BLM State Directors on March 15, 2019, and are available electronically on BLM's ePlanning website: https://goo.gl/uz89cT (BLM, 2019a).

In April of 2019, Western Watersheds Project, WildEarth Guardians, Center for Biological Diversity, and Prairie Hills Audubon Society (Plaintiffs) filed a motion in Idaho with the Ninth Circuit Court for a preliminary injunction to prohibit the BLM from implementing the 2019 BLM Sage-grouse Plan Amendments. The Plaintiffs challenged the 15 EISs issued in 2015 that govern land covering ten western states, arguing that the BLM artificially minimized the harms to GRSG by segmenting their analysis into 15 sub-regions without conducting any range-wide evaluation (*W. Watersheds Project v. Schneider).* Western Watersheds Project alleged that as a result of the review of the 2015 RMPs, then-Interior Secretary Ryan Zinke directed agencies to relax restrictions on oil and gas development in GRSG habitat. The BLM responded by issuing the 2019 RMP Amendments.

In May 2019, the Plaintiffs challenged the BLM's 2019 RMP Amendments, alleging that the agency made common errors across numerous RMPs. The Court reviewed the facts set forth in the record, including GRSG decline; the National Greater Sage-grouse Planning Strategy; items within the 2015 RMPs; the 2015 Fish and Wildlife Service finding that changed the GRSG ESA listing from "warranted but precluded" to "not warranted"; items contained in the 2019 RMP Amendments; and the Declarations of GRSG experts Dr. Clait Braun, Dr. Amy Haak, and Dr. John Connelly (*W. Watersheds Project v. Schneider*).

The Ninth Circuit Court concluded that the plaintiffs satisfied all the elements for injunctive relief and granted their motion for a preliminary injunction. Therefore, the BLM is prohibited from implementing the 2019 BLM Sage-grouse Plan Amendments for Idaho, Wyoming, Colorado, Utah, Nevada/Northeastern California, and Oregon, until such time as the Court can adjudicate the claims on the merits. The 2015 RMPs remain in effect during this time (*W. Watersheds Project v. Schneider*).

BLM Sage-grouse Habitat Management Areas

The 2015 ARMPA (BLM 2015a) identifies distinct habitat management areas for GRSG (Figure 2). These areas were derived from the intersection of space use index categories and habitat suitability categories for GRSG (Coates et al. 2014). Four habitat categories, priority (PHMA), general (GHMA), other (OHMA), and non-habitat, are defined as follows in the 2015 ARMPA (BLM 2015a):

- PHMA—BLM-administered lands identified as having the highest value to maintaining sustainable GRSG populations. Areas of PHMA largely coincide with areas identified as priority areas for conservation in the USFWS's Conservation Objectives Team (COT) report. These areas

include breeding, late brood-rearing, and winter concentration areas and migration or connectivity corridors.

- GHMA—BLM-administered lands where some special management will apply to sustain GRSG populations; these are areas of occupied seasonal or year-round habitat outside of PHMA.
- OHMA—BLM-administered lands identified as unmapped habitat in the Draft Land Use Plan Amendment (LUPA)/EIS that are within the planning area and contain seasonal or connectivity habitat areas.

According to the 2015 ARMPA (BLM 2015a),

"PHMA are areas that meet some stage of the Greater Sage-grouse life-cycle requirements, based on best available science. These broad habitat maps are necessary at the resource management plan-scale of planning in order to include a variety of important seasonal habitats and movement corridors that are spread across geographically diverse and naturally fragmented landscapes. Greater Sage-grouse use multiple areas to meet seasonal habitat needs throughout the year and the resulting mosaic of habitats (e.g., winter, breeding, nesting, early brood-rearing, late brood-rearing, transitional, and movement corridor habitats) can encompass large areas. Broad habitat maps increase the likelihood that all seasonal habitats (including transition and movement corridors) are included. While areas of nonhabitat, in and of themselves, may not provide direct habitat value for Greater Sage-grouse (e.g., canyons, water bodies, and human disturbances), these areas may be crossed by birds when moving between seasonal habitats. Therefore, these habitat management areas are not strictly about managing habitat but are about providing those large landscapes that are necessary to meet the life-stage requirements for Greater Sage-grouse. These areas will include areas that do not meet the habitat requirements described in the Seasonal Habitat Objectives table in the 2015 Final EIS. These areas meet Greater Sage-grouse habitat needs by maintaining large, contiguous expanses of relatively intact sagebrush vegetation community."

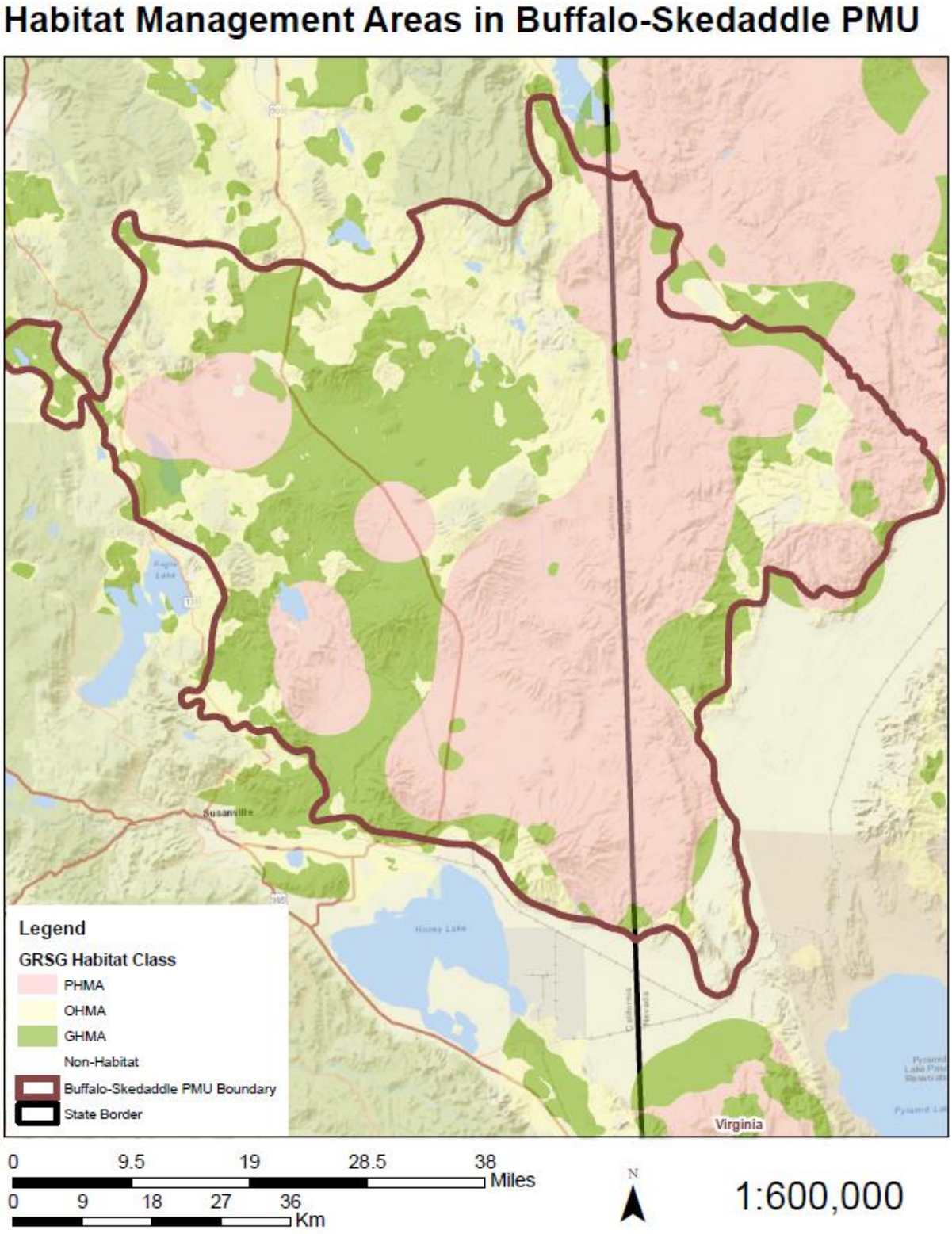

Figure 2. Habitat Management Areas within the Buffalo-Skedaddle PMU.

Land Health Assessment and Evaluation Methodology

The Bureau of Land Management is mandated under the Taylor Grazing Act of 1934, as amended and supplemented; the Federal Land Policy and Management Act of 1976; and the Public Rangelands Improvement Act of 1978, to inventory public lands and their resources periodically and systematically. Land Health Assessments (LHA) and various evaluations are tools used by land managers to determine the ability of the land to support a given use. These tools are used to assess conditions of GRSG habitat. Proper assessments help guide management and restoration actions. Each method is summarized in Table 1. For more details, see Appendix A.

Table 1. Summary of assessment tools used to measure conditions of GRSG habitat.

Assessment Tool	Summary
Assessment, Inventory, and Monitoring (AIM) **- Terrestrial** **- Aquatic (streams)** **- Lentic (springs)**	Assessment, Inventory and Monitoring (AIM) provides a framework to inventory and quantitatively assess the condition and trend of natural resources. The provided data characterizes terrestrial or aquatic conditions at a single point in time from which trends can be assessed among multiple field visits. The terrestrial data includes measures of vegetation and soil condition such as plant species cover and composition, plant height, and soil stability. The aquatic data consists of chemical, physical, and biological indicators of stream or river condition and includes measures such as pH, macroinvertebrate biological condition, percent streambed fine sediments, and bank stability and cover. Lentic protocols are currently in development. All of the provided data is gathered following standardized methods.
Landscape Monitoring Framework (LMF)	Landscape Monitoring Framework (LMF) data are similar to and are a precursor to AIM data. The data were collected to characterize terrestrial conditions at a single point in time, similar to AIM. Terrestrial data provides measures of vegetation and soil condition such as plant species cover and composition, annual production by species, and soil stability. LMF data can be cross-walked with AIM data.
Habitat Assessment Framework (HAF)	Habitat Assessment Framework (HAF) is a comprehensive framework for assessing GRSG habitat in the sagebrush ecosystem. Four pillars form the foundation for the success of this approach: science, effective conservation policy, implementation, and adaptive management. Advances in landscape ecology enable conservation planners to develop spatially explicit decision support tools that link populations with habitats for effective conservation planning, implementation, and evaluation at landscape scales. A shift from local to landscape conservation will empower decision-makers to maximize likelihood of achieving conservation by implementing site-scale actions within priority landscapes. Standardized methodologies provide consistency in terminology and techniques for site-scale assessments.
Proper Functioning Condition (PFC)	Proper functioning condition (PFC) is a qualitative method for assessing the condition of riparian wetland areas. The term PFC is used to describe both the assessment process and a defined, on-the-ground condition of a riparian-wetland area. The PFC assessment refers to a consistent approach for considering hydrology, vegetation, and erosion/deposition (soils) attributes and processes to assess the condition of riparian wetland areas. The on-the-ground condition termed PFC refers to how well the physical processes are functioning.

Primary Threats to GRSG in the Buffalo-Skedaddle PMU

The 2015 ARMPA (BLM 2015) identifies and incorporates measures to conserve, enhance, and restore GRSG habitat by avoiding, minimizing, and compensating for unavoidable impacts of threats. The ARMPA refers to the USFWS's COT report (USFWS 2013) which identified threats to GRSG habitat in the Nevada and Northeastern California Sub-region, and the focus in this section will be on threats identified for the Western Great Basin Population (Oregon, California, and Nevada). Urbanization and "isolated small size" were not identified as threats, and only one threat, recreation, was characterized as unknown. The following threats were characterized as "present but localized": sagebrush elimination, agriculture conversion, energy, mining, and infrastructure. The threats identified as "present and widespread" were fire, conifers, weeds/annual grasses, grazing, and free-roaming equids. In addition, the Buffalo-Skedaddle Sage-grouse Working Group has identified riparian degradation and human-subsidized predation as major threats to GRSG in this PMU. Below is more information on each of the "present and widespread" threats, and additional threats identified by the working group.

Fire

Large wildfires within the Buffalo-Skedaddle PMU have resulted in significant habitat change across the landscape (Figures 3 and 4). Minimizing habitat losses resulting from natural disturbances such as wildfires is a specific goal of this conservation strategy.

In recent history, wildfires in the western U.S. have become larger and occur in shorter intervals than in the past (Dennison et al. 2014; Tables 2 and 3). In August of 2012, the Rush Fire occurred on lands managed by the BLM Eagle Lake Field Office (ELFO) and spread north, onto the Applegate Field Office (AGFO). This fire originated from a lightning strike and grew to 315,577 acres affecting Lassen County, California, and Washoe County, Nevada. In 2015, the Dodge Fire ignited along the northern ELFO boundary and spread onto the AGFO burning 10,500 acres. In 2017, two more substantial fires ignited within the Rush Fire footprint. The Mud Fire occurred along Smoke Creek Road burning 6,039 acres and the Parsnip fire ignited in the north, near Painter Flat and burned 18,618 acres of BLM land. In 2020, the Cold Springs Fire burned nearly 78,969 acres of the northern extent of the Buffalo-Skedaddle PMU.

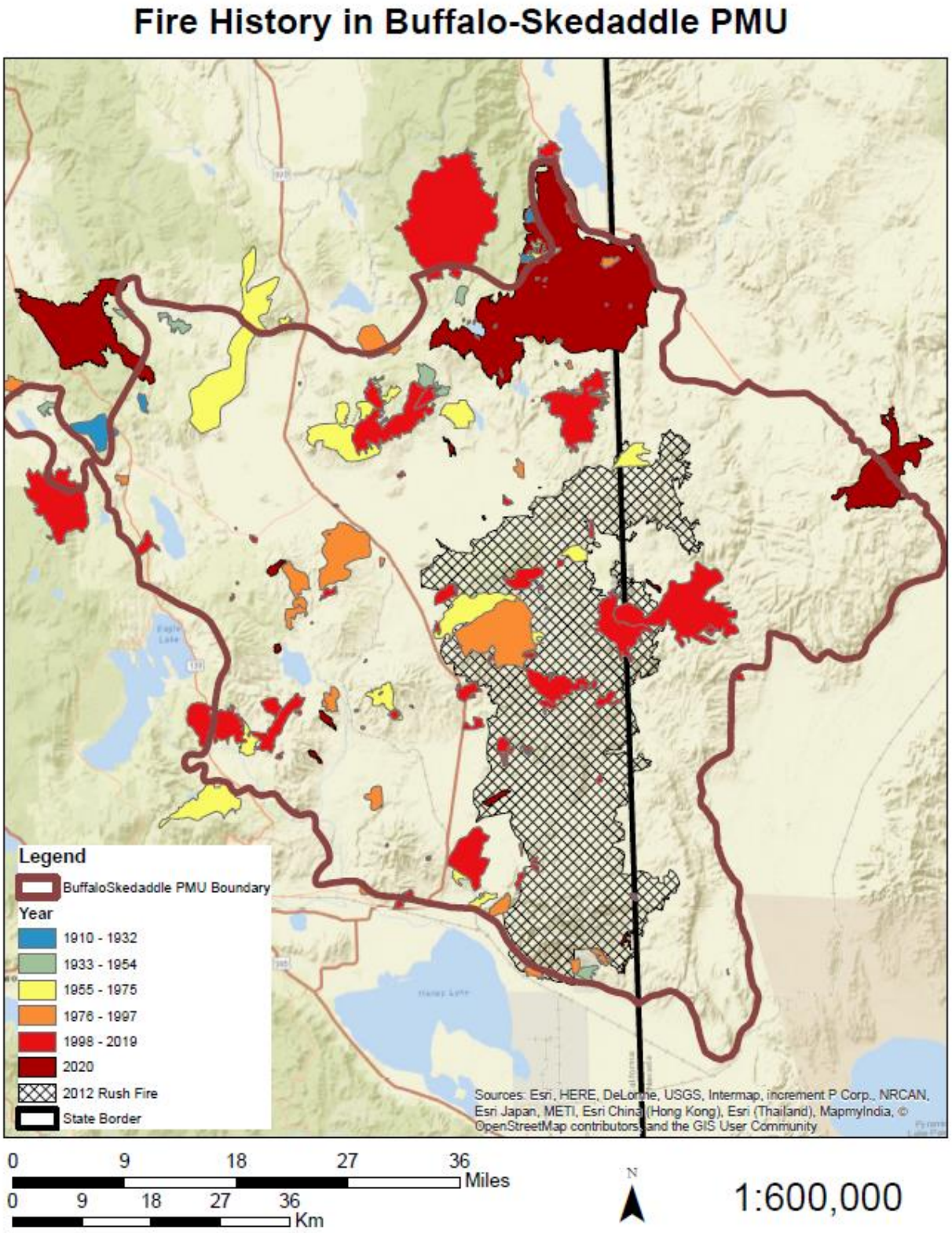

Figure 3. Fire history in the Buffalo-Skedaddle PMU.

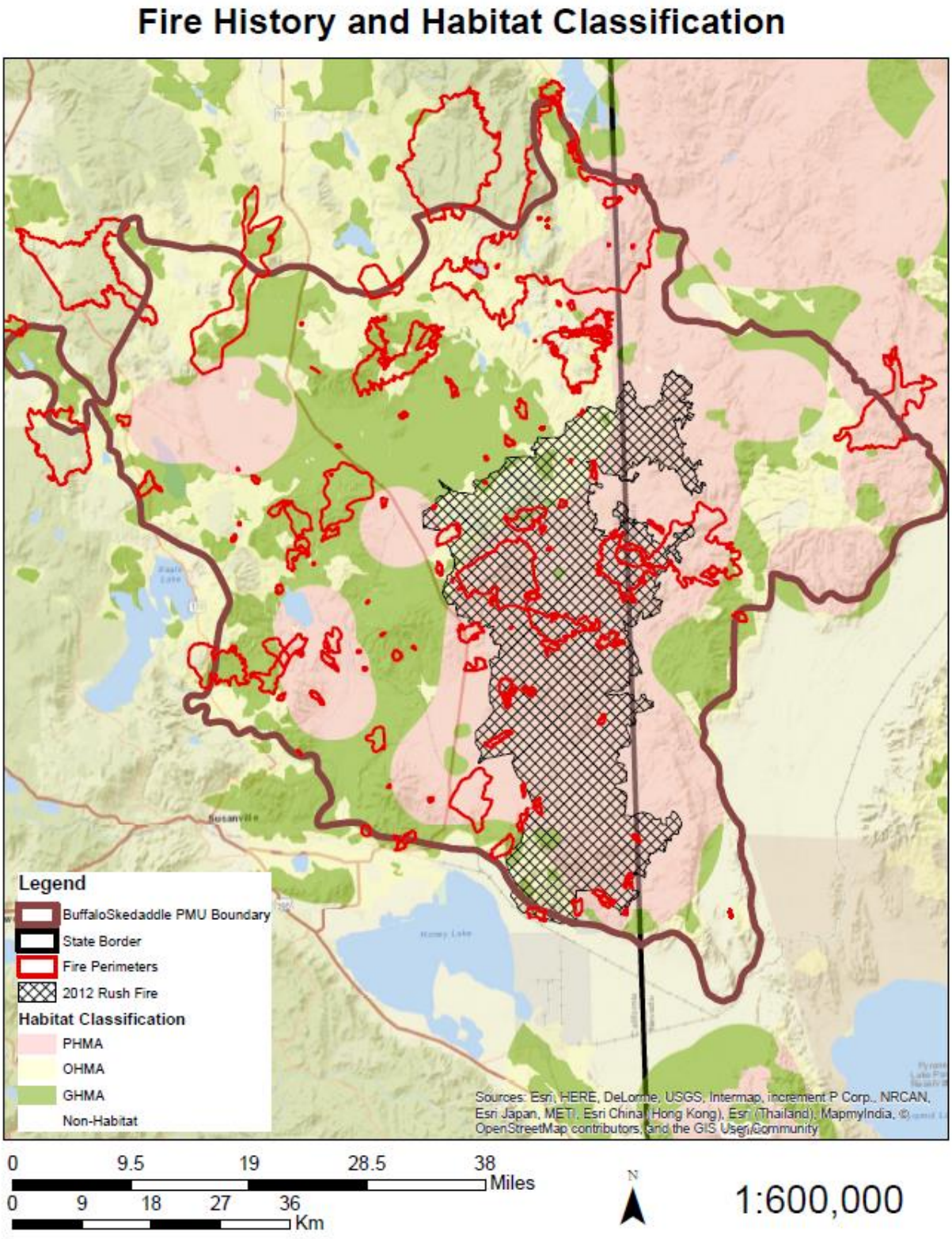

Figure 4. Fires that occurred from 1970 to 2020 within the Buffalo-Skedaddle PMU.

Table 2. Number of acres burned within the Buffalo-Skedaddle PMU from 1960 to 2020 for fires affecting greater than 1000 acres in the PMU. Fires are organized by size.

Fire Name	Year	Acres
RUSH	2012	313,532.64
W-5 Cold Springs	2020	78,968.82
N/A	1990	23,107.86
R-4 PARSNIP	2017	18,618.47
LIGHTNING #20	1961	13,010.46
9 MILE	1973	12,458.25
DODGE	2015	10,524.98
MCDONALD	2010	9,410.10
Poodle	2020	8,120.71
SMOKE	2003	7,790.23
MUD	2017	6,039.35
RUSH	2002	4,849.61
OBSERVATION COMPLEX	2006	4,128.50
WILLOW	1999	3,621.77
R1 RANCH	2019	3,380.21
PUTR PLANTING	1969	2,583.35
N/A	1988	2,178.59
N/A	1987	2,014.48
CORRAL FIRE	2008	1,795.85
N/A	1985	1,641.45
LIGHTNING #37	1964	1,607.18
BLACK	2002	1,512.34
N/A	1979	1,453.09
MENDIBOUREAU	2009	1,427.03
BLUE	2001	1,203.51
SECRET	2003	1,195.76
HARRISON SPRINGS	1964	1,177.32
Gold	2020	1,160.93
SPANISH	2012	1,151.44
N/A	1986	1,124.50
W-1 MCDONALD	2019	1,020.81
Total Acres		**541,809.58**

Table 3. Number of acres burned in the Buffalo-Skedaddle PMU from 1945 to 2020 for fires affecting greater than 100 acres of the PMU.

Fire Name	Year	Acres
BARE CR.	1945	162
COLD SPRINGS	1949	2417
ORDNANCE BLM #4	1953	964
N/A	1954	2202
S.P.R.R.	1958	761
S.P.R.R. #2	1958	830
SNOWSTORM	1958	2283
MADELINE LTNG #13	1959	169
THREE PEAKS	1959	12255
LIGHTNING #20	1961	13010
HARRISON SPRINGS	1964	1177
LIGHTNING #37	1964	1607
DORSEY BUTTE	1966	476
PUTR PLANTING	1969	2583
9 MILE	1973	12458
GERIGCOUGAR	1977	107
LIGHTNING #127	1977	377
N/A	1979	1453
N/A	1985	1641
DRY CREEK	1986	819
N/A	1986	1124
BLM #D-430	1987	619
N/A	1987	2014
N/A	1988	2179
N/A	1990	23108
N/A	1994	199
DEMO	1995	447
N/A	1995	603
RAVE	1996	140
N/A	1996	576
WILLOW	1999	3622
BLUE	2001	1204
GRASSHOPPER	2001	992
BLACK	2002	1512
RUSH	2002	4850
RAM	2003	183
SECRET	2003	1196
SHINN	2003	595
SKEDADDLE	2003	286
SMOKE	2003	7790
SKEDADDLE	2004	368
SNAKE	2004	455
STONEY	2004	955
OBSERVATION COMPLEX	2006	4129
BULL	2007	169
CORRAL FIRE	2008	1796
MENDIBOUREAU	2009	1427
MCDONALD	2010	9410
HOG	2011	268
MARR	2012	227
RUSH	2012	313533
SPANISH	2012	1151
DODGE	2015	10525
SHINN	2015	111
LONE	2017	215
MUD	2017	6039
PEG	2017	149
R-3 MUD	2017	100
R-4 PARSNIP	2017	18618
R-4 RANCH	2017	120
R-5 SPANISH	2017	167
R-5 STONEY	2017	204
R-9 SHINN	2017	278
TUMBLEWEED	2018	316
HORSE	2019	178
R1 JUNIPER	2019	130
R1 RANCH	2019	3380
SNOWSTORM	2019	264
W-1 MCDONALD	2019	1021
Gold	2020	1161
Poodle	2020	8121
R-1 MAPES	2020	259
R2 - Trumbull	2020	577
R-3 LITTLE FREDOYNER	2020	187
R-3 SKEDDADLE	2020	198
R-5	2020	472
R-6 MIXIE FLAT	2020	216
R-8 PINECONE	2020	567
W-4 TERMO	2020	266
W-5 Cold Springs	2020	78969
Total Acres		**466695**

The majority of these fires burned in GRSG PHMA. When sagebrush burns it usually dies, no matter the intensity, and it is often replaced with invasive species that prevent the re-establishment of sagebrush (Knapp 1996). This is a detriment not only to GRSG, but to other sagebrush obligate species as well. Restoration projects were carried out in an attempt to replace GRSG habitat lost in the fires. In each of these fires, drill seeding areas were considered based on accessibility and landscape topography. Hand-planted seedlings sites were chosen mainly for proximity to known leks. Higher elevation and north-facing slopes were the main considerations for aerial seeded sites. Areas with lower cheatgrass components were also included as areas of importance. However, success of seeding and planting efforts are often poor (Knutson et al. 2014).

Conifers (Juniper Encroachment)

Western juniper, although a native species, is currently widely invasive throughout the Intermountain West (Miller and Tausch 2001). Prior to widespread livestock grazing that began in the 19th century and universal fire suppression, junipers usually grew in old growth stands or as juniper savannah. Some possible reasons for the expansion of juniper include a wet, mild climate that supported vigorous growth of western juniper, livestock grazing that reduced fine fuels and vegetative competition with juniper, rising carbon dioxide levels increasing woody species growth, and changes in fire return intervals (Miller et al. 2005). This expansion is concerning because of increased soil erosion, reduced stream flows, reduced forage production, altered wildlife habitat, and changes in plant communities (Miller et al. 2005).

Old-growth stands were, and still are, small, isolated, and subject to rare, stand-replacing fires. These trees grow on rocky, shallow soils with small amounts of fine fuels. Juniper savannah is characterized by younger trees growing at low densities (<30% crown closure). A juniper savannah has a robust shrub layer and an abundant understory of grasses and herbaceous plants. Soils are generally deeper, and fires more frequent and of mixed severity (BLM 2007).

In the Buffalo-Skedaddle PMU, juniper is affecting the northern and western edge of GRSG habitat, including the Horse Lake area, Grasshopper Valley, Hayden Hill, Tuledad Canyon, the Madeline Plains, Dodge Springs, Shinn Ranch, Spanish Springs, and Little Black Mountain. As of 2015 several smaller juniper cuts have already occurred in these areas, although much more work needs to be done. Juniper also occurs on the southern and eastern sides of the PMU, but it is not as widespread. The Rush Fire of 2012 burned through that area, killing some juniper.

A recent study in eastern Oregon showed that at greater than 4% canopy cover of juniper, GRSG leks were non-existent (Baruch-Mordo et al. 2013). Therefore, juniper expansion is a concern for the persistence of GRSG lek sites. While planning juniper cuts in order to benefit GRSG, managers should consider the ability of the landscape to recover from the disturbance, as well as proximity to adjacent sagebrush and GRSG habitat. Some factors to look at include existing vegetation, soil moisture, soil temperature, weed presence, elevation, aspect, post-cut management, terrain, accessibility, equipment disturbance, and post-cut debris treatment (Miller et al. 2005). Reference *Biology, Ecology, and Management of Western Juniper*, Technical Bulletin 152, by Rick Miller et al. for more information on Western Juniper.

Scientists who study juniper encroachment have defined three stages of encroachment: Phase I, Phase II and Phase III (Table 4). As juniper encroaches onto a site, the site crosses thresholds as the canopy

expands from one Phase to another. A threshold can be viewed as a transition from one "state" or plant community to another. In plant ecology, thresholds generally represent a transition that is difficult to reverse. Often the transition involves not only a change in plant species, but also a change in processes such as erosion, infiltration, water balance, fire, etc. (Miller et al 2005).

Table 4. Phases of juniper succession (adapted from Miller et al 2005).

Rate of encroachment	% Canopy Cover	Leader Growth (cm/year)	Understory	Berry Production	Young Tree Recruitment
Phase I	< 10%	terminal >10 lateral >10	Fully Intact	Low to none	Active
Phase II	10-30%	terminal >10 lateral >10	Thinning	Moderate to high	Active
Phase III	≥ 30%	terminal >10 lateral <5	Sparse to Absent	High	Limited

Weeds/Annual Grasses

The majority of the Buffalo-Skedaddle PMU has been significantly affected by annual invasive plant species. According to the 2013 COT report (USFWS 2013), "The increase in mean fire frequency has been facilitated by the incursion of nonnative annual grasses, primarily cheatgrass (*Bromus tectorum*) and medusahead (*Taeniatherum caput-medusae*), into sagebrush ecosystems (Billings 1994; Miller and Eddleman 2001). Exotic annual grasses and other invasive plants also alter habitat suitability for sage-grouse by reducing or eliminating native forbs and grasses essential for food and cover (75 FR 13910, and references therein). Annual grasses and noxious perennials continue to expand their range, facilitated by ground disturbances, including wildfire (Miller and Eddleman 2001), improper grazing (Young et al. 1972, 1976), agriculture (Benvenuti 2007), and infrastructure associated with energy development (Bergquist et al. 2007). Management of this threat is two-pronged: (1) control, or stopping the spread of invasive annual grasses, and (2) reduction or elimination of established invasive annual grasses."

Grazing

Livestock grazing is the major land use in the Buffalo-Skedaddle PMU and can be managed at the local level. Improper livestock management can have negative impacts on GRSG habitat. In an effort to avoid improper management of livestock and native grazers the COT report (USFWS 2013) advises land managers to "...Conduct grazing management for all ungulates in a manner consistent with local ecological conditions that maintains or restores healthy sagebrush shrub and native perennial grass and forb communities and conserves the essential habitat components for sage-grouse (e.g., shrub cover, nesting cover)."

The current livestock grazing regime managed by the Eagle Lake Field Office has been renewing livestock grazing permits to allow for more adaptive management based on changing environmental and ecological conditions. One example is to modify the season of use to allow for either early or late season

grazing. This does not extend the period of use; it only gives BLM and the permittee an option to graze an area early in the season or late in the season. Targeted grazing is another tool used to control annual invasive grass species and has been applied in specific areas.

Free-Roaming Equids

According to the 2013 COT report (USFWS 2013), "Free-roaming equid grazing is presented separately from ungulate grazing due to the differing impacts equids have on sagebrush ecosystems. On a per capita body mass, horses consume more forage than cattle or sheep and remove more of the plant which limits and/or delays vegetative recovery (Menard et al. 2002), and horses can range further between water sources than cattle, thereby making them more difficult to manage. Equid grazing results in a reduction of shrub cover and more fragmented shrub canopies, which can negatively affect sage-grouse habitat (Beever and Aldridge 2011). Additionally, sites grazed by free-roaming equids have a greater abundance of annual invasive grasses, reduced native plant diversity and reduced grass density (Beever and Aldridge 2011)."

Free-roaming equids occur in large numbers primarily on the eastern side of the Buffalo-Skedaddle PMU within the Twin Peaks Herd Management Area (HMA; Figure 5). According to the Twin Peaks Herd Management Area Wild Horse and Burro Gather Plan Environmental Assessment (BLM 2019b), "The appropriate management level (AML) range within the Twin Peaks HMA is 448 to 758 wild horses and 72 to 116 burros. The AML upper limit is the maximum number of wild horses and burros that can graze while maintaining a thriving natural ecological balance and multiple use relationship on the BLM-administered public lands in the area…. In 2010, 1,637 wild horses and 162 burros were gathered, 1,579 wild horses and 160 burros removed, and 58 wild horses and one burro were released back to the Twin Peaks HMA…. Post-gather in 2010, an estimated 793 wild horses and 160 burros remained on the HMA based on an aerial survey…. The most recent direct animal count within and outside the Twin Peaks HMA in June 2019 found 2,338 wild horses 520 burros, and 39 mules." This means that as of June 2019, the Twin Peaks HMA was over maximum AML by more than three times for wild horses and by more than five times for burros.

The BLM ELFO has a wild horse and burro gather planned for Summer 2022 to work toward reducing herd sizes and getting back to the appropriate AML.

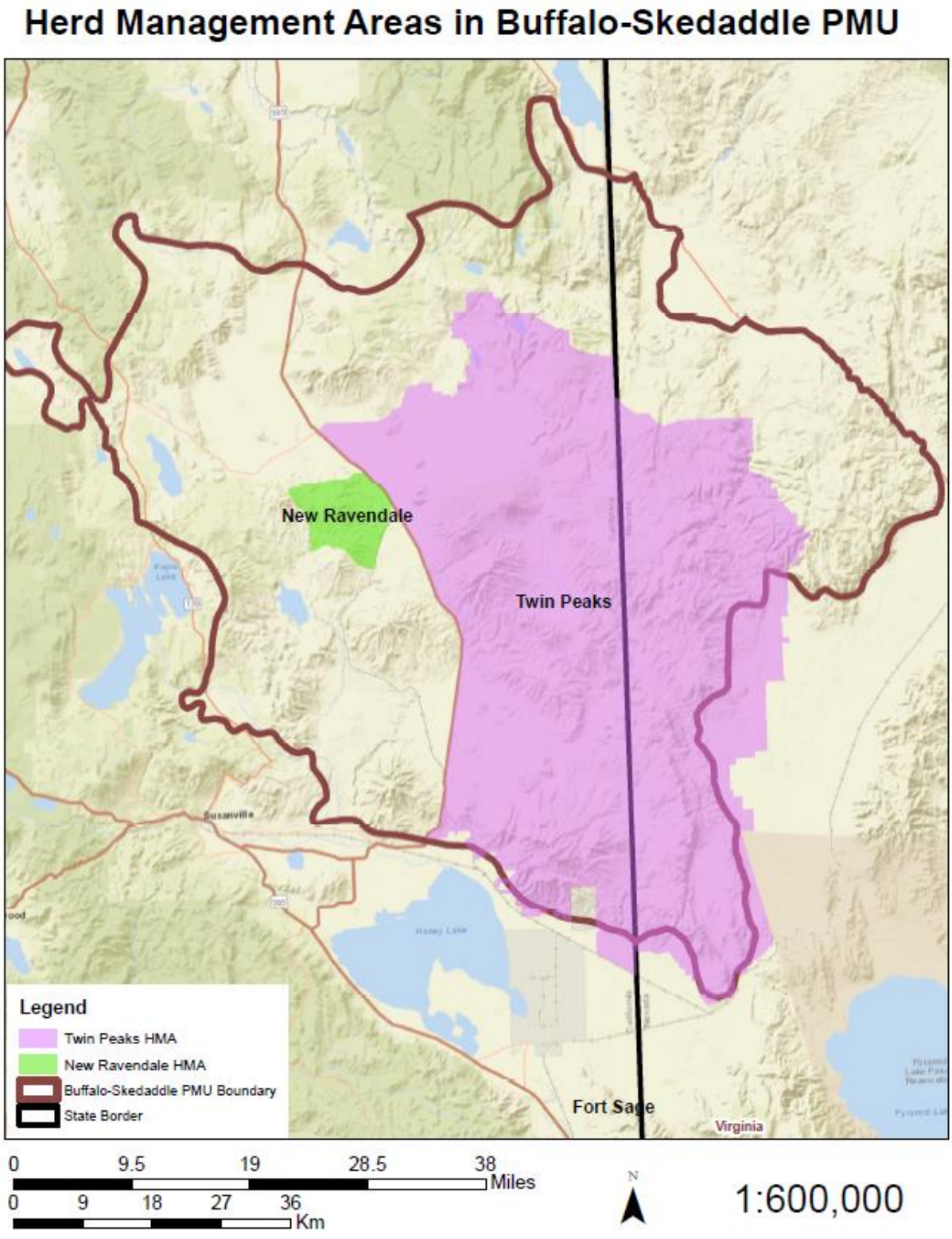

Figure 5. Herd Management Areas within the Buffalo-Skedaddle PMU.

Riparian, Meadow, and Spring Degradation

Riparian ecosystems in California and elsewhere have experienced significant decline. These habitats provide cover, shade, food, breeding areas, nesting areas, and more for GRSG and a multitude of other wildlife species. Healthy riparian areas improve water quality, reduce erosion, and attract beneficial insects for GRSG. Seasonal drying and senescence of herbaceous vegetation (July-August) cause female GRSG to move their broods from breeding areas to more productive summer habitats, wet meadows, and riparian systems (Connelly 2011). Leks are often located within several miles of wet sites, and breeding areas are usually less than two miles of wet habitats (NRCS 2014). Hens choose to mate and nest within a reasonable walk of where they can find late summer foraging for their broods.

Riparian enhancement projects have become a priority in northeastern California since the signing of the Water Resources & Riparian Enhancement EA in 2016. This document covers ELFO and AGFO and is programmatic, meaning that it allows management to design improvement projects as sites require and as funding becomes available. Most spring designs focus on development or redevelopment of spring sources which includes fencing water sources to exclude large hoofed grazers. However, some designs include erosion control and meadow improvement. Conservation and improvement of riparian habitat in the PMU continues to be a focal point for the working group.

Human-Subsidized Predation

Anthropogenic subsidies for predators of GRSG are a threat to populations throughout the Great Basin. Predators are natural part of the ecosystem, but increased populations of corvids (primarily ravens) that did not co-evolve with GRSG make populations more vulnerable to this aspect of mortality. Common raven abundance in the United States and Canada has tripled from early 1980s to 2010 (Sauer et al. 2008), facilitated by unintended anthropogenic resource subsidies that support raven reproduction and survival (Boarman 2003), such as powerlines, structures, trash, roadkill, etc.

The Buffalo-Skedaddle PMU contains transmission lines, old windmills, and other structures that ravens often use to nest. One major powerline runs between two active leks within the PMU, and ravens frequent the area.

Significant and Ongoing GRSG related projects

The BLM ELFO and AGFO have implemented several projects that benefit rangelands and GRSG habitat. In the past ten years ELFO has treated approximately 18,500 acres of encroaching juniper and AGFO has treated approximately 17,000 acres. The ELFO has written a Phase I Juniper Programmatic EA which has expedited treating young encroaching juniper adjacent to GRSG lek areas.

Riparian restoration efforts to elevate stream beds, alleviate erosion, and stabilize adjacent meadow areas include projects on Stony Creek, Rocky Table, Sheep Spring meadow. The ELFO installed ten rock weirs and a head-cut rock run-down at Stony Creek in 2012 after the Rush Fire. The weirs were constructed to help catch sediment and slow erosion of the denuded meadow soils surrounding the incised creek. In 2018, Zeedyk structures (low profile, hand-built rock structures) were installed at Rocky Table to slow the force of flow and reduce erosion in the ephemeral waterway. This method was also applied at Sheep Spring in 2020. In addition, Sheep Spring was fenced in 2021 to reduce impact from

livestock grazing. The working group plans to implement similar projects to other perennial and ephemeral water sources and meadows in the future.

Under the Water Resources & Riparian Enhancement EA the ELFO has treated several springs with an estimated 25 acres protected. The AGFO has treated two springs and associated aspen stands which encompassed 215 acres. Several springs have been evaluated across both field offices and are expected to receive similar treatments in the future.

Under the Rush Creek Improvement Project, ten springs and one waterway were treated, covering approximately 280 acres. This project focused on redeveloping non-functioning springs and protecting water sources, including a flowing waterway, from large hoofed grazers.

In addition, all fences are in the process of being marked within 1.2 miles of active GRSG leks to avoid fence collision mortality as GRSG are flying into the leks early in the mornings. Markers will be replaced when needed or when fire affects the fence.

Identified Research Projects

The ELFO has some ongoing research projects that are discussed below. Some of these projects are collaborations between the BLM, other state or federal agencies and/or academic institutions. This is not a comprehensive list, but it includes some of the important research occurring in GRSG habitat.

Post-fire Livestock Grazing Management on Public Rangelands in Northeast CA

This research project is being conducted by UC Cooperative Extension and looks at how vegetation responds after fire under different grazing management strategies on northeastern California rangelands. The hypothesis is that perennial grass and shrub cover will increase over time in areas that are rested from grazing after fire, and cover of these functional groups will decrease over time in areas that are grazed by livestock in the year following the fire. This research offers insight into how quickly rangeland health will recover and become ready to support livestock grazing without risk of long-term natural resource damage following wildfire.

Eagle Lake Fuel Breaks

Two fuel break study sites have been implemented to test species ability to compete with annual invasive species and to stop or slow fire. The starting point for this effort is the establishment of research plots looking at pre-seeding weed control, seeding method and species/variety selection. Establishment and persistence of seeded species will be measured and linked with relative presence of annual grasses. In the future the group hopes to test fuel break implementation methods in other areas.

Agricultural Research Station Insect Study

The United States Department of Agriculture (USDA) Agricultural Research Station (ARS) in Reno, Nevada has a long-term project across the PMU that gathers and analyzes data on insect fauna associated with medusahead (*Taeniatherum caput-medusae*). The results may allow for biological control to contribute to the development of integrated management of this noxious weed through a better understanding of its biology and ecology.

Rodent Seed Caching Enclosures

This project is being conducted by the USDA, ARS and the University of Nevada, Reno (UNR). These entities have collaborated to study the effectiveness of rodents as dispersers of western juniper seeds. Typically, birds are thought to be the main dispersers of juniper seeds, but scatter-hoarding rodents have been shown to collect juniper seeds and cache them at depths favorable for germination. The rodents may gather seeds directly from juniper berries or off the ground from wind-dispersed and bird- or mammal-defecated seeds. If the seeds are cached and subsequently not recovered, they may contribute to juniper expansion.

The Field of Dreams Project

This is a collaborative project between the BLM ELFO; the BLM Carson City, Nevada; the U.S. Geological Survey (USGS); Institute for Applied Ecology (IAE); and Nevada State Prisons. The goal of this project is to increase sagebrush stands in burned areas that are devoid of shrubs. Sagebrush seed is locally collected and grown out as seedlings in local prisons under the direction of IAE. Planting sites were chosen based on proximity to leks and telemetry data. The theory behind this project is that if sagebrush stands are available, GRSG will use them for nesting and brood-rearing habitat when the stands grow to attain characteristics acceptable to GRSG for these life-cycle requirements.

Telemetry

There have been three efforts in the Buffalo-Skedaddle PMU to trap GRSG and track them using radio telemetry or satellite transmitters. Gail Popham studied GRSG between 1998 and 2000, where she located 45 nests of radio-marked hens (Popham 2000). Dawn Davis examined demographic parameters and factors influencing nest survival of female GRSG in northeastern California between 2007 and 2009 (Davis 2012). Additionally, she used known-fate models in program MARK to examine survival of broods to ten weeks of age and bi-weekly survival rates of female GRSG over an eight-month period.

Most recently USGS began tracking GRSG in the Buffalo-Skedaddle PMU in 2013. The purpose of the study was to monitor GRSG response to a large-scale wildfire by comparing GRSG populations inside and outside of the Rush Fire perimeter. The data continues to be used to learn more about GRSG locally and throughout the Great Basin. One of USGS's main objectives is to predict the annual population abundance and rate of change over time. Over the study area, it was found that overall the population was in decline from 2011-2019. Other objectives were to determine how fire, specifically the 2012 Rush Fire, impacted survivability and nest success, and nesting preferences. Data was analyzed from before and after the fire, both inside and outside of the fire perimeter. Results showed that leks in the burned areas had a higher annual rate of population change (λ) than leks in the unburned areas before the Rush Fire; however, leks in the burned areas had a lower λ than leks in the unburned areas, after the Rush Fire. Results also showed that nests in the burned areas had a higher survival probability than nests in the unburned areas before the Rush Fire; however, nests in the burned areas had a lower nest survival probability than nests in the unburned areas after the Rush Fire. For nesting preferences, it was found that outside the wildfire perimeter, dwarf sagebrush canopy cover, perennial grass height, and nest substrate width had a positive relationship with selection at nest sites when compared to microhabitat availability outside the wildfire perimeter. At nest sites inside the wildfire perimeter, results showed a positive relationship of perennial grass height and vertical cover with selection at nest sites when compared to microhabitat availability inside the wildfire perimeter. Nest substrate height and horizontal

cover had positive influences on nest survival in unburned areas; however, for nests in burned areas, results did not show any nest habitat covariates that influenced nest survival probability.

USGS also developed a conservation planning tool (CPT) informed by pre-fire resource selection models and GRSG nest habitat suitability. The CPT was developed to identify areas of the greatest nesting habitat loss to better inform targeted restoration and conservation actions focused on GRSG nesting within the area burned by the Rush Fire.

Winter Habitat Assessment

The USGS began a project in 2020 to develop quantitative tools for BLM to better assess winter habitat conditions for GRSG in northeastern California, particularly in areas impacted by large wildfires (e.g., the Rush Fire). Developed tools will help inform the BLM's Habitat Assessment Framework.

Short and Long-term goals and objectives

1. Remove western juniper near leks and brood-rearing areas on both public and private land
    a. Treat 900 acres per year of Phase I western juniper using fire crews, Cal-Fire crews, private lands with NRCS and private contractors
    b. Treat specifically around Shinn area leks, Sage Hen Spring, nesting polygons shown from pre-fire telemetry work, one-mile radius around Little Black's, Pete's Valley, Horse Lake, and Spanish Springs, Horse Lake Springs, and riparian areas
2. Restore burned areas. Percent area restored will vary based on site accessibility, funding available, timing of funding, site conditions and weather
    a. Plant appropriate ecological site species in burned areas within five years, with the goal of one year or before an annual grass monoculture is established preventing future restoration efforts
3. Prevent risk of large fires in the future
    a. Implement fuel and/or fire breaks
    b. Reduce western juniper cover in areas that could fuel a fire spreading into GRSG habitat
    c. Prioritize road maintenance near GRSG habitat to facilitate fire suppression access
4. Restore degraded streams, springs, and meadows within GRSG brood-rearing habitat
    a. Identify and prioritize list of potential sites
    b. Implement some demonstration sites to increase local knowledge about mesic site restoration
    c. Treat three to five mesic sites annually
5. Improve grazing management for sagebrush ecosystem resilience
    a. Repair and improve livestock water developments to enhance grazing management capabilities
    b. Use monitoring on allotments to help guide grazing management. Increase monitoring when funding and opportunity arise
    c. When grazing permits are renewed, broaden the season of use to accommodate annual variability in seasonal conditions

    d. Add flexibility of livestock grazing permits to allow for fuel reduction, targeted grazing, restoring mesic areas and dormant season use
6. Treat approximately 400 acres of weeds per year including Scotch thistle (*Onopordum acanthium*), Russian Knapweed (*Rhaponticum repens*), Canada thistle (*Cirsium arvense*), Mediterranean sage (*Salvia aethiopis*), perennial pepperweed (*Lepidium latifolium*), and annual grasses that threaten GRSG habitat
7. Where possible, remove or reduce anthropogenic subsidies such as trash, roadkill and tall structures that attract predators of GRSG
    a. Assess risk of raven predation through field data and observations
    b. Identify anthropogenic subsidies
8. Continue researching new techniques and locally adapted solutions, and report on results
    a. Fuel breaks/seeding/herbicide trials
    b. Sagebrush seedling plantings

Lek Summaries

Lek Population Planning Areas

Lek Population Planning Areas (LPPAs) are areas designated by the Buffalo-Skedaddle Working Group to help focus and prioritize projects that will have the most impact on GRSG populations. The Habitat Management Areas, Fire and Invasives Assessment Tool (FIAT) Project Planning Areas (PPAs; Appendix B), and lek buffers were used to help inform the creation of LPPAs. Local experts then discussed and removed areas that were included in those lek buffers that were no longer priorities for GRSG conservation projects. In addition, larger FIAT PPAs, such as the Shinn PPA, were broken up into smaller more manageable units (Table 5, Figure 6). The working group also decided which leks or groups of leks made sense to combine into LPPAs. This further helped focus projects and reduced duplicate planning for leks in similar geographic areas that had similar needs.

In addition, the working group considered known recent activity when developing the LPPAs (Table 6; Appendix D). Active leks were included in LPPAs while inactive, historic, and unknown leks were often left out. Lek statuses are defined below.

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

Some leks within the Buffalo-Skedaddle PMU were grouped into complexes, due to their close proximity. Lek locations can move slightly over the years, and certain leks are favored over others depending on the year. Leks within a complex are less than approximately one mile from each other and are often much closer (less than 1/4 mile). The graphed peak male attendance data in the next sections are derived from lek complex data (Table 7).

The working group analyzed the specific characteristics of the LPPAs and ranked the main threats to the GRSG population within each LPPA (Table 8). A list of priority conservation actions was developed for each LPPA to mitigate major threats in the area. These action items are compiled in a Google spreadsheet that can be viewed here. The list should be reviewed yearly to add or adjust projects as needed for the next year. See Appendix C for additional maps and tables depicting resources and threats within each LPPA.

Table 5. FIAT Project Planning Areas and their corresponding LPPAs. The large Shinn PPA was broken into four different LPPAs. There is no LPPA in the Cold Springs PPA due to inactivity in that area. Additionally, only a small portion of the Wall Canyon PPA is in the Buffalo-Skedaddle PMU, so there is no overlapping LPPA for that area.

Fire and Invasives Assessment Tool Project Planning Area	Overlapping Lek Population Planning Area
Madeline Plains	Grasshopper
North Horse Lake	Horse Lake
Madeline Plains Connectivity	Madeline Plains
Shaffer Mountain Connectivity	Shaffer Mountain
Shinn	Shinn
	Skedaddle/Dry Valley Rim
	Chalk Bluff
	West Buffalo Hills
Duck Flat	West Buffalo Hills
Cold Springs	N/A
Wall Canyon	N/A
N/A	East Buffalo Hills

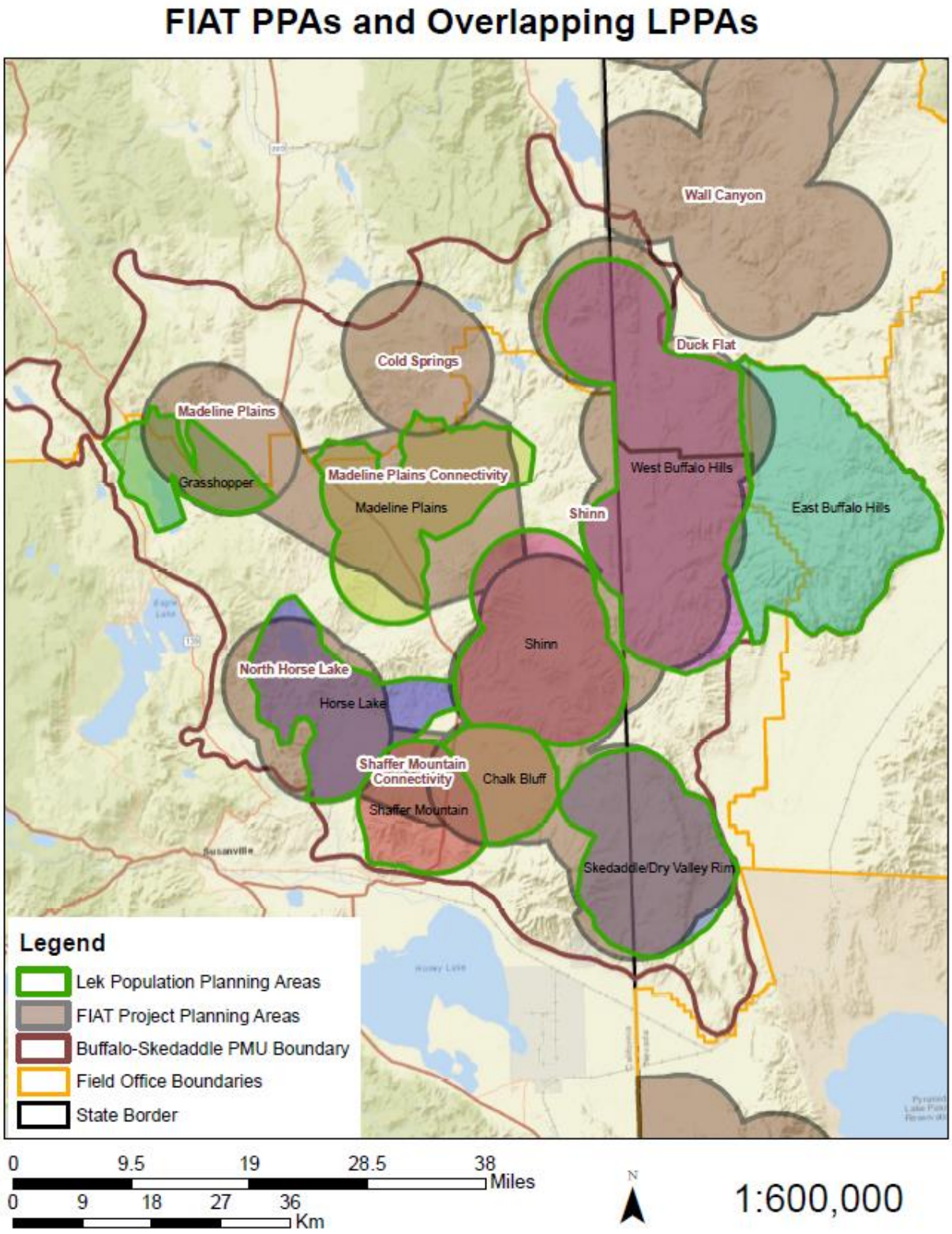

Figure 6. Map of FIAT PPAs and overlapping LPPAs.

Table 6. List of all known lek complexes (current and historic) and their statuses.

LPPA	Lek Complex	First year of data on record	First year of consistently collected data	Last year males recorded	Status	State
Chalk Bluff	Chalk	1955	1988	2021	Active	CA
	Chalk/LMF	1964	Not consistent	1994	Unknown	CA
Grasshopper	Grasshopper	1957	1989	2021	Active	CA
	Madeline	1954	1989	2014	Inactive	CA
Horse Lake	Horse Lake	1960	1994	2021	Active	CA
	LBM	1955	1987	2021	Active	CA
	Pete's Creek	1998	1998	2021	Active	CA
	Pete's Valley	1963	Not consistent	1966	Unknown	CA
Madeline Plains	Chicken Ranch	2016	2016	2021	Active	CA
	Spanish Springs	1994	1994	2019	Active	CA
	Coyote	1988	Not consistent	1994	Unknown	CA
Shaffer Mountain	Shaffer	1953	1964	2020	Active	CA
	Gilman/Shaffer	1953	2010	2020	Active	CA
	LMF	1954	Not consistent	1991	Unknown	CA
	Viewland	1953	Not consistent	1972	Unknown	CA
Shinn	Hall	1953	1988	2021	Active	CA
	Rush	1999	1999	2019	Active	CA
	Shinn	1953	1987	2021	Active	CA
Skedaddle/Dry Valley Rim	Gilman	1955	1987	2021	Active	CA
	Skedaddle	1955	1988	2021	Active	CA
	Telephone	1955	1989	2021	Pending Active	CA
	Parker Canyon/ Eastside	1992	2016	2019	Active	NV
	Skedaddle South	1955	1955	2019	Active	NV
	Gilman/Red Rock Canyon	1972	Not consistent	2019	Unknown	NV
	Rush Creek/Shinn Ranch	1979	Not consistent	2009	Unknown	NV
East Buffalo Hills	Granite Canyon	1972	2005	2019	Active	NV
	Sawmill	1972	2005	2016	Unknown	NV
	Stockade Flat	1953	Not consistent	1953	Unknown	NV
	Chicken Canyon	1975	2001	2020	Active	NV
	Jones Flat	1972	Not consistent	2019	Unknown	NV
West Buffalo Hills	Mixie Flat	1979	2004	2019	Active	NV
	Parsnip	1972	2005	2019	Active	NV
	Tuledad/Wire Lake North	2002	Not consistent	2016	Unknown	NV
	Garden Lake	1972	2001	2019	Active	NV
	Rye Patch Canyon	1977	Not consistent	2016	Unknown	NV
	Tuledad	1965	2002	2018	Unknown	CA
N/A	Demolition	1972	Not consistent	1972	Unknown	CA
N/A	Dodge	1981	Not consistent	2006	Unknown	CA
N/A	Hayden	1990	Not consistent	2004	Inactive	CA
N/A	Pea Creek	1991	Not consistent	2016	Inactive	CA
N/A	Spencer	1955	Not consistent	2000	Unknown	CA

Table 7. List of all leks within each active lek complex. Leks in bold are the main lek(s) in the complex. Data from all leks within a complex were used to create the peak male graphs for each LPPA.

FIAT PPA	LPPA	Lek/Lek Complex	Lek ID	Lek Name
Duck Flat	West Buffalo Hills	Tuledad	LAS0034	Tuledad Valley Rim
			LAS0037	Tuledad Road alt #3
			LAS0054	Tuledad Road alt #2
			LAS0126	Tuledad Valley
			LAS0160	**Tuledad Road**
Madeline Plains	Grasshopper	Grasshopper	LAS0044	Dry Valley
			LAS0105	**Grasshopper Valley**
			LAS0168	**Oring Grasshopper**
		Madeline	**LAS0002**	**Madeline Prairie**
			LAS0003	Madeline Plains-Westside/Ostrich Road
			LAS0015	Madeline Robin
			LAS0060	Madeline (West)
			LAS0062	Madeline (East)
North Horse Lake	Horse Lake	Horse Lake	**LAS0106**	**Horse Lake**
			LAS0116	Horse Lake (Nancy's)
			LAS0169	Oring Horse Lake
		LBM	**LAS0077**	**Little Black Mtn.**
			LAS0159	LBM 04
		Pete's Creek	**LAS0120**	**Pete's Creek**
Madeline Plains Connectivity	Madeline Plains	Chicken Ranch	**LAS0172**	**Chicken Ranch**
		Spanish Springs	LAS0079	Fleming Spring
			LAS0080	**Spanish Spring**
Shaffer Mountain Connectivity	Shaffer Mountain	Shaffer	**LAS0004**	**Shaffer Mtn.**
			LAS0091	Shaffer alternate #2
		Gilman/Shaffer	LAS0090	Gilman Spring (Shaffer)
			LAS0165	**Gilman/Shaffer**
N/A	East Buffalo Hills	Chicken Canyon	**BUSK-012**	**Chicken Canyon**
		N/A	**BUSK-013**	**Granite Canyon**
			BUSK-015	**Five Spring**
		Sawmill	**BUSK-017**	**Dobe**

Table 7. Continued.

FIAT PPA	LPPA	Lek/Lek Complex	Lek ID	Lek Name
Shinn	Shinn	Hall	**LAS0057**	**Hall Spring**
			LAS0135	Rush Creek W
			LAS0162	New Hall Spring
		Rush	**LAS0112**	**Rush Creek**
			LAS0161	New Rush
		Shinn	**LAS0001**	**Shinn Ranch**
			LAS0014	Sage Hen Spring (Shinn)
			LAS0045	Shinn North (Shinn Ranch #2)
			LAS0046	Shinn Ranch alt #1
		Shinn Dawn	LAS0158	N Sage Hen Springs
			LAS0164	**Shinn Dawn/Sage Hen springs**
	Chalk Bluff	Chalk	LAS0055	West of Bull Flat
			LAS0071	**Chalk Bluff**
			LAS0072	Chalk Bluff Alternate #7
			LAS0137	Chalk Bluff Alternate #2
			LAS0138	Chalk Bluff Alternate #3
			LAS0139	Chalk Bluff Alternate #4
			LAS0140	Chalk Bluff Alternate #5
			LAS0142	Chalk Bluff Alternate #8
	Skedaddle/Dry Valley Rim	Gilman	**LAS0011**	**Gilman**
			LAS0063	Wildhorse
			LAS0065	N. of Gilman
			LAS0127	Gilman Alt #3
		Skedaddle	LAS0051	Skedaddle alt #1
			LAS0067	Skedaddle alt #2
			WAS0002	**Skedaddle**
			WAS0004	WAS0004 sat #1
			BUSK-035	**Skedaddle**
		Skedaddle South	**BUSK-039**	**Skedaddle South**
		Parker Canyon/ Eastside	**BUSK-195**	**Parker Canyon South**
	West Buffalo Hills	Garden Lake	**BUSK-003**	**Garden Lake**
		N/A	**BUSK-001**	**Little Adobe Flat**
			BUSK-022	**Parsnip 1**
		Mixie Flat	**BUSK-021**	**Mixie Flat**

Table 8. Risks to GRSG populations in each LPPA. Threat levels were ranked by the Buffalo-Skedaddle Working Group with consideration of the 2013 USFWS Conservation Objectives Team Report (USFWS 2013).

Risks	Skedaddle/Dry Valley Rim	Shinn	Chalk Bluff	Horse Lake	Shaffer Mountain	Madeline Plains	Grasshopper	East Buffalo Hills	West Buffalo Hills
Invasive Annual Grasses	High	High	High	High	High	Moderate	Moderate	High	High
Fire	High	High	High	High	High	Moderate	Moderate	High	High
Conifers	Low	High	Low	High	Low	High	High	High	High
Free Roaming Equids	High	Moderate	High	Low	Low	Moderate	Low	High	High
Inappropriate Livestock Grazing	Moderate	Moderate	Low	Moderate	Low	Moderate	Low	Moderate	High
Riparian, Meadow and Spring Degradation	High	Moderate	High	Moderate	Moderate	Low	Moderate	High	High
Sagebrush Elimination	Low	Low	Moderate	Low	Moderate	Moderate	Low	Low	Low
Human-subsidized predation (powerlines, structures, etc.)	Low	Moderate	High	Low	High	High	Low	Low	Low
Agricultural Conversion	Low	Low	Low	Low	Low	High	Low	Low	Low
Energy/Mining Development	Moderate	Low	Low	Low	Low	Low	Low	Low	Low
Disease-West Nile Virus	Low	Low	Low	Low	Low	Low	Low	Low	Low
Urbanization	Low	Low	Low	Low	Low	Low	Low	Low	Low

Skedaddle/Dry Valley Rim LPPA

Population Summary: The eastern portion of the ELFO contains the majority of the leks within the Buffalo-Skedaddle PMU. Virtually all the leks showed a significant decline of males counted since the 315,000-acre Rush Fire which ignited in August 2012. Since then, the GRSG population has declined, shrub cover has declined, and annual grasses are prevalent in warmer and drier soils. Nesting is mostly localized near leks. A few birds nest in the vicinity of Little Mud Flat and in the hills east of Bull Flat. Brood-rearing also occurs locally as well as around Chalk Bluff, Little Mud Flat, and 5-Springs Mountain. The areas with remaining sagebrush may be wintering areas for the western part of the Buffalo-Skedaddle populations.

The active leks within this LPPA include the Skedaddle, Gilman, Parker Canyon South, and Skedaddle South (limited data) leks (Figure 7). The area also includes four pending active leks consisting of the Red Rock Canyon, Skedaddle North, Telephone Spring and Parker Canyon leks. The largest lek is the Skedaddle lek with an average of 71.4 males from 2000-2019. The Parker Canyon South lek has experienced an average of 27.5 males in attendance; however, that lek was more recently discovered with observations existing only from 2016 through 2019.

Telemetry data collected as a result of the Rush Fire research in California and the Virginia Mountains study area in Nevada have indicated that this sub-unit also serves as important winter habitat for GRSG in this PMU as well as the Virginia/Pahrah PMU that lies further south. Areas of concentration include the upper elevations between Parker Canyon and Thomas Canyon, the area around the Skedaddle lek and Sheep Camp Draw near the Nevada-California border.

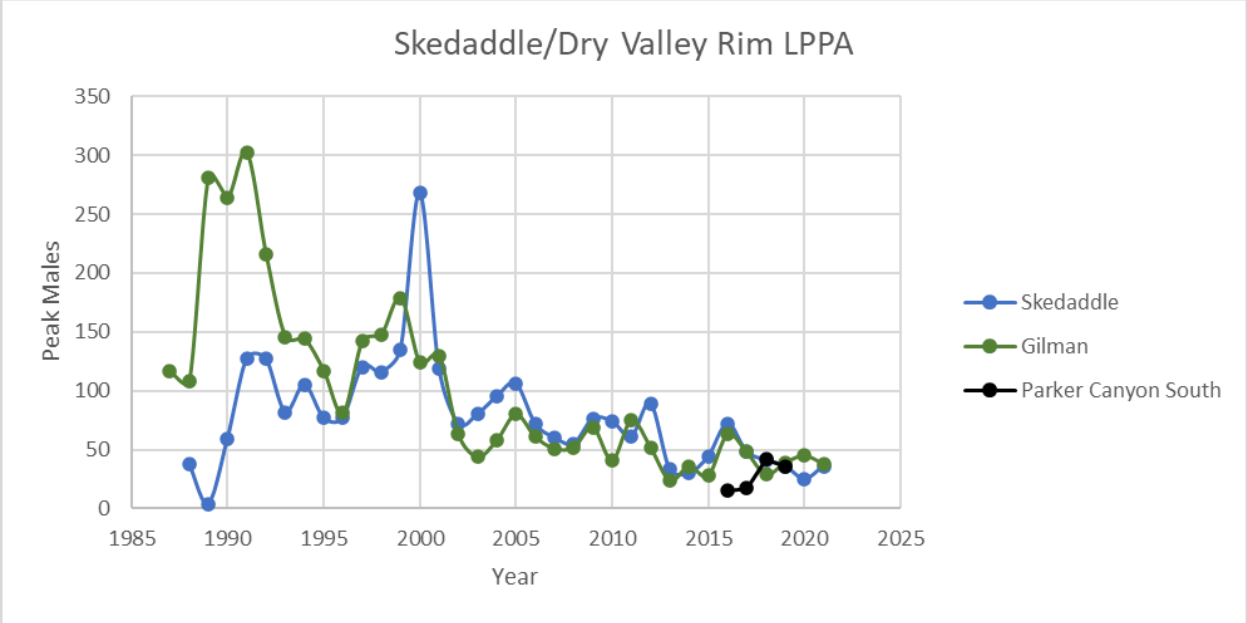

Figure 7. Peak male attendance at Gilman, Skedaddle, and Parker Canyon South lek complexes within the Skedaddle LPPA.

Habitat Summary (Figures 8 and 9)**:** There is a significant lack of sagebrush cover in this area and a higher proportion of cheatgrass and medusahead due to the Rush Fire and other fires. In the areas where sagebrush remains, the understory is dominated by cheatgrass. This area has low resistance and resilience to disturbance, except in the higher elevations in the Skedaddle Mountains. There are small springs in the hills that provide brood-rearing habitat for GRSG. A large wetland complex exists on Rush Creek and Smoke Creek on the privately-owned Smoke Creek Ranch. A smaller meadow is on the Skedaddle Ranch.

Habitat conditions along the east slope of the Dry Valley Rim and along the upper elevations of the rim (from Black Mountain to Eagle Head) are in relatively fair condition compared to other areas of the Nevada portion of this PMU. Native shrub communities are mostly intact and there is a larger component of native perennial bunchgrasses in the system. Further west, towards the California border, invasive annual grasses become more prominent. This is the case descending in elevation along the eastern boundary of the PMU near the Smoke Creek Road as well. No juniper encroachment is present within this portion of this sub-unit. Water sources are very limited with a few springs and seeps as well as developed water sources (small reservoirs).

Priority Conservation Actions:

- Identify and prioritize restoration and development of springs: Gilman Spring, Bull Flat Spring, Morgan Spring, Willow Spring, Wildhorse Spring, others…
- Fuel breaks/Green Strips along Skedaddle Ranch Road
- Increase sagebrush cover: aerial seeding on snow, sagebrush plug plantings
- Improve grazing management/horse use management through water availability
- Treat cheatgrass in key areas using results from trials

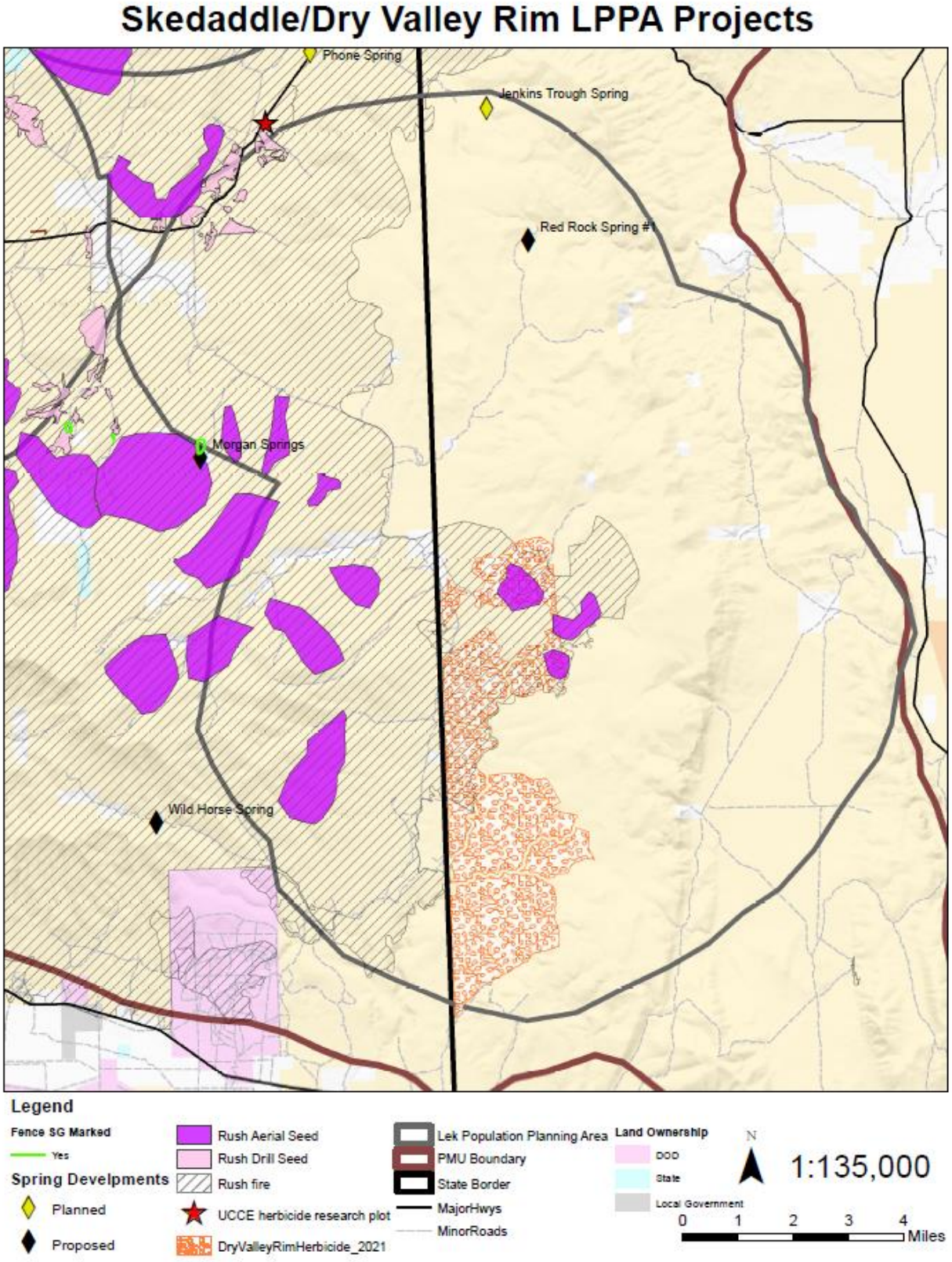

Figure 8. Projects within the Skedaddle/Dry Valley Rim LPPA.

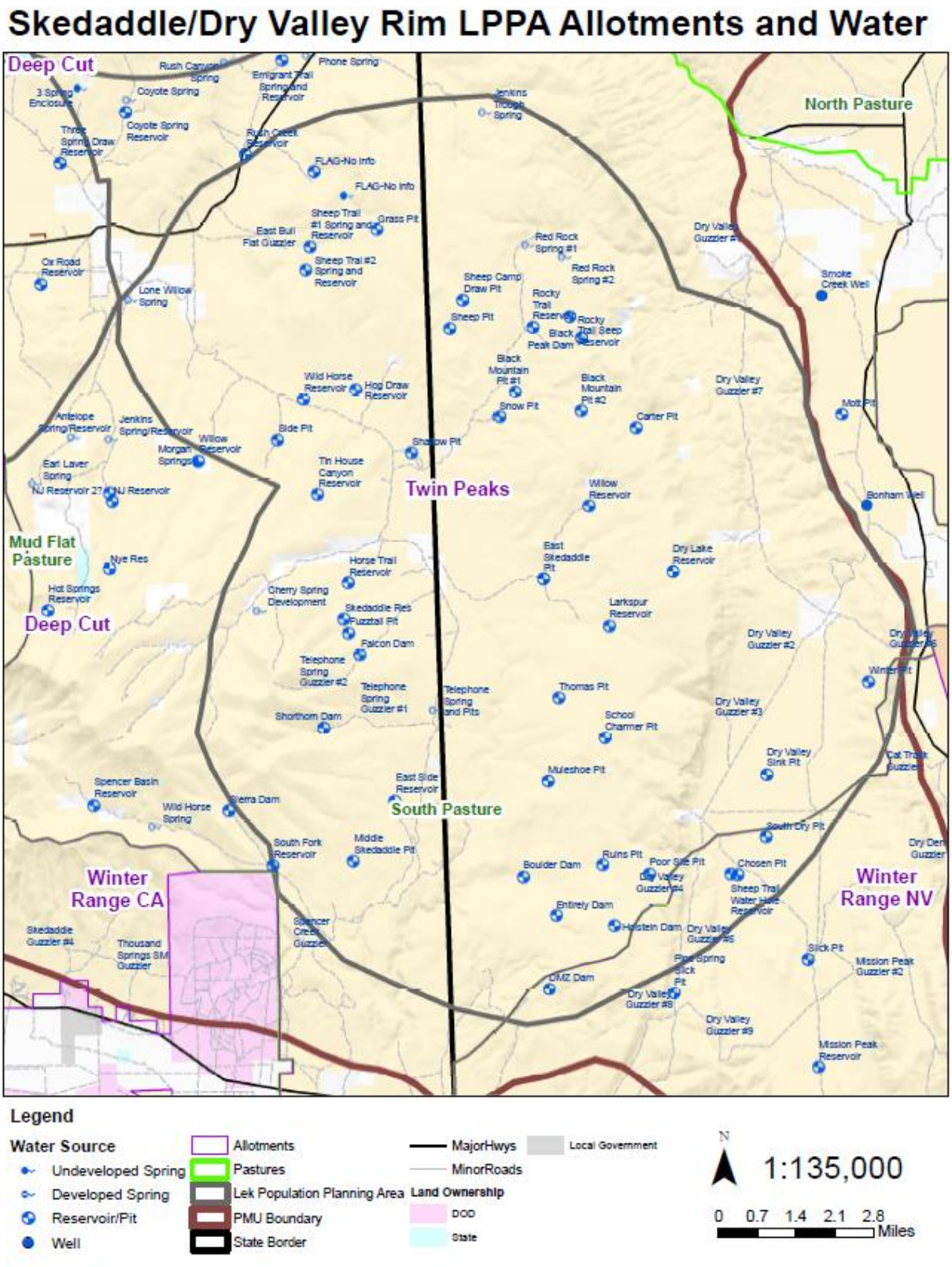

Figure 9. Allotments and water within the Skedaddle/Dry Valley Rim LPPA.

Shinn LPPA

Population Summary: The eastern portion of the ELFO contains the majority of the leks within the Buffalo-Skedaddle PMU. Hall, Rush, Shinn, and Shinn Dawn leks are located within the Shinn LPPA. Virtually all these leks showed a significant decline of males counted since the Rush Fire (Figure 10). It is still unknown what long-term effects the fire will have on GRSG and other wildlife species, but shrub cover has declined. Perennial grass cover is good at cooler, wetter sites, while annual grasses are more prevalent in warmer, drier, lower elevation soils.

Prior to the Rush Fire, nesting occurred in the east Shinn Peaks area, Al Shinn Canyon and Stony Creek Springs. Brood-rearing occurred mostly in the Spanish Springs Peak and Shinn Ranch areas. Significant survey and GIS data show Shinn Ranch to be an important winter area. As of 2018, little telemetry exists for habitat use by these birds post-Rush Fire.

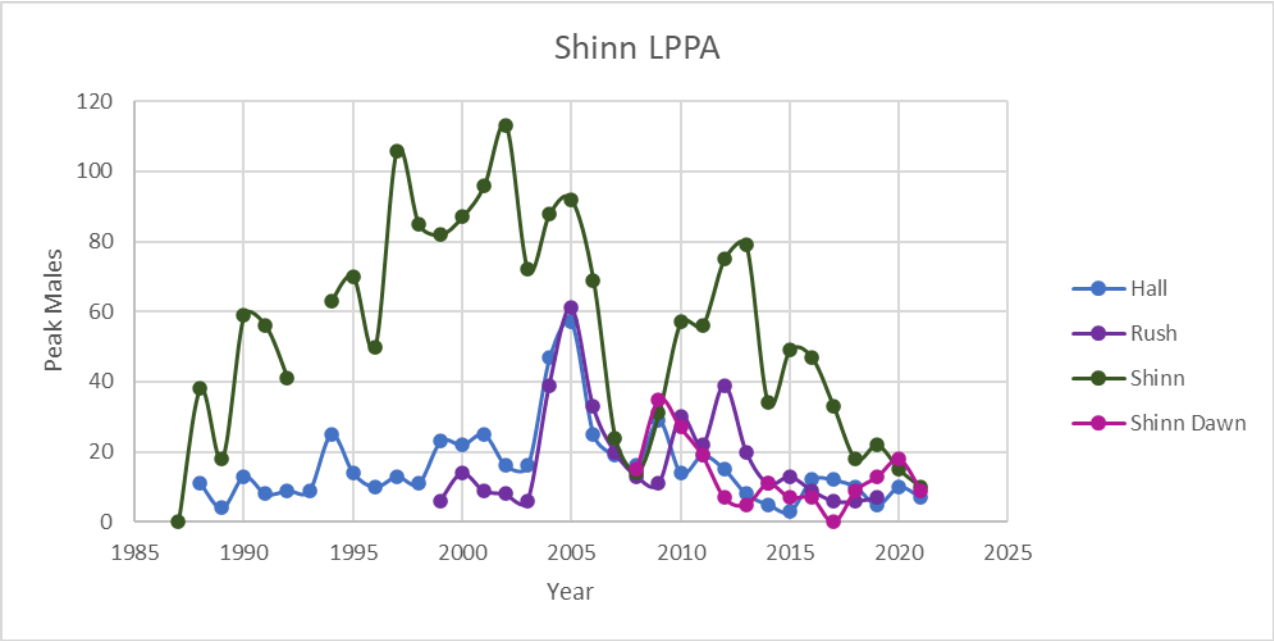

Figure 10. Peak male attendance at the Hall, Rush, Shinn, and Shinn Dawn lek complexes within the Shinn LPPA.

Habitat Summary (Figures 11 and 12)**:** Riparian areas in the Shinn LPPA consist mostly of small perennial and ephemeral streams and remote springs and seeps. Smoke Creek is the main perennial stream that runs near the Shinn lek complex. Vegetative communities along this waterway consist mainly of perennial bunch grasses, willow, *Carex sp.*, *Juncus sp.*, and various wetland obligate and wetland facultative species. Small springs and seeps dot the landscape and support many of the same wetland obligate and facultative species that are found along the perennial waterways.

Prior to the Rush Fire the area around the Shinn lek complex supported large expansive stands of sagebrush. Wyoming big and Lahontan sagebrush plant communities were present in the lower elevations and mountain big sagebrush communities and scattered aspen stands could be found in the

higher elevations. Some areas with deeper soils support basin big sagebrush and Great Basin wild rye stands. In areas that have very shallow rocky soils, it was common to find low sagebrush and shallow rooted grasses and forbs growing. After the Rush Fire, many areas became nearly devoid of shrubs and have since converted to annual grasslands and annual forb stands. Particularly in warmer, drier locations many sites are dominated by cheatgrass and tumble mustard, and where clay soils are present, medusahead is often abundant.

Priority Conservation Actions:

- Remove Phase I western juniper around Shinn area leks, Sage Hen Spring, and nesting polygons shown from pre-fire telemetry work
- Sagebrush planting by seed and plugs in warm stony and stony loam soils near Sage Hen spring and Shinn Ranch
- Stream restoration on Shinn Ranch
- Weed treatment, range seedings, and sagebrush plantings in appropriate areas on Shinn Ranch
- Grazing management-increase BLM permit flexibility and allow for winter grazing to decrease cheatgrass, medusahead and noxious weeds as cover varies yearly.
- Inventory and improve livestock water to allow for flexible grazing management
- Easy gate for Sage Hen spring and interpretive sign for hunters

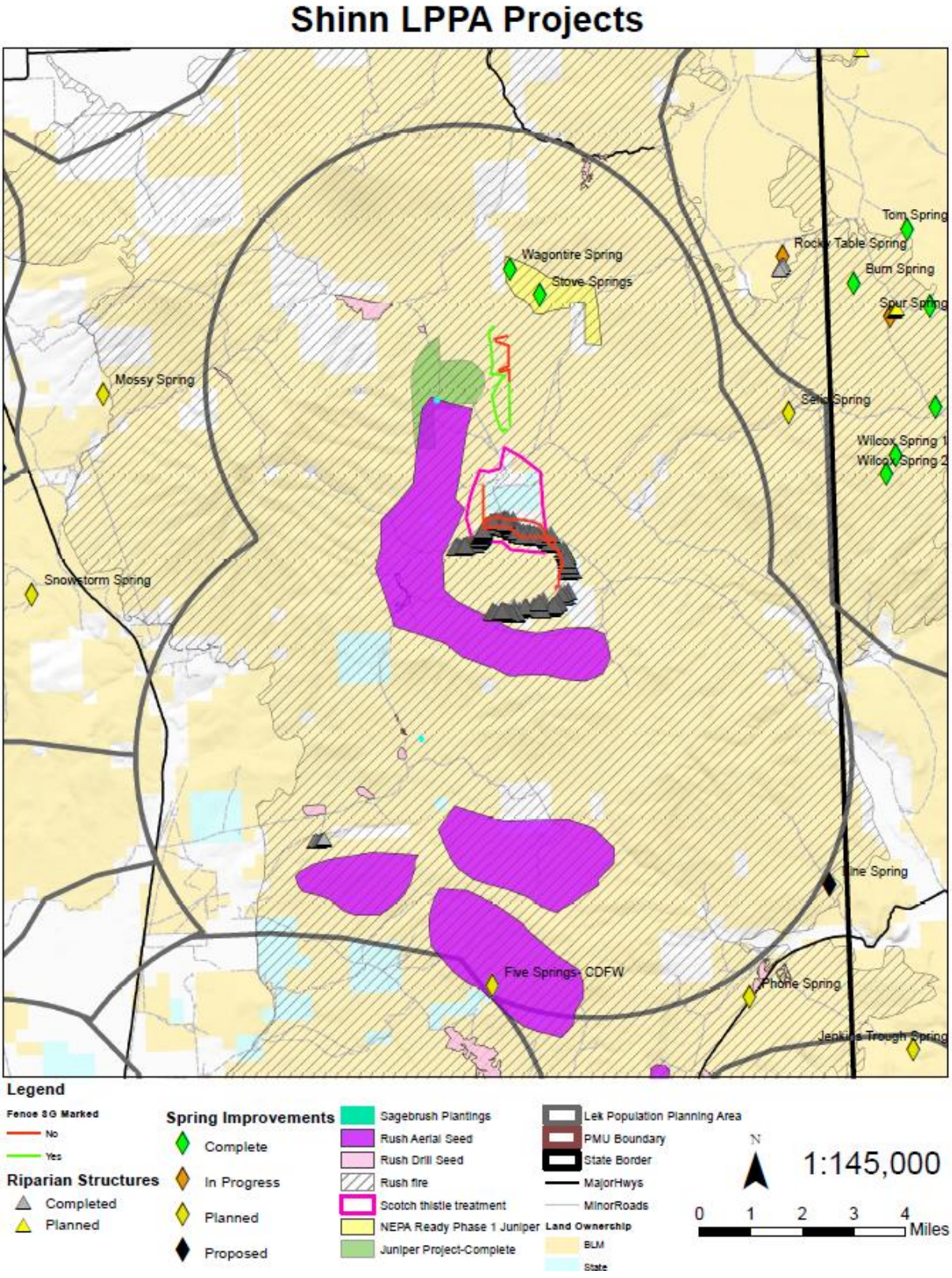

Figure 11. Projects within the Shinn LPPA.

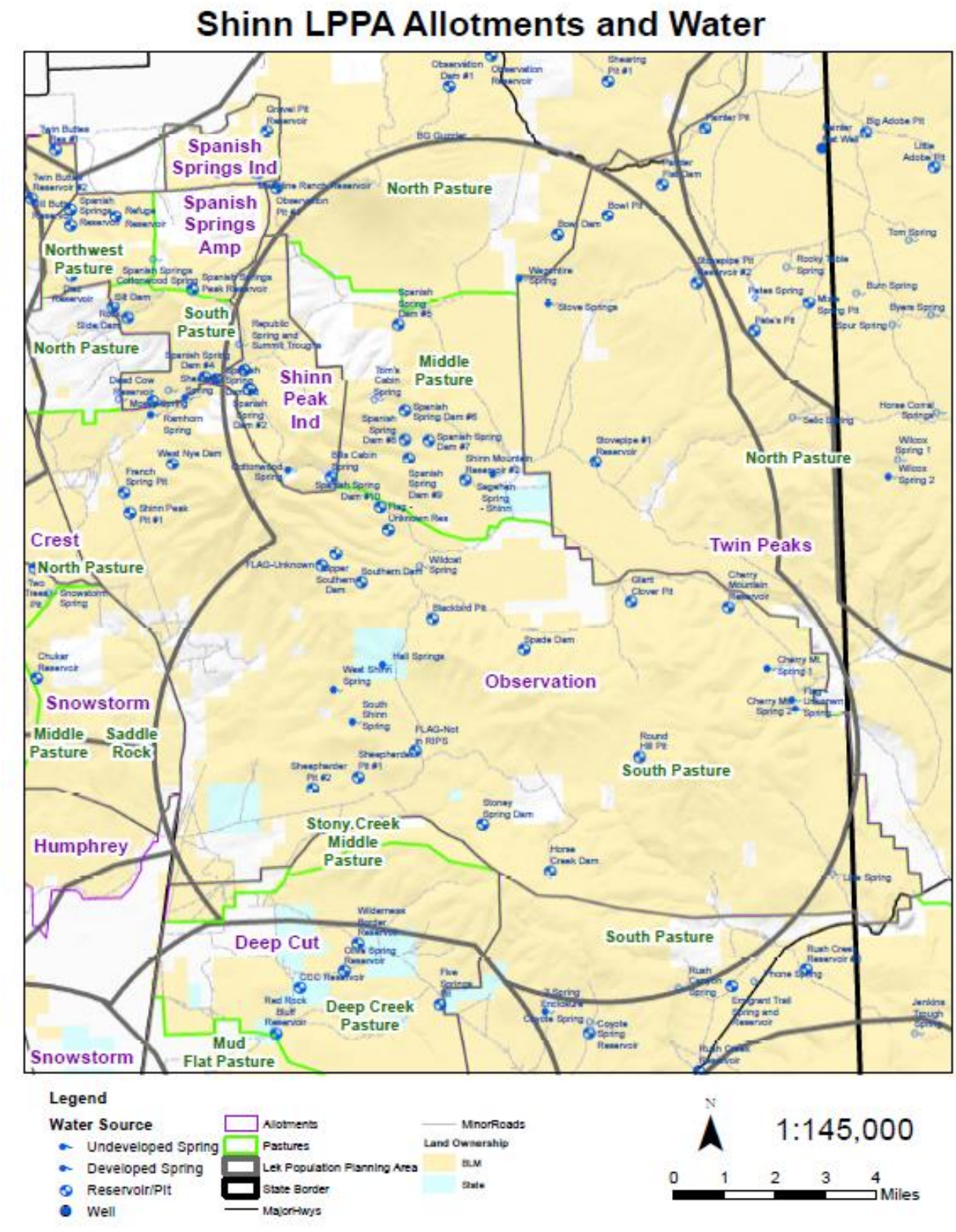

Figure 12. Allotments and water sources within the Shinn LPPA.

Chalk Bluff LPPA

Population Summary: Chalk Bluff lek complex showed a significant decline of males counted since the 315,000-acre Rush Fire which ignited in August 2012 (Figure 13). In addition, shrub cover was significantly reduced in the Chalk Bluff LPPA due to the Rush Fire, and annual invasive grasses are prevalent. The population of the Chalk Bluff lek complex has fluctuated over the years. Some females move long distances to nest, even pre-Rush fire, including to Snowstorm Mountain, 5-Springs, Skedaddle Mountain, and Little Mud Flat. Brood-rearing takes place in these same areas, sometimes at somewhat higher elevations.

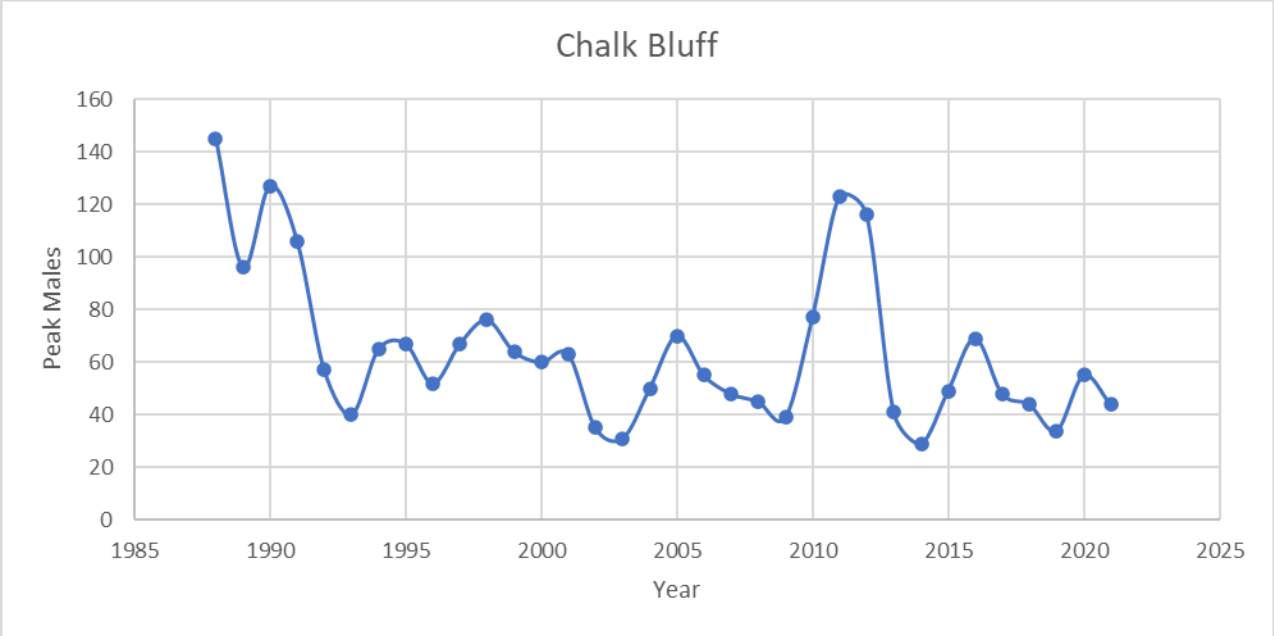

Figure 13. Peak male attendance at Chalk Bluff lek complex.

Habitat Summary (Figures 14 and 15)**:** Currently, sagebrush cover is very low in this area. Islands of sagebrush do exist, and GRSG scat has been found in this LPPA. USGS telemetry confirmed the extensive use of sagebrush islands by GRSG. Potentially this fragmentation could lead to increased predation risk. The understory component in burned and unburned areas is dominated by annual invasives. Some native grasses (predominantly bottlebrush squirreltail) and forbs still persist, but they are sparsely scattered within the sea of annual grasses.

Priority Conservation Actions:

- Increase sagebrush cover through sagebrush seeding and sagebrush plug plantings
- Improve grazing management and horse and burro impacts through increased water availability
- Treat cheatgrass in key areas using results from trials
- Establish fuel breaks/green strips along Smoke Creek Road

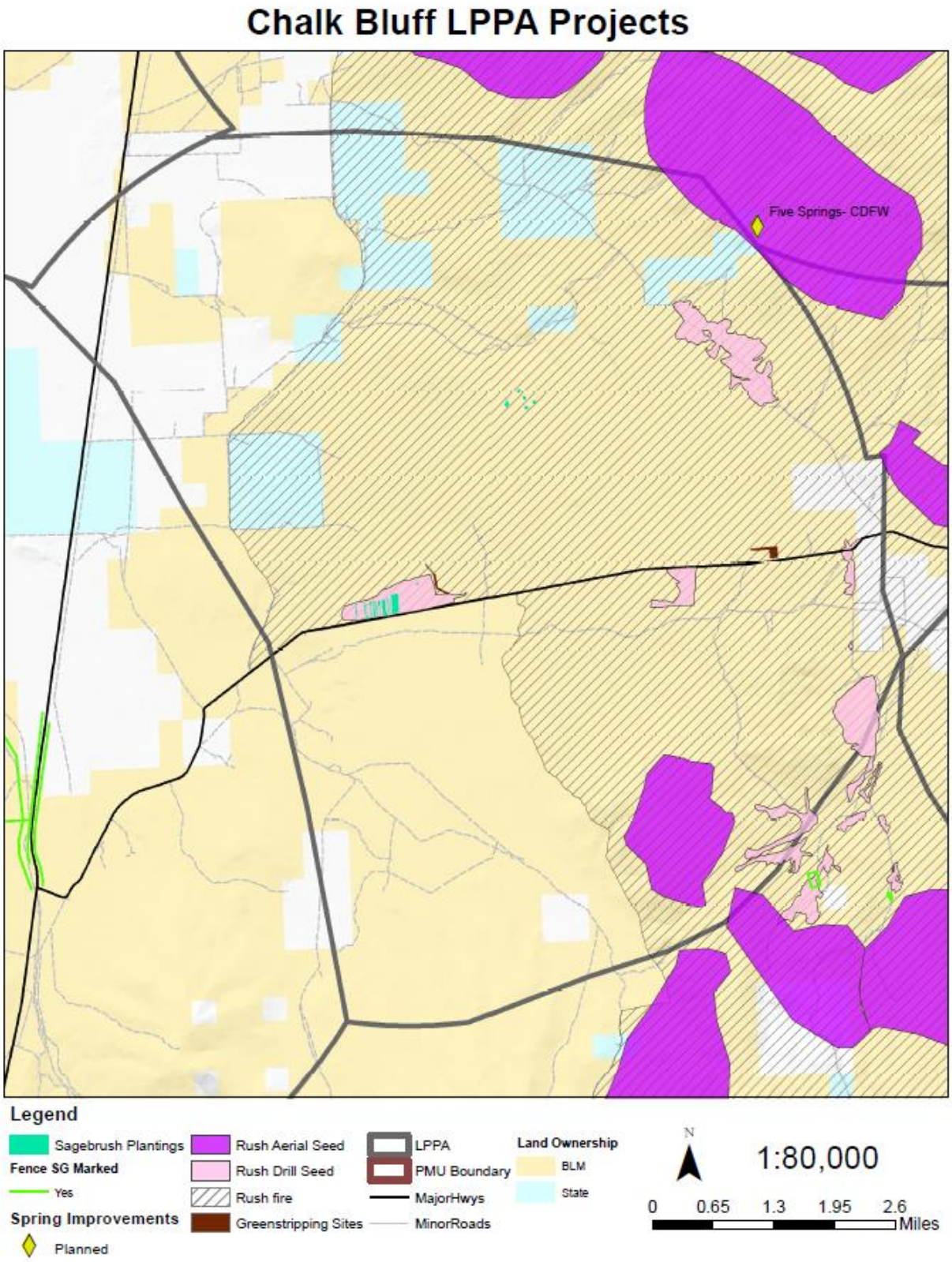

Figure 14. Projects within the Chalk Bluff LPPA.

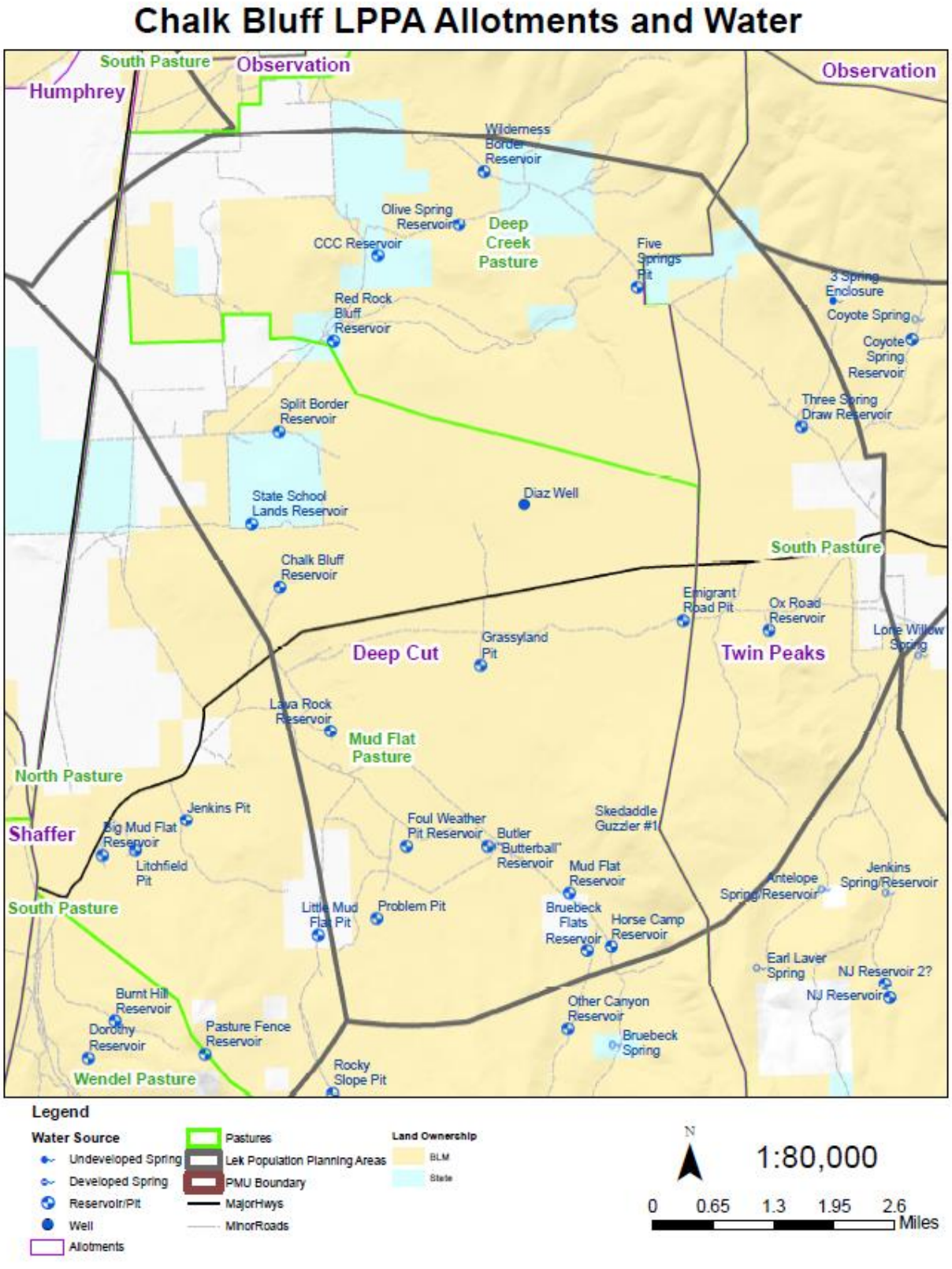

Figure 15. Allotments and water sources within the Chalk Bluff LPPA.

Horse Lake LPPA

Population Summary: The Horse Lake LPPA currently supports three active GRSG leks: Horse Lake, Little Blacks Mountain, and Pete's Creek (Figure 16). Telemetry data from studies done from 1998-2001 and from 2007-2009 showed very similar results; frequent detections occurred in the Blacks Mountain area and even more heavily to the southeast near Biscar, the Tablelands and near the Shaffer lek. Brood-rearing is known to occur on some of the private land.

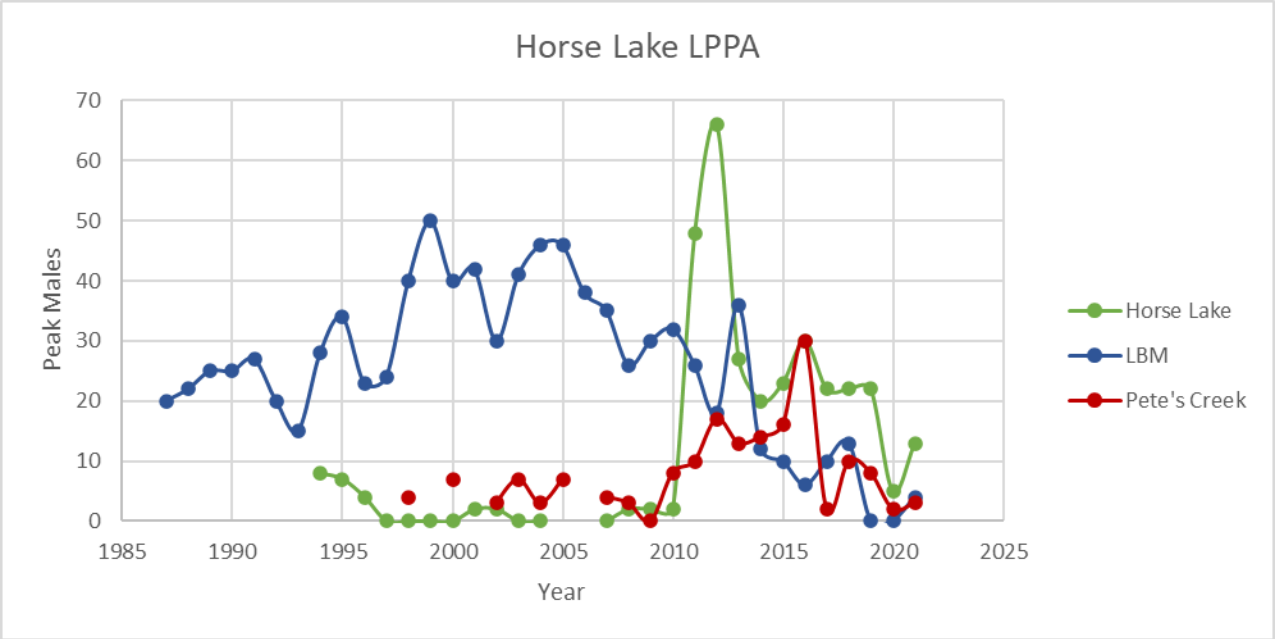

Figure 16. Peak male attendance at Horse Lake, Little Blacks Mountain (LBM), and Pete's Creek lek complexes within the Horse Lake LPPA. Efforts to count the Horse Lake and Pete's Creek leks were inconsistent in the past.

Habitat Summary (Figures 17 and 18)**:** Vegetation within the area is typical of the sagebrush community, and includes sagebrush, bitterbrush, and other browse species, with understories composed of annual and perennial grass and forb species. The lower elevation uplands support Wyoming big and Lahontan sagebrush plant communities. Mountain big sagebrush communities and scattered aspen stands can be found in the higher elevations. Some areas with deeper soils support basin big sagebrush and Great Basin wild rye stands. Some areas have very shallow rocky soils, and it is common to find low sagebrush and shallow rooted grasses and forbs growing there.

Water within or in proximity to the Horse Lake LPPA include Pete's Creek, Snowstorm Creek, Biscar Reservoirs, Craemer Reservoir, Willow Creek, and multiple springs and ephemeral drainages. These provide important riparian habitat for GRSG brood-rearing by supplying beneficial forbs and insects to nesting females and young broods. Several locations of noxious weeds are known within the vicinity and are treated annually.

Priority Conservation Actions:

- Remove phase I western juniper in a two-mile radius around Little Blacks Mountain, Pete's Creek, and Horse Lake leks.
- Remove western juniper from riparian and spring areas
- Repair existing livestock water developments to enhance grazing management capabilities
- BLM grazing permit flexibility to accommodate priority nesting and brood-rearing areas
- Identify areas of concern with high cover of cheatgrass in probable nesting habitat (with BLM monitoring data, USGS telemetry data, Buffalo-Skedaddle group)
- Plan small scale annual weed reduction projects in identified priority areas depending on results of trials
- Create a fire fuel break along Horse Lake Road
- Fuels treatments in areas determined by BLM forester and fire specialists (when priority phase I areas are complete)
- Monitor juniper cuts and consider restoration possibilities if necessary
- Possible understory enhancement in some of the older/denser sagebrush stands
- Remove phase I juniper in the Humphrey 3C Allotment

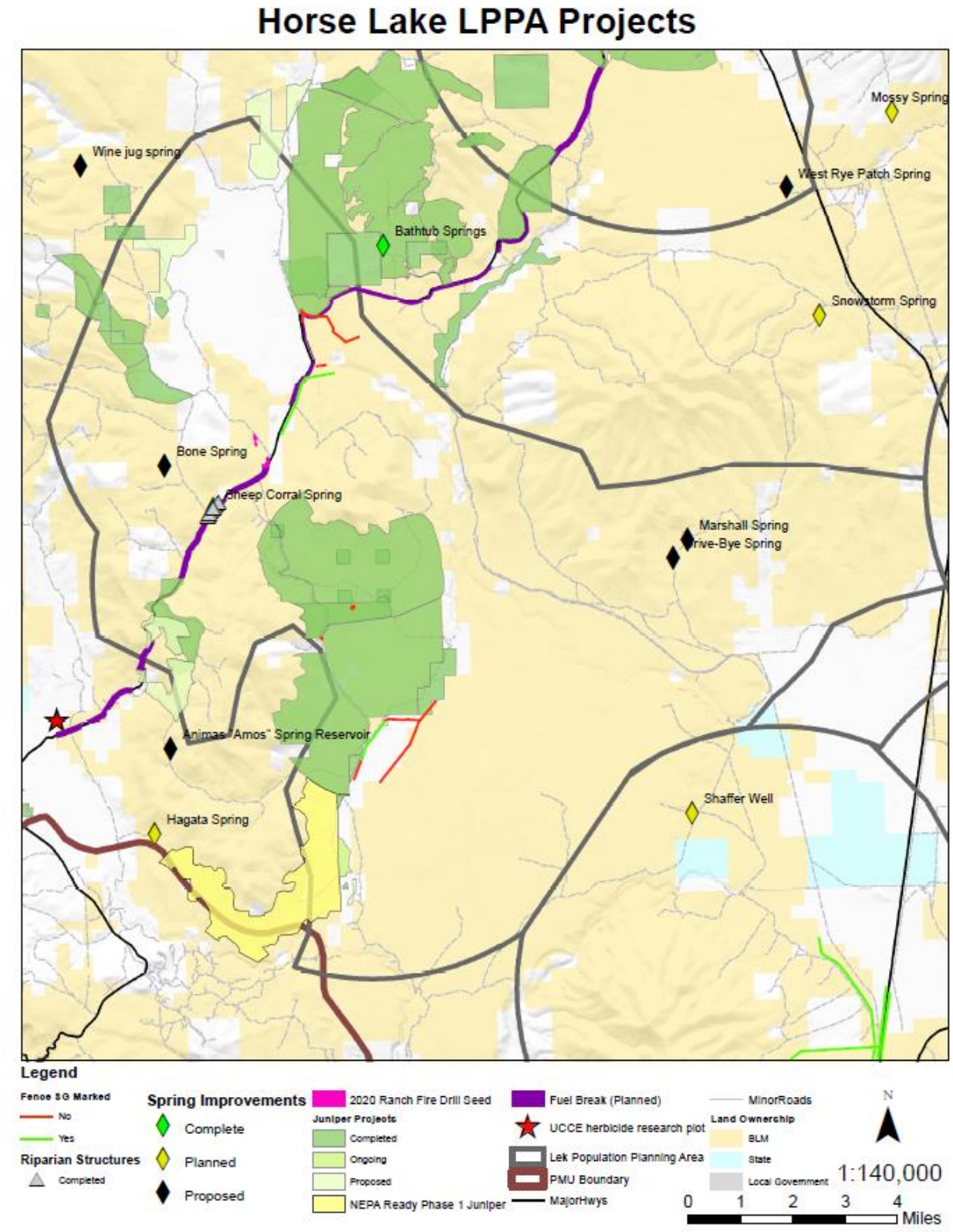

Figure 17. Projects within the Horse Lake LPPA.

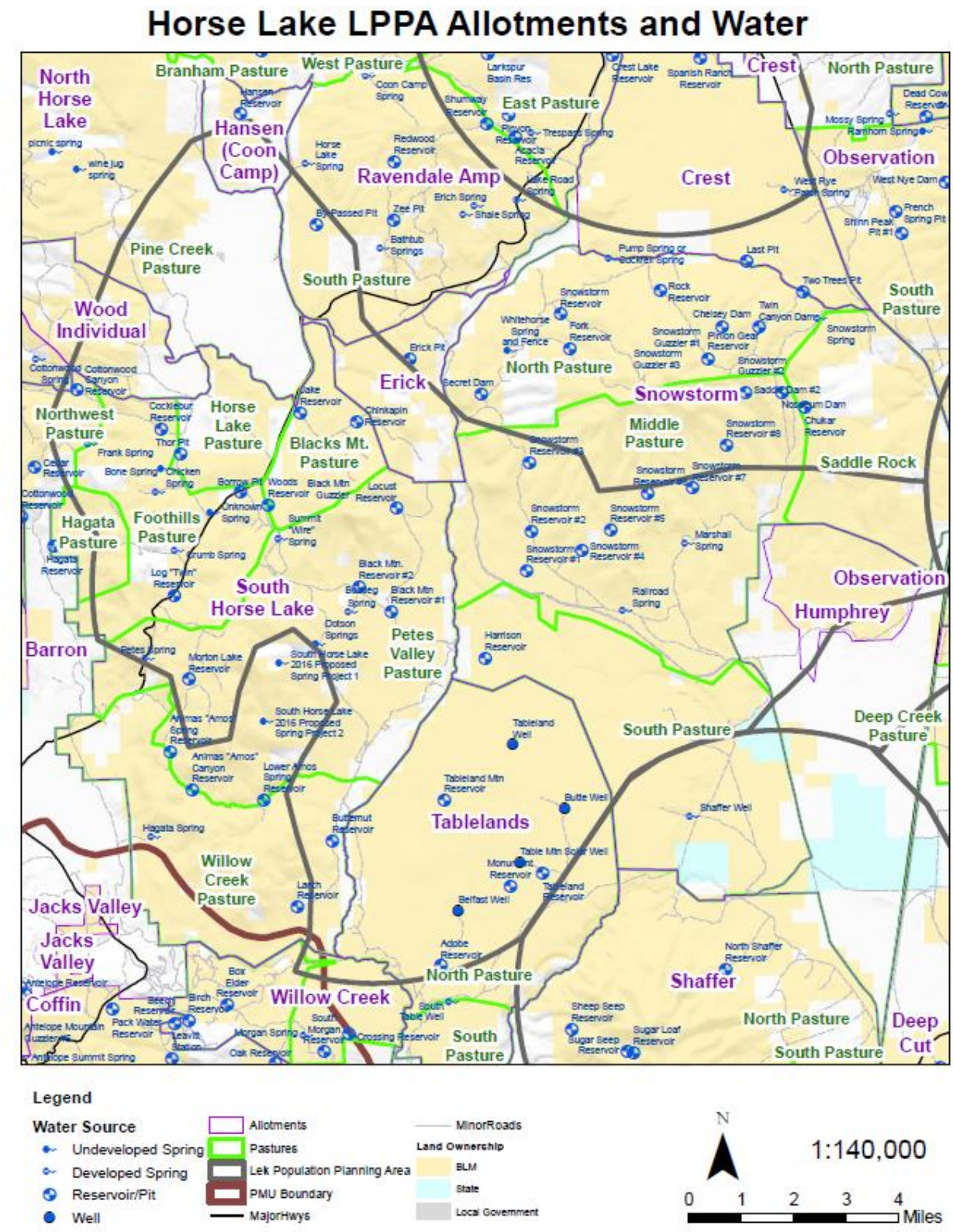

Figure 18. Allotments and water within the Horse Lake LPPA.

Shaffer Mountain LPPA

Population Summary: The Shaffer Mountain lek population is stable with the annual variation expected of a GRSG breeding site (Figure 19). According to telemetry and GPS data, the area provides important summering habitat for Little Blacks Mountain, Chalk Bluff, Shaffer, Skedaddle, and Horse Lake birds in addition to nesting and brood-rearing habitat for Horse Lake, Chalk Bluff, and Shaffer hens. Additionally, the area provides fall habitat for Pete's Creek and Chalk Bluff. Birds seem to be using open flats, avoiding steep drainages, and using areas with annual weeds for nesting. Snowstorm Creek and Shaffer Well areas are used for nesting and brood-rearing.

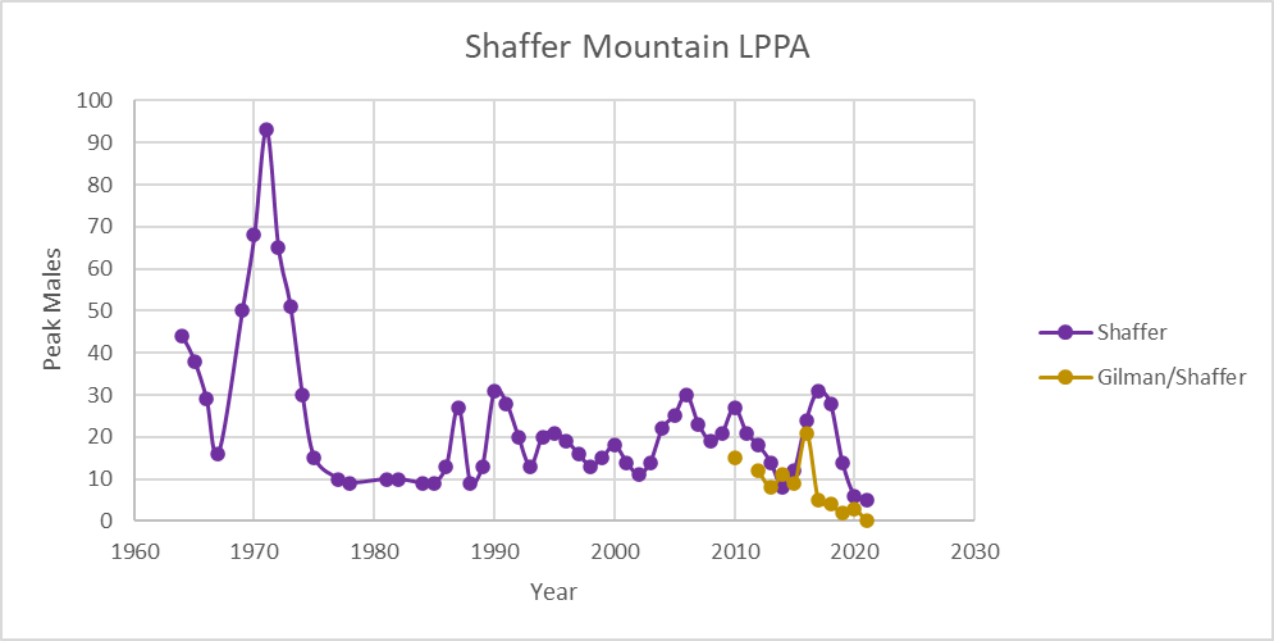

Figure 19. Peak male attendance at Shaffer and Gilman/Shaffer lek complexes.

Habitat Summary (Figures 20 and 21)**:** The Shaffer Mountain LPPA encompasses Biscar Wildlife Area to the northwest, across Karlo Road to Hwy 395, and south to Shaffer Mountain. Shaffer Mountain reaches 6735 feet in elevation and at the higher reaches supports mountain brush communities that have abundant bunchgrasses and forbs. Springs and intermittent drainages provide riparian areas suitable for brood-rearing habitat near the Shaffer Lek. Snowstorm Creek and Secret Creek run through this area, feeding into Balls Canyon, and there are numerous springs that feed small meadows. Scattered juniper exists on rocky outcrops that often are refuges for bluebunch wheatgrass and other bunchgrasses. To the east is Mud Flat, a dry remnant lakebed mostly barren of vegetation except for some forbs that come up in the spring.

The Tablelands, a plateau to the west important for summering GRSG, has been invaded by annual cheatgrass and medusahead. Perennial pepperweed, Canada thistle and spotted knapweed are the main noxious weed species known to occur in this LPPA. The heaviest infestations occur along the Highway 395 corridor, Balls Canyon and Snowstorm Creek.

The 2017 Mud Fire burned 5373 acres of the southeast portion of the planning area, and fire history reveals that a 1985 fire burned an additional 656 acres in this northwest part of the LPPA.

Priority Conservation Actions:

- Identify meadow restoration opportunities and implementation steps
- Improve Gilman Springs and work toward BLM parcel acquisition
- Repair Shaffer Well to provide additional water
- Collaborate with permittees on feasibility of winter grazing and feeding protein supplements to help encourage Great Basin wild rye and other perennial plant species
- Set up experimental medusahead work on Tablelands

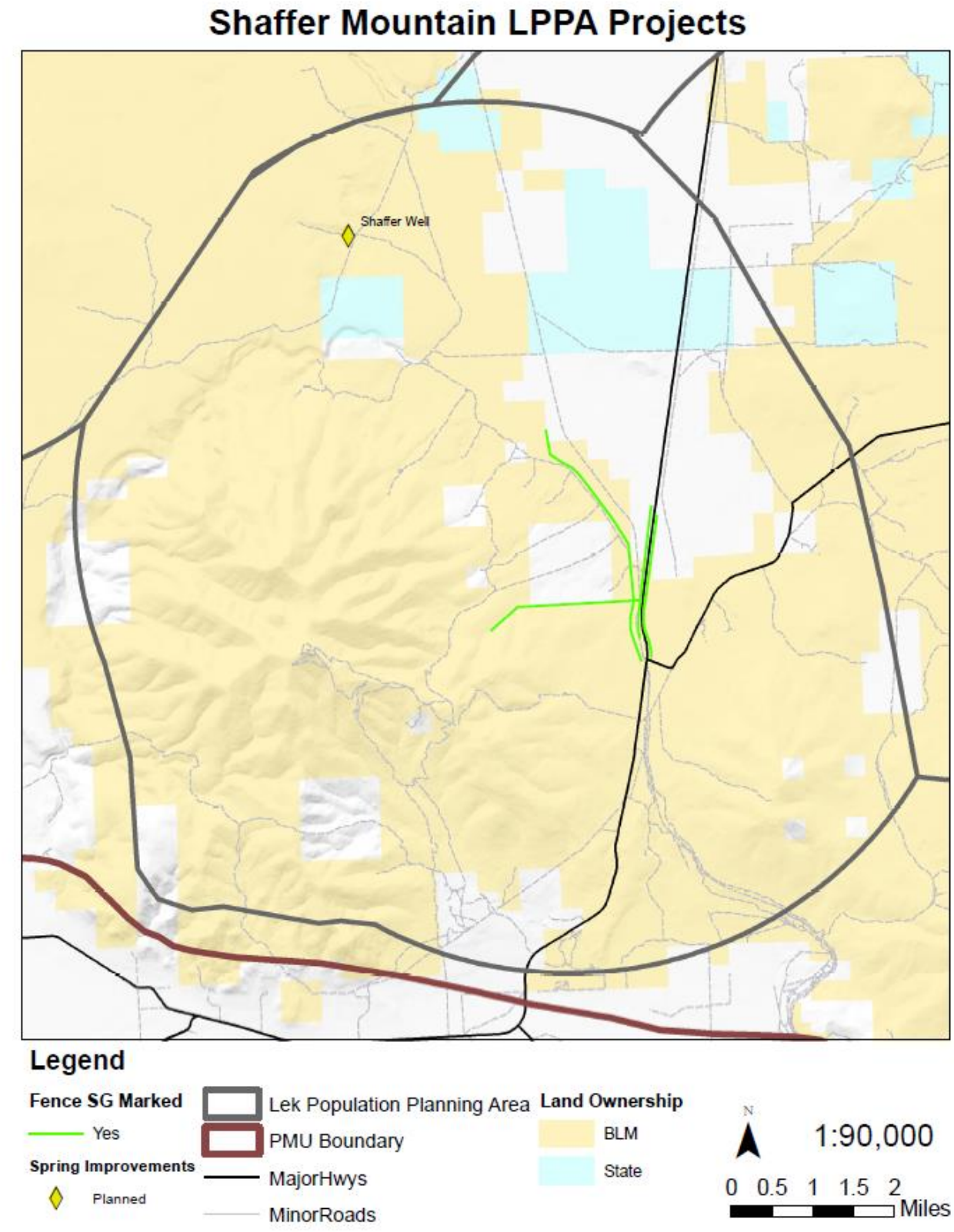

Figure 20. Projects within the Shaffer Mountain LPPA.

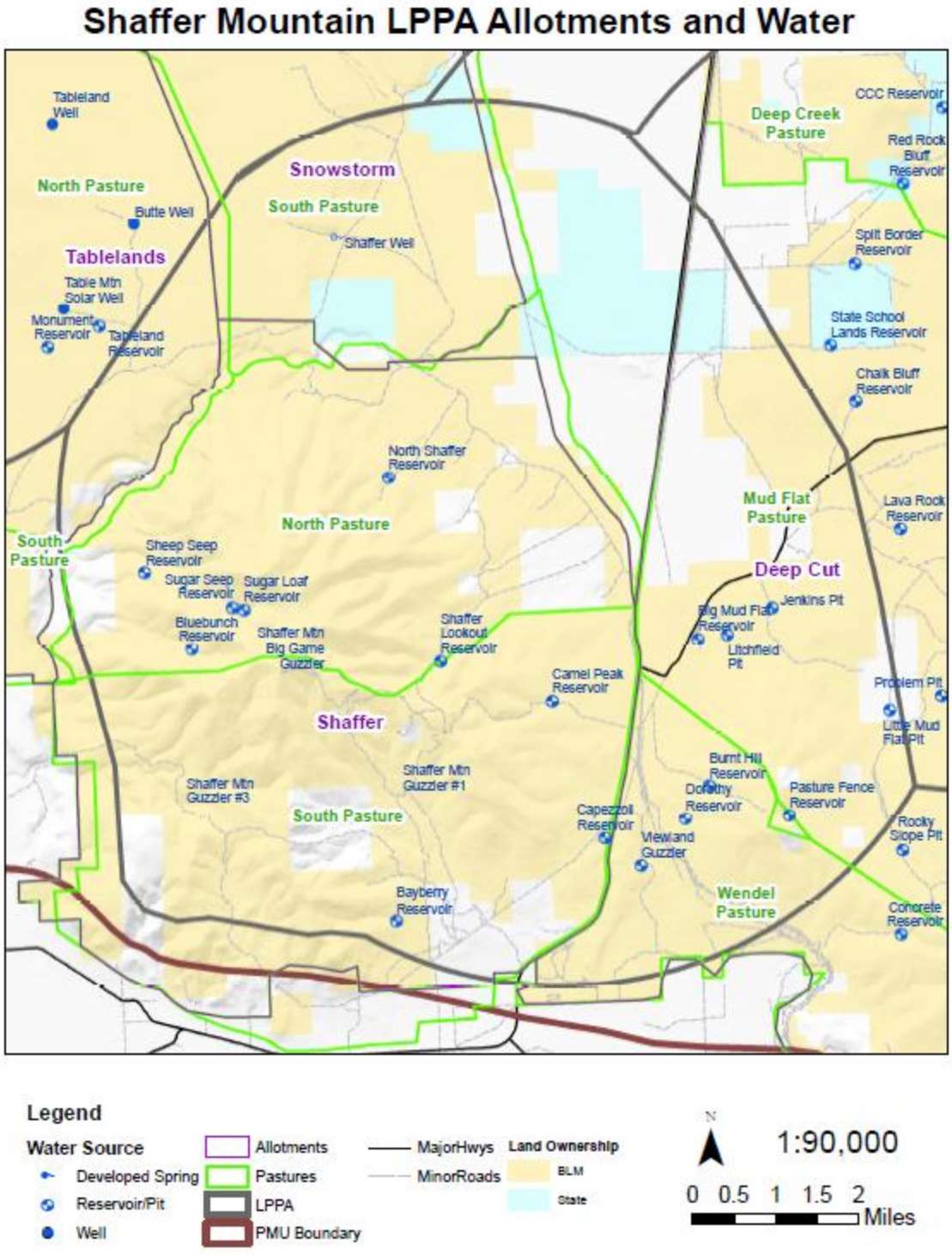

Figure 21. Allotments and water sources within the Shaffer Mountain LPPA.

Madeline Plains LPPA

Population Summary: The Madeline Plains LPPA has two leks that have been active in recent history. Spanish Springs lek has declined while the Chicken Ranch lek was recently made known to the Buffalo-Skedaddle group and is located on privately owned land (Figure 22).

Birds from Spanish Springs lek nest on Snowstorm Mountain, Spanish Springs Peak, and the west side of Madeline Plains. These birds brood-rear primarily in the Madeline Plains, commonly taking advantage of irrigated alfalfa fields in the area. Birds from Shinn, Skedaddle, and Chalk Bluff leks also commonly brood-rear in the Madeline Plains.

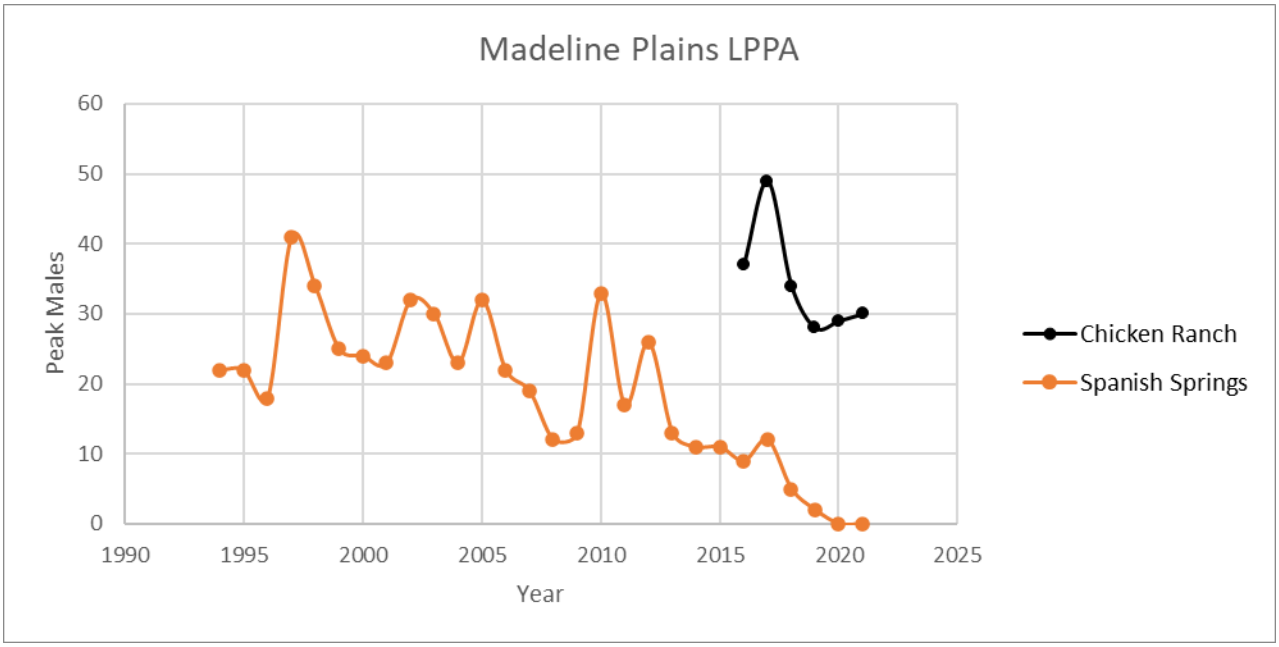

Figure 22. Peak male attendance at Chicken Ranch lek and Spanish Springs lek complex within the Madeline Plains LPPA.

Habitat Summary (Figures 23 and 24) The Madeline Plains LPPA is a relatively flat basin of approximately 200,000 acres. Most of the land is privately owned, several sections were divided into 20-acre parcels and are owned individually, mostly by absentee landowners. Surrounding the plains are ridges and mountains dominated by mature western juniper. Some sagebrush plant communities are in the early stages of juniper encroachment. The plains are a checkerboard of hayland and sagebrush, dominated by Basin big sagebrush plant communities. The understory in general is low in diversity and abundance. Soils are mostly Ravendale Silty Clay or some variation of a playa complex. Water often ponds on the soils in the winter and early spring.

Annual grasses and other weeds can be extensive in places, especially where there has been disturbance. Perennial pepperweed, Scotch thistle, yellow starthistle, Russian knapweed and Mediterranean sage are the primary known noxious weed species. Most populations are located along the Highway 395 corridor, Horse Lake Road and within the footprint of the Observation and Rush Fires.

A large portion of the sagebrush has not burned in a long time and is becoming decadent. Fire history reveals that in 2001 the Observation fire burned 1868 acres in the southeastern portion of the LPPA. In 2012 the Rush Fire burned over the same footprint. On the southwestern edge a 1990 fire burned 3004 acres of the planning area. Approximately four fires under 300 acres occurred between 1961 and 2012 in this planning area (Appendix C, Figure 31).

The Madeline Plains contains a large number of roads and small parcels of land which can disrupt the continuity of habitat preferred by GRSG and other landscape species. Roadkill and tall structures useful for nesting and perching can attract common ravens and other aerial predators of GRSG. Farming on the Madeline Plains can provide brood-rearing habitat, but GRSG still need cover from predators. Areas that have been previously farmed but are currently fallow often have an influx of weeds after farming operations desist. Consequently, weeds can decrease the quality of habitat or spread to other areas.

Priority Conservation Actions:

- Juniper removal around Spanish Springs lek and other areas that are a lesser priority
- Talk to county about how the Buffalo-Skedaddle group can support code enforcement of illegal marijuana farms
- Monitoring in partnership with Alturas ranches for GRSG use and lekking area on the west side of Madeline Plains, possible trapping of GRSG if a large enough group is found (50 to 100)
- Outreach to individual landowners about perennial grass understory plantings, and/or removing predator (mostly ravens) subsidies

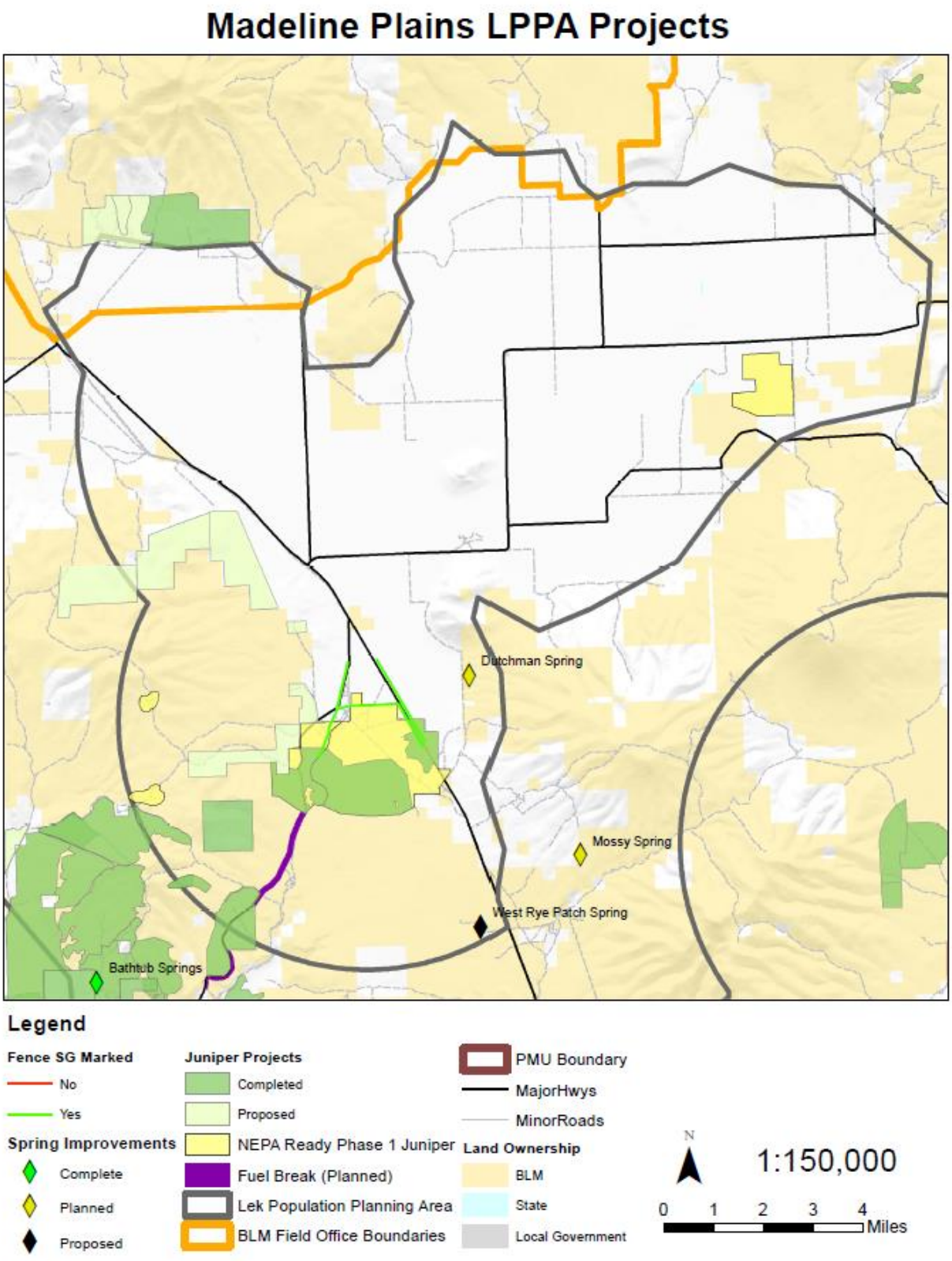

Figure 23. Projects within the Madeline Plains LPPA.

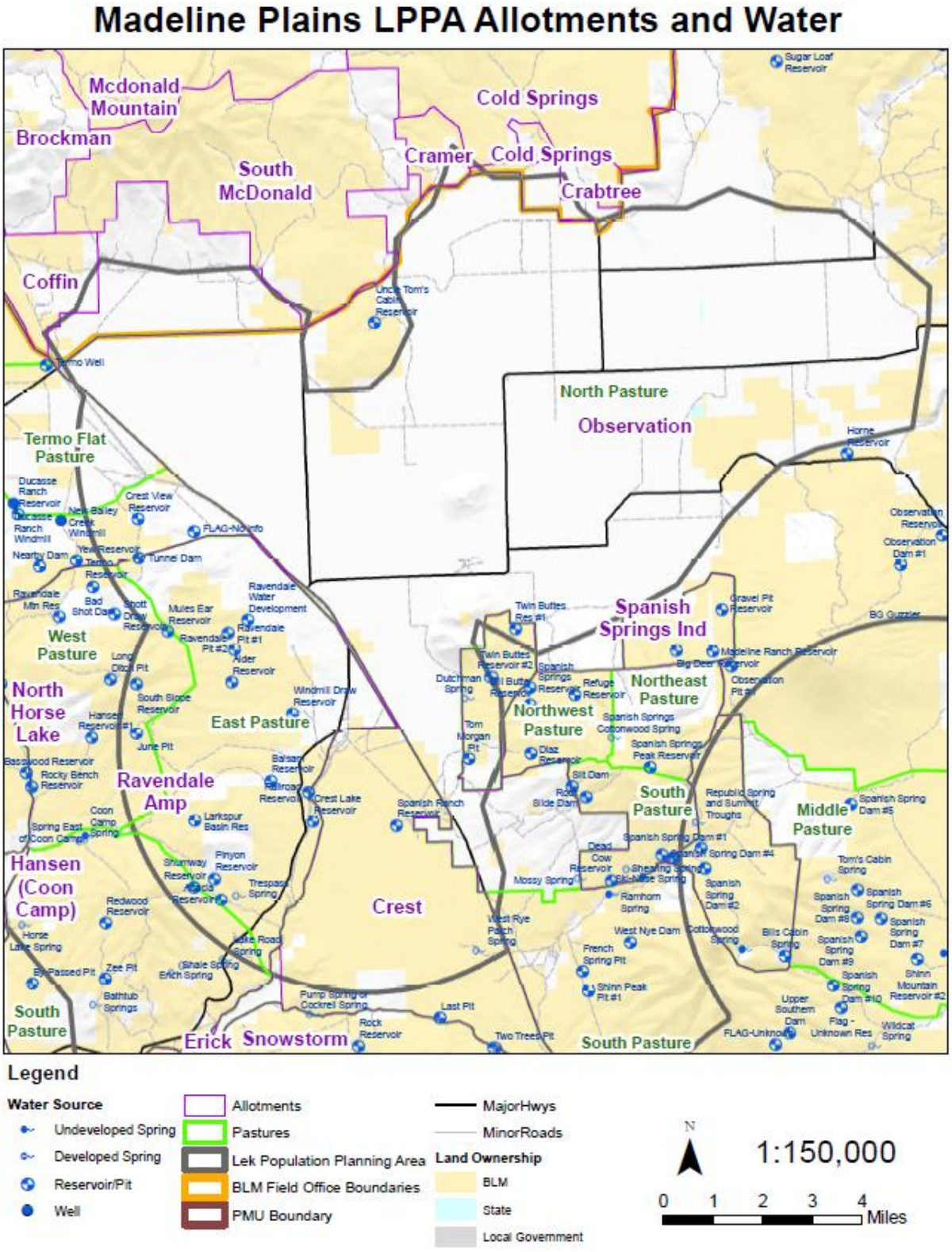

Figure 24. Allotments and water sources within the Madeline Plains LPPA.

Grasshopper LPPA

Population Summary: This LPPA includes two leks: Madeline Plains lek and Grasshopper lek. The Madeline Plains lek has declined in recent years and is east of Grasshopper lek (Figure 25). The birds from Madeline Plains do not range very far; their lek, nesting, brood-rearing, and winter habitats are in relatively close proximity. The Grasshopper population mostly nests and brood-rears in Grasshopper Valley, sometimes moving to the northern end of the valley where some recent juniper removal work was completed. They also brood-rear in springs in the uplands and in Madeline Plains. Grasshopper is a smaller GRSG population that is farther west than most in the Buffalo-Skedaddle PMU and a more isolated population. The only population farther west is Hayden Hill, however that lek has been inconsistently attended.

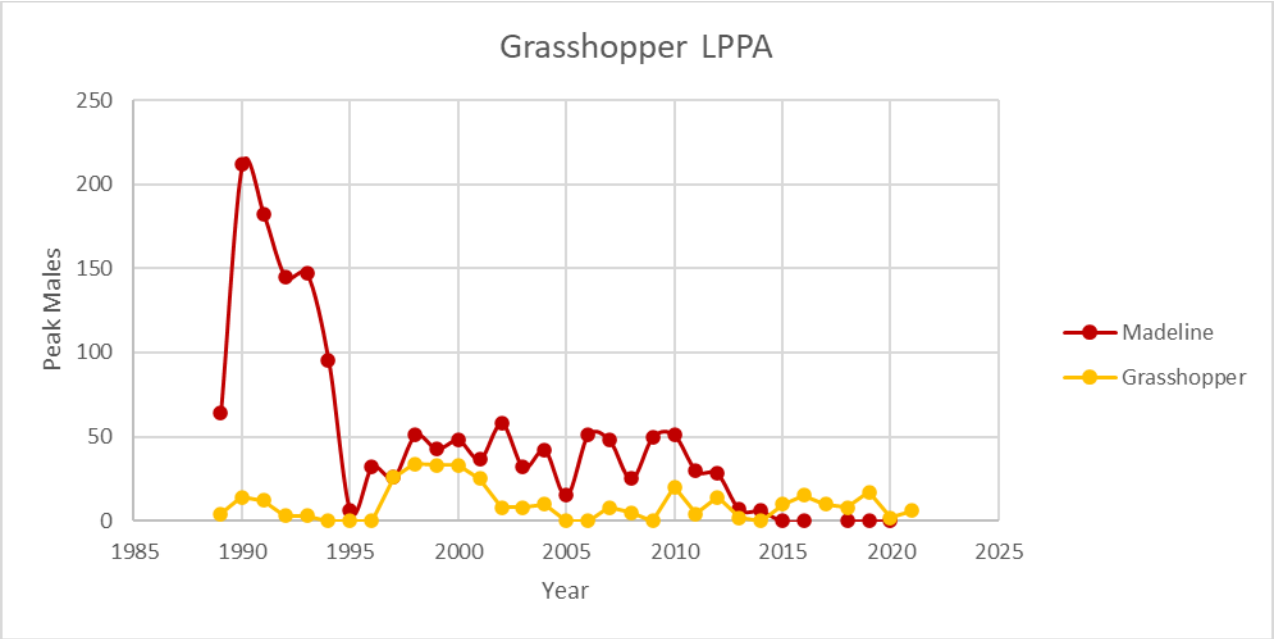

Figure 25. Peak male attendance at Grasshopper and Madeline lek complexes.

Habitat Summary (Figures 26 and 27)**:** Grasshopper Valley has a seasonal wetland lake that may expand or contract depending on the current year's precipitation. A larger meadow area is supported by Slate Creek where it crosses east under Highway 139 and feeds the meadow in the valley bottom proper. There are smaller springs in the uplands around the valley that GRSG have historically used. Western juniper and ponderosa pine line the ridges around the valley, and smaller juniper has encroached in the valley bottom particularly along fence lines and at the northern end where they line a seasonal drainage coming from Said Valley Reservoir. Some juniper removal has been done on the western edge of the valley; however, ponderosa pine remains. The understory in the uplands remains fairly intact, although there are patches of medusahead. The valley bottom has a significant amount of cheatgrass intermixed with native grasses. Silver sagebrush and Mountain big sagebrush are the dominant sagebrush species. Some sections of sagebrush in this area may have died from prolonged saturation due to extensive floods in recent years.

Priority Conservation Actions:

- Phase I juniper removal along edges of intact sagebrush in Grasshopper Valley
- Identify and prioritize meadow and spring restoration and protection

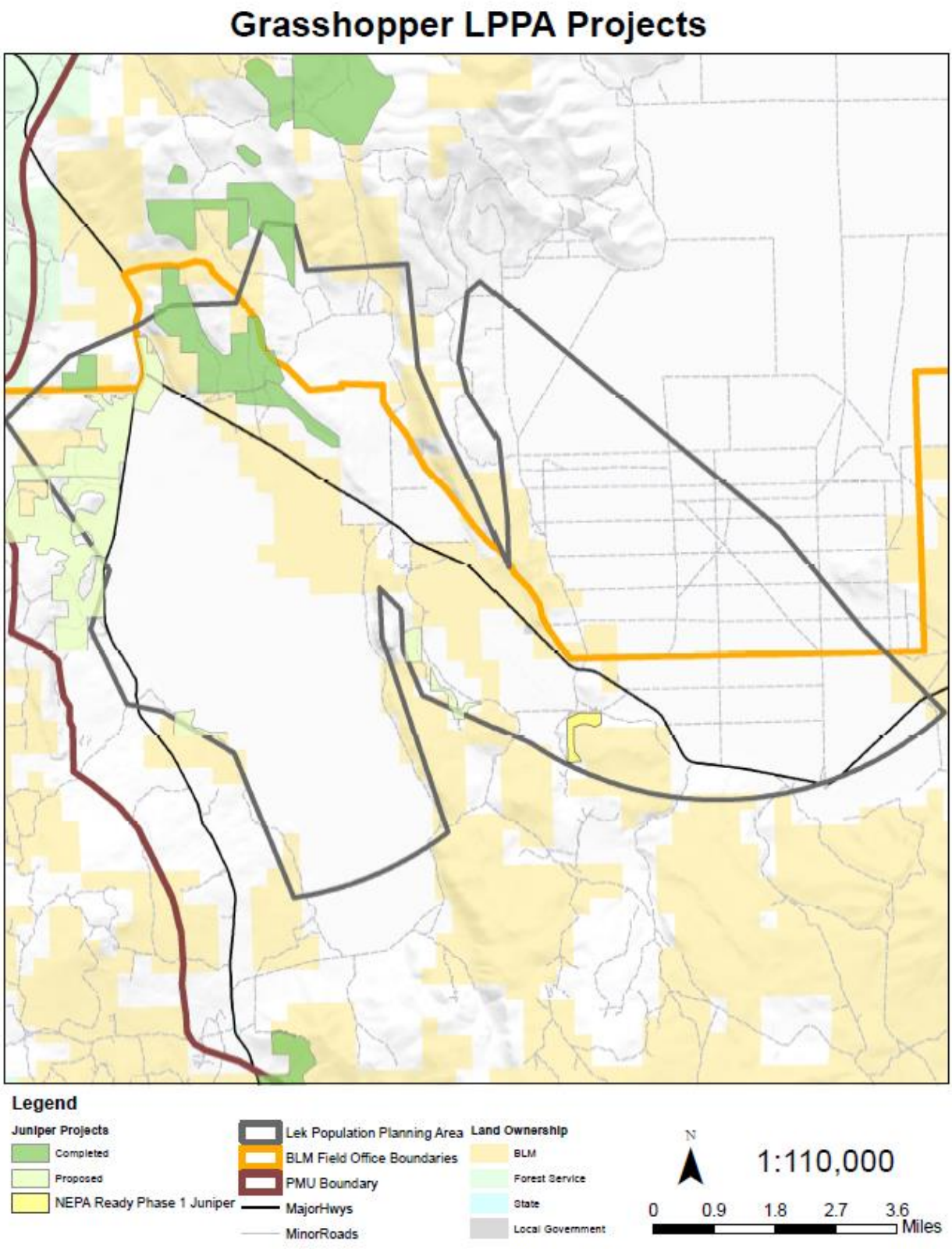

Figure 26. Projects within the Grasshopper LPPA.

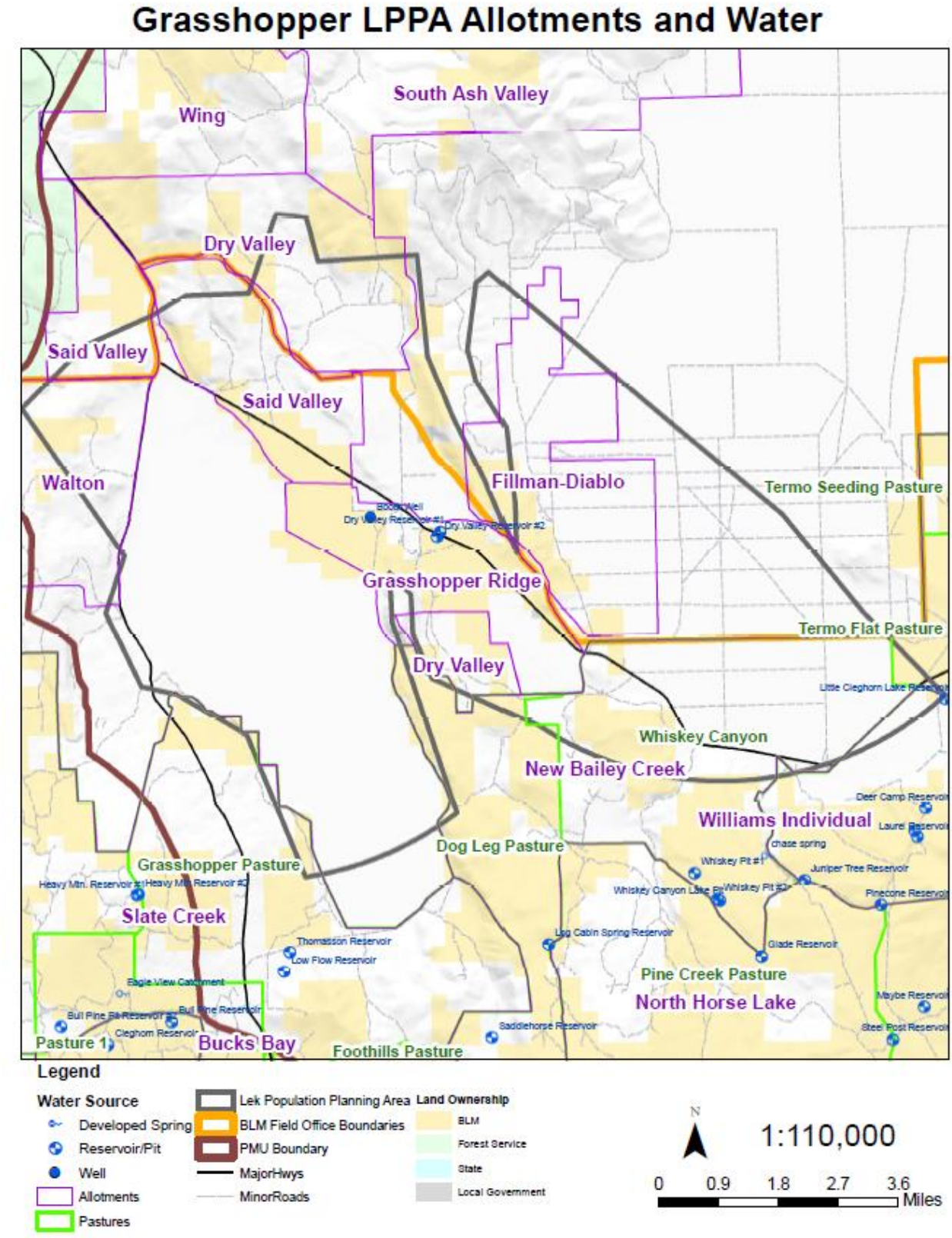

Figure 27. Allotments and water within the Grasshopper LPPA.

West Buffalo Hills LPPA

Population Summary: This sub-unit of the Buffalo-Skedaddle PMU supports five active leks which include Garden Lake, Little Adobe Flat, Parsnip 1, Mixie Flat, and Tuledad (Figure 28). This area also contains four pending active leks and 12 unknown status leks although some of these could be re-classified as historic, combined with other nearby leks, or removed from the lek list due to little or no positive data. The largest lek in this complex is the Garden Lake lek in the northern portion followed by the Little Adobe Flat and Parsnip leks in the central portion and the Mixie Flat lek in the southern portion. Both the Mixie Flat and Little Adobe Flat leks have experienced steep declines over the last 12-15 years while Garden Lake and Parsnip 1 have remained stable to slightly increasing respectively, which reflects the relative integrity of habitat in these areas (this however does not suggest these areas are not without threats).

Brood-rearing habitat is associated with various seeps and springs in the area as well as along the edge of some small dry lake beds intermittently inundated with water during the spring and early summer (e.g., Garden Lake, Pilgrim Lake and Painters Flat).

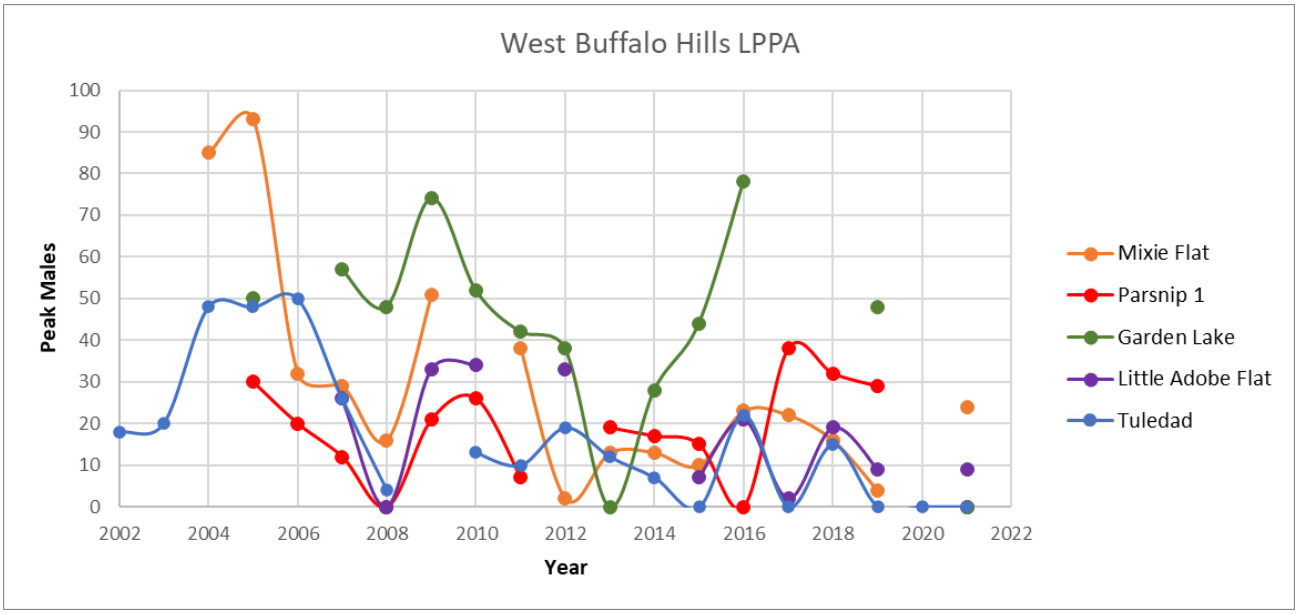

Figure 28. Peak male attendance at Mixie Flat, Parsnip 1, Garden Lake, Little Adobe Flat, and Tuledad leks in the West Buffalo Hills LPPA.

Habitat Summary (Figures 29 and 30)**:** This sub-unit extends from the California-Nevada border east to the North Fork of Buffalo Creek and from the Smoke Creek Road in the south to the Coppersmith Hills in the north. The area provides the highest elevations on the Nevada side of the PMU and thus some of the more resilient habitats, relatively speaking. Sagebrush and bitterbrush persist as the main shrub species throughout with patches of western juniper occurring from Big Adobe Flat north to Burnt Lake and Garden Lake. Much of the juniper community is dominated by older age class trees although there are

areas of encroachment. Curl-leaf mountain mahogany is also present in patches throughout this portion of the planning area. Understories in this portion of the sub-unit are co-dominated between perennial bunchgrasses (e.g., bottlebrush squirreltail, Sandberg's bluegrass and bluebunch wheatgrass) and invasive annual grasses that threaten the future integrity of the habitat.

The Coppersmith Hills, in the northern portion of the sub-unit, is mainly dominated by invasive annual grasses which include cheatgrass, rattlesnake chess and medusahead. Some patches of sagebrush remain, but there is a dominant component of western juniper in this area. The W5 Cold Springs Complex Fire burned 84,889 acres in the Coppersmith Hills during the summer of 2020, of which 14,400 acres were within Nevada. Without aggressive restoration actions, this area will likely be dominated by undesirable invasive annual grasses and weeds.

The southern portion of this sub-unit, which extends essentially from Painters Flat in the north down to the Smoke Creek Road continues to be dominated by sagebrush species; however, the understory is highly threatened by invasive annual grasses. Elevation decreases in this portion of the sub-unit and populations of wild horses and burros that have well exceeded Appropriate Management Levels have virtually destroyed grass and forb species as well as perennial and intermittent water sources in this area, whether they are springs or riparian systems.

The BLM ELFO, NDOW and others have partnered to protect and improve springs and riparian resources in this sub-unit. Nine spring projects have been completed and progress is being made on 16 other spring projects.

Priority Conservation Actions:

- Wild Horse and Burro Gather to lower the population back to Appropriate Management Level
- Remove Phase I western juniper within a two-mile radius around the Garden Lake, SOB Lake, Little Adobe Flat, and Burnt Lake leks
- Remove western juniper from riparian and spring areas within one mile of Sidehill Spring, Deer Spring, Rowland Spring, Pilgrim Lake and various other spring and riparian areas in the area
- Address medusahead infestation north of Garden Lake (possible sheep bedding area) and reseed
- Update BLM grazing permits, including adding flexibility (e.g., rest rotation etc.) to improve rangeland and riparian health and conditions
- Investigate opportunities to re-establish native shrubs near the Buffalo, West Buffalo, Buffalo Creek #1, and Buffalo Creek #2 leks as well as some lower elevation areas along Buffalo Creek as these areas serve as important winter habitat for GRSG, mule deer and pronghorn
- Investigate areas that would benefit from green-strips or fuel breaks such as the Buckhorn Road

East Buffalo Hills LPPA

Population Summary: The East Buffalo Hills planning area supports three active leks including the Chicken Canyon, Granite Canyon, and Five Spring leks (Figure 31). There is also one pending active lek (Dobe) that is likely active and three unknown status leks. The sub-unit extends from the North Fork of Buffalo Creek and Cedar Canyon east to Nevada State Highway 447. This area is difficult to survey due to access during the spring months and very rough, rocky roads. Aerial survey is normally conducted in this portion of the planning unit. On average, the largest lek in the unit is the Chicken Canyon lek supporting an average of 22.1 males. This lek had 31 males in attendance in 2020 and has had attendance in the upper 40's from 2016-2018. The next largest lek, on average, is the Dobe lek with 16.5 males followed by the Five Spring and Granite Canyon leks with an average attendance of 8.2 and 6.7 males, respectively.

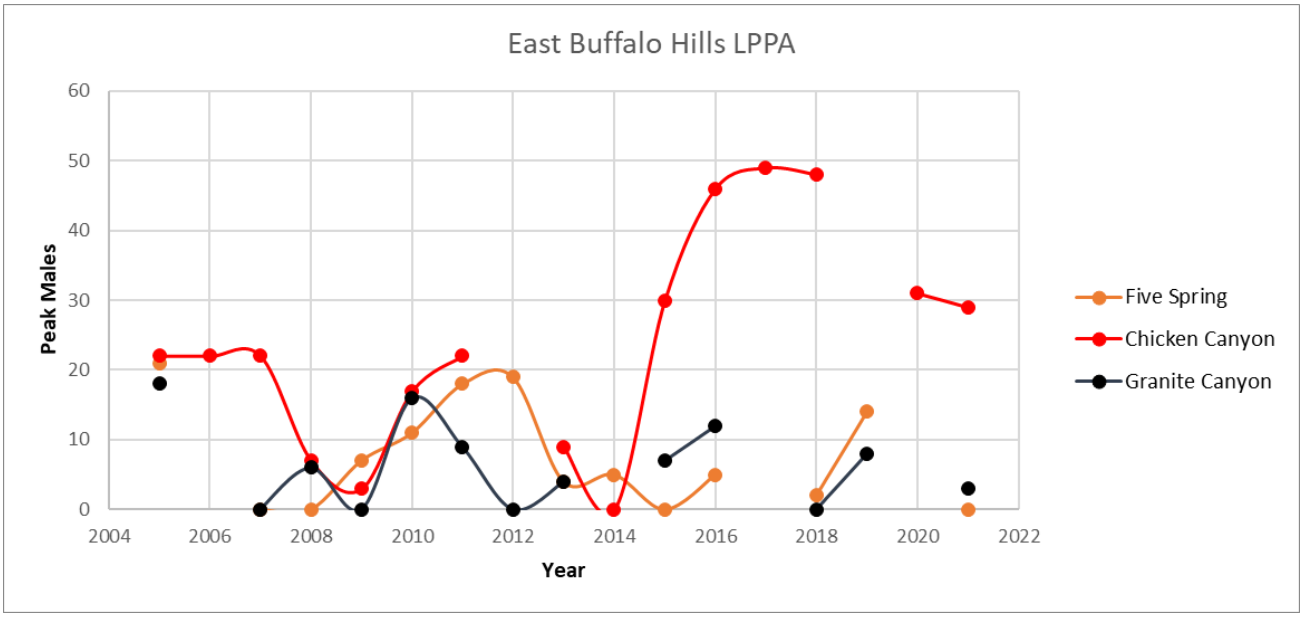

Figure 31. Peak male attendance at the Five Spring and Chicken Canyon leks in the East Buffalo Hills LPPA.

Habitat Summary: This portion of the Nevada side of the Buffalo-Skedaddle PMU has a larger component of western juniper than many of the other sub-units. Late seral shrubs include sagebrush species, bitterbrush, and rabbitbrush. Perennial understory species consist of bottlebrush squirreltail, Sandberg's bluegrass and bluebunch wheatgrass; however, invasive annual species such as cheatgrass and medusahead rye threaten these communities. During the summer of 2020, the "Poodle" fire burned approximately 13,600 acres, much of it considered Priority Habitat Management Area. This fire started near Poodle Mountain and burned northeast across Nevada State Highway 447 into the Massacre PMU. The habitat loss will negatively impact nesting habitat near the Dobe lek and likely some brood-rearing habitat associated with Jones Canyon as well.

Riparian habitat along the North Fork of Buffalo Creek and many springs and seeps are at risk throughout this portion of the PMU. Many springs could be considered no longer functioning or functioning at risk due to heavy wild horse and livestock use. Juniper encroachment into and adjacent to spring and riparian areas also threatens these important brood-rearing areas. Brood-rearing habitat also exists on some of the “flats” in this portion of the PMU including Jones, Boulder and Stockade Flat. Normally, these areas are considered late brood-rearing habitat supported by various “pit tanks”.

Priority Conservation Actions:

- Remove encroaching junipers on mesas between Chicken Canyon and Paul’s Camp
- Remove encroaching junipers within and adjacent to springs and riparian areas
- Treat medusahead rye within Chicken Canyon and subsequent reseeding
- Through fencing or structural methods, improve spring sources in Chicken Canyon and Coyote Canyon
- Implement Wild Horse and Burro Gather to lower the population back to Appropriate Management Level

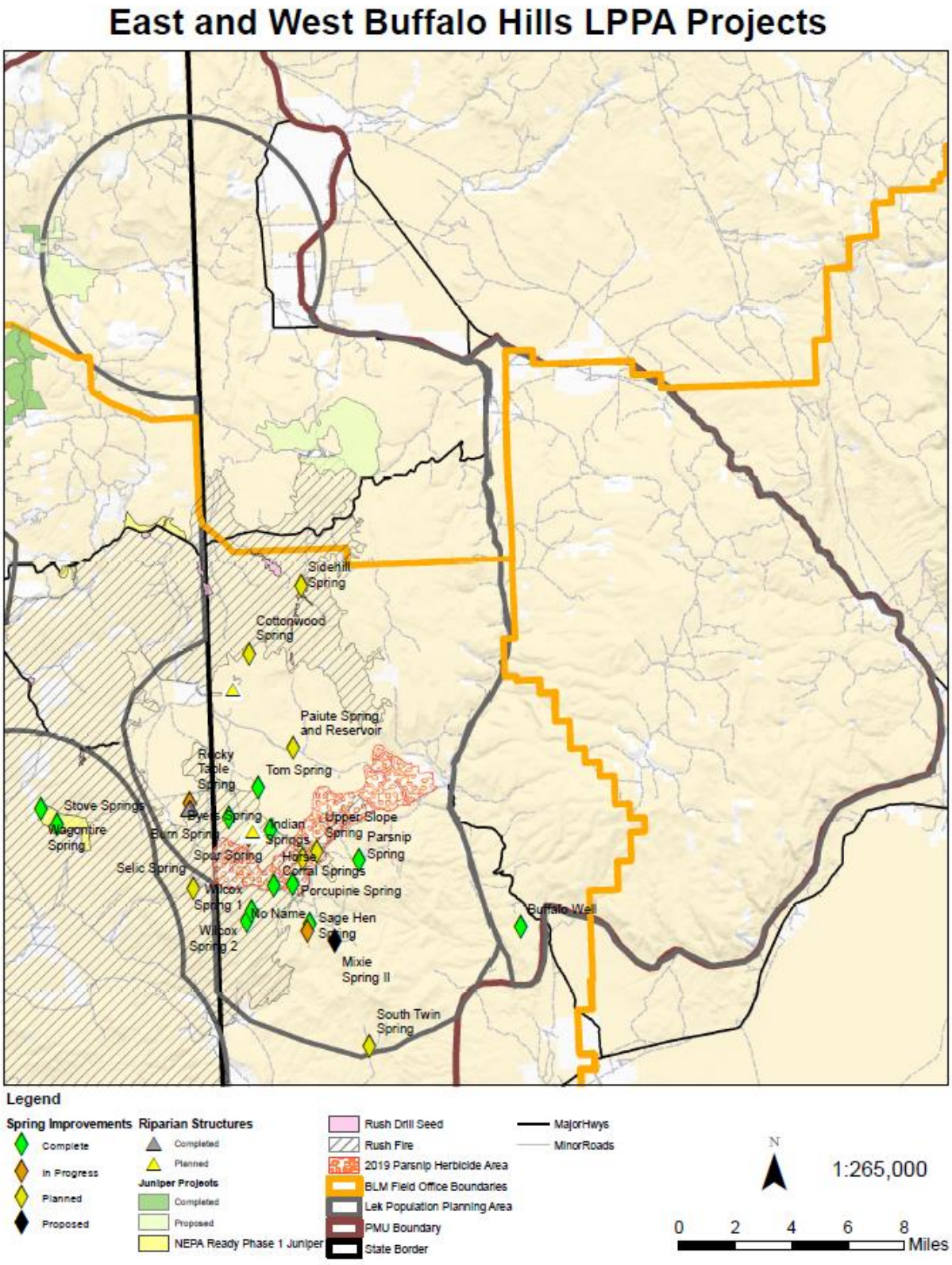

Figure 29. Projects within the East Buffalo Hills LPPA and West Buffalo Hills LPPA.

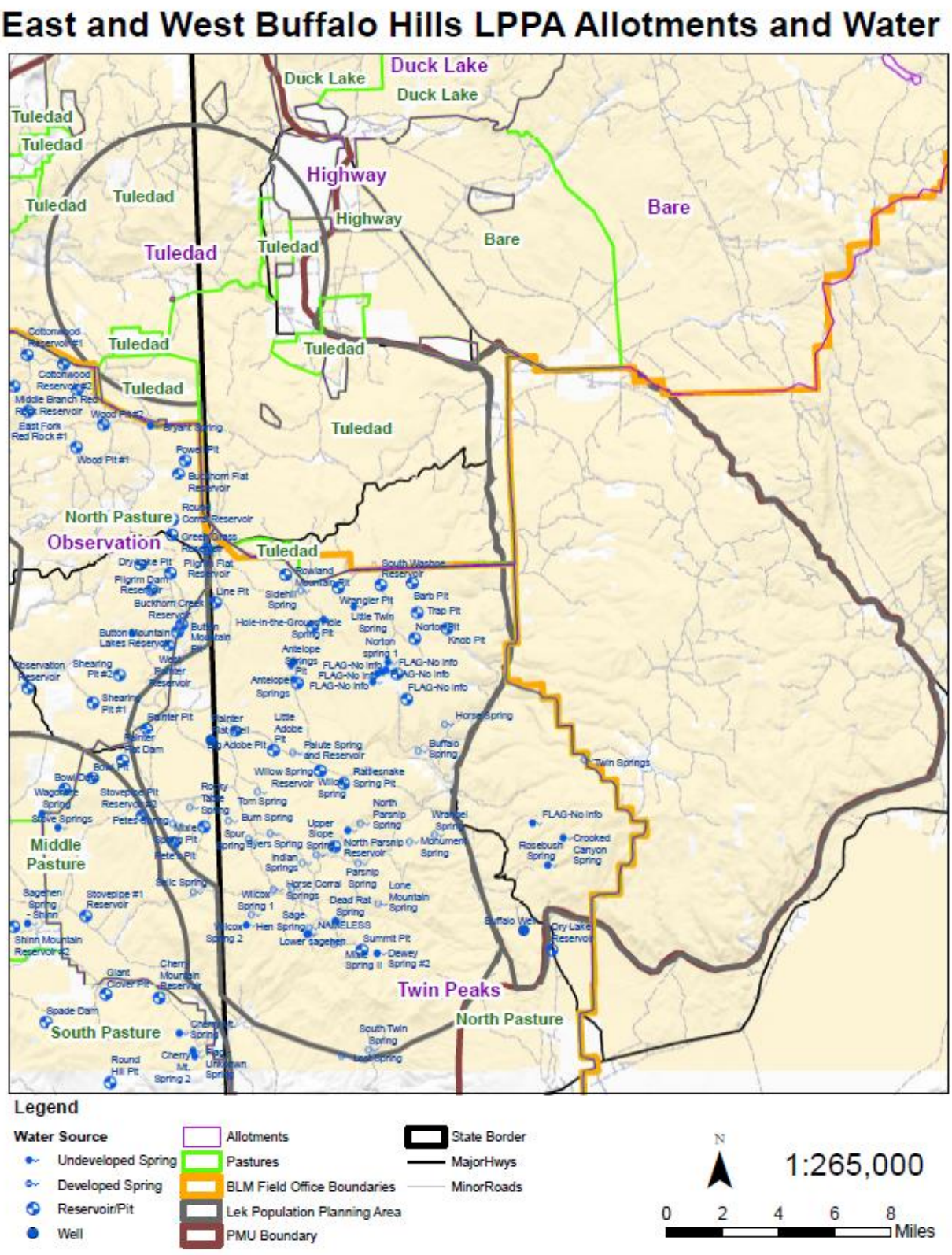

Figure 30. Allotments and water sources within the East Buffalo Hills LPPA and West Buffalo Hills LPPA.

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Appendices

A. Land Health Monitoring

B. Fire and Invasive Assessment Tool and Greater Sage-grouse and Project Planning Areas

C. LPPA Maps and Tables

D. Table of Active and Historic Leks

Appendix A: Land Health Monitoring

I. Process for Establishing California BLM's Standards and Guidelines

Standards and Guidelines were developed by the Northeast California Resource Advisory Council (RAC), which is organized to operate within the old Susanville District boundaries. An Environmental Impact Statement (EIS) was initiated to address impacts to the land associated with standards and guidelines developed by California BLM's RACs. The *Rangeland Health Standards and Guidelines for California and Northwestern Nevada Final EIS* (USDI 1998) was completed and distributed in April 1998. The Record of Decision was issued by the State Director in June of 1999 (USDI 1999a). The Secretary of The Interior approved the Record of Decision July 13, 2000 (USDI 2000). On June 1, 1999, The California State Director issued an Instruction Memorandum addressing the development of land health standards stating: "we have formulated a statewide process to adopt California's Rangeland Health Standards as the standards for Land Health (USDI 1999b)." Hereafter in this document Rangeland Health Standards shall be referred to as Land Health Standards or Standards for Land Health.

II. Land Health Assessment Process (LHA)

A Land Health Assessment is a stand-alone report designed to ascertain compliance with the Rangeland Health Standards and Guidelines for California and Northwestern Nevada. The report describes a land health assessment of BLM-administered public lands to gauge whether conditions are currently meeting Rangeland Health Standards, relative to site potential, as defined in 43 Code of Federal Regulations 4180.1. The five standards of rangeland health for Nevada and California are the following: 1) Upland soils, 2) Streams, 3) Water Quality, 4) Riparian and Wetland Sites, and 5) Biodiversity. In the evaluation, the BLM determines whether the assessment area meets or fails to meet these standards, and if failing, completes a causal factor analysis to determine which actions contribute to the failure to meet rangeland health standards.

Assessment, Inventory, and Monitoring (AIM), Landscape Monitoring Framework (LMF), Habitat Assessment Framework (HAF), and Proper Functioning Condition (PFC) can be components of a Land Health Assessment. Performance of Land Health Assessments within the Eagle Lake Field Office follows the guidance provided in Technical Reference 1734 – 6, Version 5 (Pellant et al. 2020).

For BLM, land health assessments are typically conducted by an Interdisciplinary (ID) Team consisting generally of a botanist, soil scientist, ecologist, wildlife biologist, and rangeland management specialist. In general, sites are selected for their representation of the area being assessed based on the overall size of the soil mapping unit, or because they require assessment to explain what issues may be present causing the site to not, or obviously, reflect the ecological site being assessed. Sites may, if appropriate, be selected both within burned areas and outside of burned areas to reflect the history of the allotment. Sites are chosen randomly using GIS, and then verified on the ground to ensure that they are representative of the soil mapping unit. The Eagle Lake Field Office area has Natural Resources Conservation Service (NRCS) Order 3 Soil Survey coverage. Order 3 level surveys produce soils mapping units that are a minimum of 1.6-16 ha which is slightly more coarse than Order 1 and 2. Order 3 surveys are based off of remotely sensed data and are verified in the field by traversing representative areas.

The status of three attributes of land health are determined at each site: 1) Soil/Site Stability, 2) Hydrologic Function, and 3) Integrity of the Biotic Community (Biotic Integrity).

Seventeen indicators are evaluated that provide the basis for determining the status of the attributes.

Table IV.B.1. Indicators of Land Health and their Application to Attributes of Land Health

Indicators	Soil/Site Stability	Hydrologic Function	Biotic Integrity
1. Rills	X	X	
2. Water Flow Patterns	X	X	
3. Pedestals and/or Terracettes	X	X	
4. Bare Ground	X	X	
5. Gullies	X	X	
6. Wind-Scoured, Blowouts, and/or Deposition areas	X		
7. Litter Movement		X	
8. Soil Surface Resistance to Erosion	X	X	X
9. Soil Surface Loss or Degradation	X	X	X
10. Plant Community Composition and Distribution Relative to Infiltration and Runoff		X	
11. Compaction Layer	X	X	X
12. Functional/Structural Groups			X
13. Plant Mortality/Decadence			X
14. Litter Amount		X	X
15. Annual Production			X
16. Invasive Plants			X
17. Reproductive Capability of Perennial Plants			X

Each indicator is rated as to its departure from the ecological site description or reference site and assigned a numerical value. There are five categories of departure:

1 = None to Slight (Healthy)

2 = Slight to Moderate (Healthy)

3 = Moderate (At Risk of Becoming Unhealthy)

4 = Moderate to Extreme (Unhealthy, Perhaps Crossing a Threshold from One State to Another)

5 = Extreme (Unhealthy, Has Crossed a Threshold)

The category that best fits the "preponderance of evidence" for each of the three attributes relative to the distribution of indicator ratings is the status of that attribute. Indicators used in the LHA process are also tied to the criteria developed by the Northeast California RAC for Standard 1 – Upland Soil and Standard 5 – Biodiversity.

III. Assessment, Inventory, and Monitoring (AIM) Strategy

The AIM Strategy was developed to address this need for a Bureau-wide, standardized set of monitoring activities that would integrate data collection and management. The strategy is intended to produce quantitative data that ensures the ability of the BLM to make "informed, defendable resource decisions", and provides a framework for reporting on resource conditions above the local scale. The general goals of the AIM strategy are to: "(1) document the distribution and abundance of natu-ral resources on public lands; (2) determine resource conditions; and (3) identify natural resource trend or change" (Toevs et al. 2011).

In 2013, the Eagle Lake and Applegate Field Offices, with help from the BLM National Operations Center (NOC) and USDA Agricultural Research Service (ARS) initiated an AIM monitoring sample design as a pilot monitoring project. The pilot sample design was redeveloped in 2014 and a 5-year sample draw was finalized. This sample design utilized Iso Cluster unsupervised classification of LandSat 8 imagery to stratify BLM land managed by both field offices into 10 strata. Four hundred thirty-six (436) base points with five, one-year panels were randomly generated evenly across strata utilizing the Generalized Random-Tessellation Stratified survey design.

The AIM program follows the AIM Strategy (Toevs et al. 2011). The AIM program uses protocols described by Herrick et al. (2005) to assess cover indicators including vegetation cover and composition, vegetation height, the proportion of a site with bare ground and large inter-canopy gaps, and soil stability. The protocols and methods of AIM provide quantitative rangeland indicators that assist BLM and non-agency staff in various capacities. AIM Data is entered into TerraDat and then accessed by BLM specialists.

BLM FOs, DOs, and SOs will work with the assessment and monitoring branch at the NOC to design a sampling strategy that conforms to the national AIM sampling strategy and provides adequate sample points in sage-grouse seasonal habitats to complete the site-scale habitat assessment data collection. BLM offices in need of additional sampling locations to complete the habitat assessment process should

use a statistically valid sampling design that conforms to the AIM strategy. FOs should coordinate with their state AIM coordinator or the NOC AIM leads to generate an appropriate sample design.

IV. Landscape Monitoring Framework (LMF)

The BLM initiated the Landscape Monitoring Framework (LMF) in 2011 as a west-wide monitoring effort on BLM land. LMF utilizes the Natural Resource Conservation Service's (NRCS) National Resources Inventory (NRI) protocol. Through an inter-agency agreement with the NRCS, NRCS teams completed annual sampling using a random, spatially balanced, west-wide sample design. LMF utilizes two paired points with a third paired overdraw point to increase the efficiency of sampling and to reduce travel time. While structurally distinct from the AIM protocol, both NRI and AIM utilize the same core monitoring methods and are comparable at the indicator level.

The Landscape Monitoring Framework (LMF) is part of AIM and collects terrestrial monitoring data to assess resources using AIM methods. LMF data, which is available across rangelands, allows for the calculation of indicator values at multiple scales and provides estimates of vegetation and soil condition trends--indicators collected at LMF points provide information for sage-grouse habitat needs *(The Greater Sage-Grouse Monitoring Framework,* BLM and USFS, May 2014).

V. Sage-grouse Habitat Assessment Framework (HAF)

The vision of the Habitat Assessment Framework (HAF) is to empower managers to implement project-level actions that make sense at landscape scales. To achieve this vision, the HAF addresses two primary subjects: (1) applying the hierarchy for implementing landscape conservation, and (2) providing the inventory and outcome-based evaluation tools necessary for assessing effectiveness of resulting conservation actions (TR 6710-1 2015).

In order to meet the requirements of the Sage-Grouse Habitat Assessment Framework (TR 6710-1), priority landscapes are identified across the species range (broad scale) and appropriate conservation actions are implemented within seasonal habitats to benefit populations (site scale). The HAF has adopted the hierarchical orders of habitat selection as described by Johnson (1980), who described four orders of habitat selection in which each higher order is dependent on the previous order. First-order selection is described as "the selection of physical or geographical range of a species" (Johnson 1980). For sage-grouse, the range is defined by populations of sage-grouse associated with sagebrush landscapes (Connelly et al. 2003). Populations or subpopulations within those populations are the second-order selection. Third-order selection is the home range of an individual bird. Location and size of a home range is determined in part by the quality and juxtaposition of resources within and between seasonal habitats. Fourth-order selection is the use of a particular nesting, feeding, or roosting site within one particular seasonal habitat. At the second order, state and regional planners and decision makers have the flexibility to design a future landscape and the location and types of actions necessary to achieve desired conditions. The resource manager has significant flexibility in evaluating third- and fourth-order habitat selection. The manager must provide an accurate estimate of populations, subpopulations, seasonal-use habitats, and ecological site potentials to effectively coordinate and design appropriate conservation actions (TR 6710-1 2015).

VI. Riparian Proper Functioning Condition (PFC)

Riparian Proper Functioning Condition can be used as a qualitative method for assessing the condition of riparian and wetland areas. The term PFC is used to describe both the assessment process, and a defined, on-the-ground condition of a riparian area. The on-the-ground condition termed PFC refers to how well the physical processes are functioning. PFC is a state of resiliency that will allow a riparian area to hold together during high flow events with a high degree of reliability.

Riparian and upland plants are rated by the probability of where they occur. A rating was developed through a thorough review of botanical literature and professional judgment of national and regional experts. Plant species are assigned a rating that represents the estimated probability, or frequency, with which it is thought to occur in wetlands as opposed to non-wetlands. This rating system is published by the Army Corp of Engineers and is used by many state and federal agencies, non-governmental agencies and in the private sector mostly in the U.S. (Lichvar, et. al. 2012).

Indicator Status	**% Occurrence in Wetlands**	**Examples**
Obligate Wetland (OBL). Almost always occur in wetlands. Plants (woody and herbaceous) found in standing water, or seasonally saturated soils for 14 or more consecutive days.	99	*Eleocharis acicularis*, needle spikerush; *Nasturtium officinale*, watercress
Facultative Wetland (FACW). Usually occur in wetlands but occasionally found in non-wetlands.	67-99	*Juncus balticus*, baltic rush; *Mentha arvensis*, wild mint
Facultative (FAC). Equally likely to occur in wetlands and non-wetlands. Can occur in hydric, mesic or xeric habitats.	34-66	*Populus tremuloides*, quaking aspen; *Leymus cinereus*, Great Basin wild rye
Facultative Upland (FACU). Usually occur in non-wetlands but occasionally found in wetlands. Predominantly occur on drier or more mesic sites where water rarely saturates the soil or where it floods soil surface seasonally.	1-33	*Carex douglasii*, Douglas sedge; *Prunus virginiana*, common chokecherry
Obligate Upland (UPL). Almost never occur in wetlands. Plants occupy mesic to xeric non-wetland habitats. They almost never occur in standing water or saturated soils.	1	*Artemisia tridentata*, big sagebrush; *Elymus elymoides*, bottlebrush squirreltail

Appendix B: Fire and Invasive Assessment Tool and Greater Sage-grouse and Project Planning Areas

The Fire and Invasive Assessment Tool (FIAT) is a multi-agency, range-wide assessment that incorporates resistance and resilience concepts as committed to in the Greater Sage-Grouse Land Use Plan Amendments (BLM 2015b). In an ecological context, resistance is the ability of an ecosystem to remain unchanged when subjected to a disturbance, and resilience is the ability of an ecosystem to recover from a disturbance. The FIAT process looks at contributing factors to the loss of GRSG habitat including wildfire, conifer expansion, and invasive annual grasses. The objective of FIAT assessments is to identify priority habitat areas and management strategies to reduce the impacts on GRSG from invasive annual grasses, wildfires, and conifer expansion. In addition, these assessments are designed to provide the USFWS with regulatory certainty on the extent, location, and rationale for management opportunities that address significant threats to GRSG.

The Western Great Basin/Warm Springs Valley FIAT team assessed and identified broad Project Planning Areas (PPAs) and associated proactive and reactive management strategies and vegetation treatments focused on the four program areas (fuels management, fire operations, habitat restoration and recovery, and post-fire rehabilitation management). In the Buffalo-Skedaddle Population Management Unit, 7 PPAs were designated: North Horse Lake, Shinn, Shaffer Mountain Connectivity, Madeline Plains Connectivity, Madeline Plains, Duck Lake, and Wall Canyon.

Appendix C: LPPA Maps and Tables

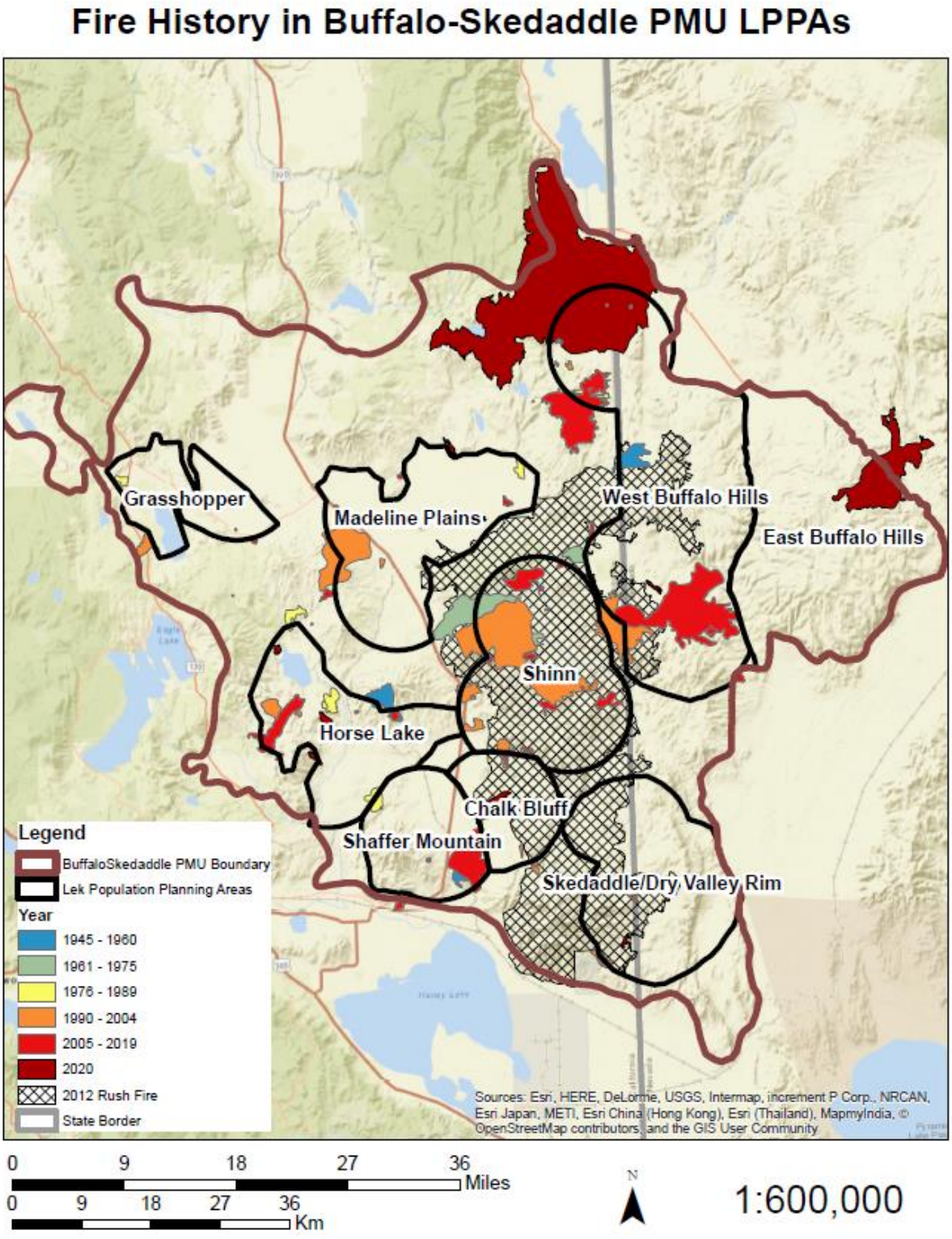

Figure 32. Fire history in the Buffalo-Skedaddle PMU LPPAs.

Table 9. Number of acres burned in each LPPA from 1945 to 2020.

Year	Chalk Bluff	East Buffalo Hills	Grasshopper	Horse Lake	Madeline Plains	Shaffer Mountain	Shinn	Skedaddle/Dry Valley Rim	West Buffalo Hills	Total acres burned in each year within LPPAs
1945									77	**77**
1954									2069	**2069**
1958				533		761				**1294**
1961							8715			**8715**
1964									78	**78**
1977			377							**377**
1979									1119	**1119**
1985				478	490	663				**1631**
1987				1194						**1194**
1988				123						**123**
1990	112				5667		12089			**17869**
1994									199	**199**
1996					140		32	208		**380**
1999									12	**12**
2001			63							**63**
2002				1604			4850			**6453**
2003	1			24			2081		4371	**6477**
2004	253						702			**955**
2006					36		3626		66	**3727**

Year	Chalk Bluff	East Buffalo Hills	Grasshopper	Horse Lake	Madeline Plains	Shaffer Mountain	Shinn	Skedaddle/Dry Valley Rim	West Buffalo Hills	Total acres burned in each year within LPPAs
2011									23	**23**
2012	24611				2134	37	104705	40374	39769	**211630**
2015							111		3137	**3248**
2017	288		24			5722	739	120	18753	**25646**
2018			14			66				**80**
2019				3240	15	55			20	**3330**
2020	577	8115		722	39			242	20738	**30431**
Total acres burned in each LPPA	**25843**	**8115**	**477**	**7918**	**8521**	**7304**	**137648**	**40944**	**90432**	**327202**

Table 10. Number of acres burned in each fire within LPPAs from 1954 to 2020.

Fire Name	Year	Chalk Bluff	East Buffalo Hills	Grasshopper	Horse Lake	Madeline Plains	Shaffer Mountain	Shinn	Skedaddle/ Dry Valley Rim	West Buffalo Hills	Total acres burned in each fire within LPPAs
	1945									77	**77**
	1954									2069	**2069**
S.P.R.R.	1958						761				**761**
SNOWSTORM	1958				533						**533**
LIGHTNING #20	1961							8715			**8715**
HARRISON SPRINGS	1964									78	**78**
LIGHTNING #127	1977			377							**377**
	1979									1119	**1119**
	1985				478	490	663				**1631**
	1987				1194						**1194**
	1988				123						**123**
	1990	112				5667		12089			**17869**
	1994									199	**199**
	1996								208		**208**
OBSERVA	1996							32			**32**
RAVE	1996					140					**140**
COPPER	1999									12	**12**
GRASSHOPPER	2001			63							**63**
BLACK	2002				1512						**1512**
HORSE	2002				91						**91**
RUSH	2002							4850			**4850**
SECRET	2003							1016			**1016**
SHINN	2003							595			**595**
SKEDADDLE	2003	1									**1**

Fire Name	Year	Chalk Bluff	East Buffalo Hills	Grasshopper	Horse Lake	Madeline Plains	Shaffer Mountain	Shinn	Skedaddle/ Dry Valley Rim	West Buffalo Hills	Total acres burned in each fire within LPPAs
SMOKE	2003							470		4371	**4841**
SNOWSTORM	2003				24						**24**
STONEY	2004	253						702			**955**
OBSERVATION COMPLEX	2006					36		3626		66	**3727**
HOG	2011									23	**23**
MARR	2012					227					**227**
RUSH	2012	24611				1868	37	104705	40374	39769	**211364**
TERMO	2012					39					**39**
DODGE	2015									3077	**3077**
S1 DUCK	2015									30	**30**
S2 COAL	2015									30	**30**
SHINN	2015							111			**111**
CHERRY	2017							25			**25**
LONE	2017									215	**215**
MUD	2017	187					5678				**5866**
PEG	2017			24							**24**
R-10 PAINTER	2017							84			**84**
R-2 BUTTE WELL	2017						17				**17**
R-2 SCHAFFER	2017						27				**27**
R-3 MUD	2017	100									**100**
R-4 PARSNIP	2017									18538	**18538**
R-4 RANCH	2017								120		**120**
R-5 SPANISH	2017							148			**148**
R-5 STONEY	2017	1						203			**204**
R-9 SHINN	2017							278			**278**

Fire Name	Year	Chalk Bluff	East Buffalo Hills	Grasshopper	Horse Lake	Madeline Plains	Shaffer Mountain	Shinn	Skedaddle/ Dry Valley Rim	West Buffalo Hills	Total acres burned in each fire within LPPAs
TERMO	2018			14							**14**
TUMBLEWEED	2018						66				**66**
COPPER	2019									20	**20**
HORSE	2019				53		55				**108**
R1 JUNIPER	2019					4					**4**
R1 RANCH	2019				2899						**2899**
R2 RAVEN	2019					11					**11**
R2 SNOWSTORM	2019				24						**24**
SNOWSTORM	2019				264						**264**
W-4 TERMO	2020					13					**13**
R-5	2020				472						**472**
R-1 MAPES	2020				63						**63**
R2 - Trumbull	2020	577									**577**
W-5 Cold Springs	2020									20522	**20522**
R-5 Dry	2020								44		**44**
Horn	2020					25					**25**
R-3 LITTLE FREDOYNER	2020				187						**187**
R-3 SKEDDADLE	2020								198		**198**
Poodle	2020		8115								**8115**
R-6 MIXIE FLAT	2020									216	**216**
Total acres burned in each LPPA		**25843**	**8115**	**477**	**7918**	**8521**	**7304**	**13764 8**	**40944**	**90432**	**327202**

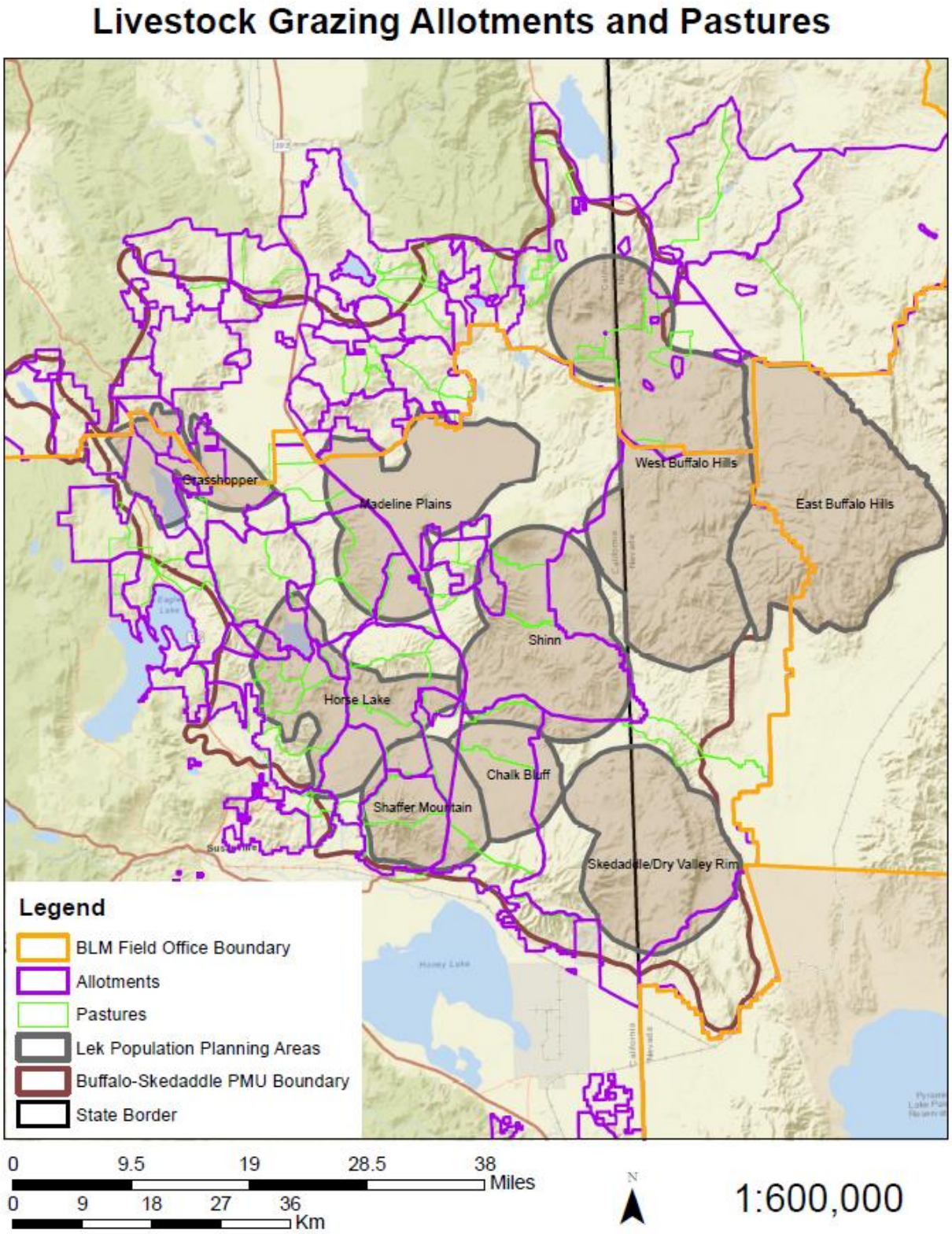

Figure 33. Livestock grazing allotments and pastures within the Buffalo-Skedaddle PMU.

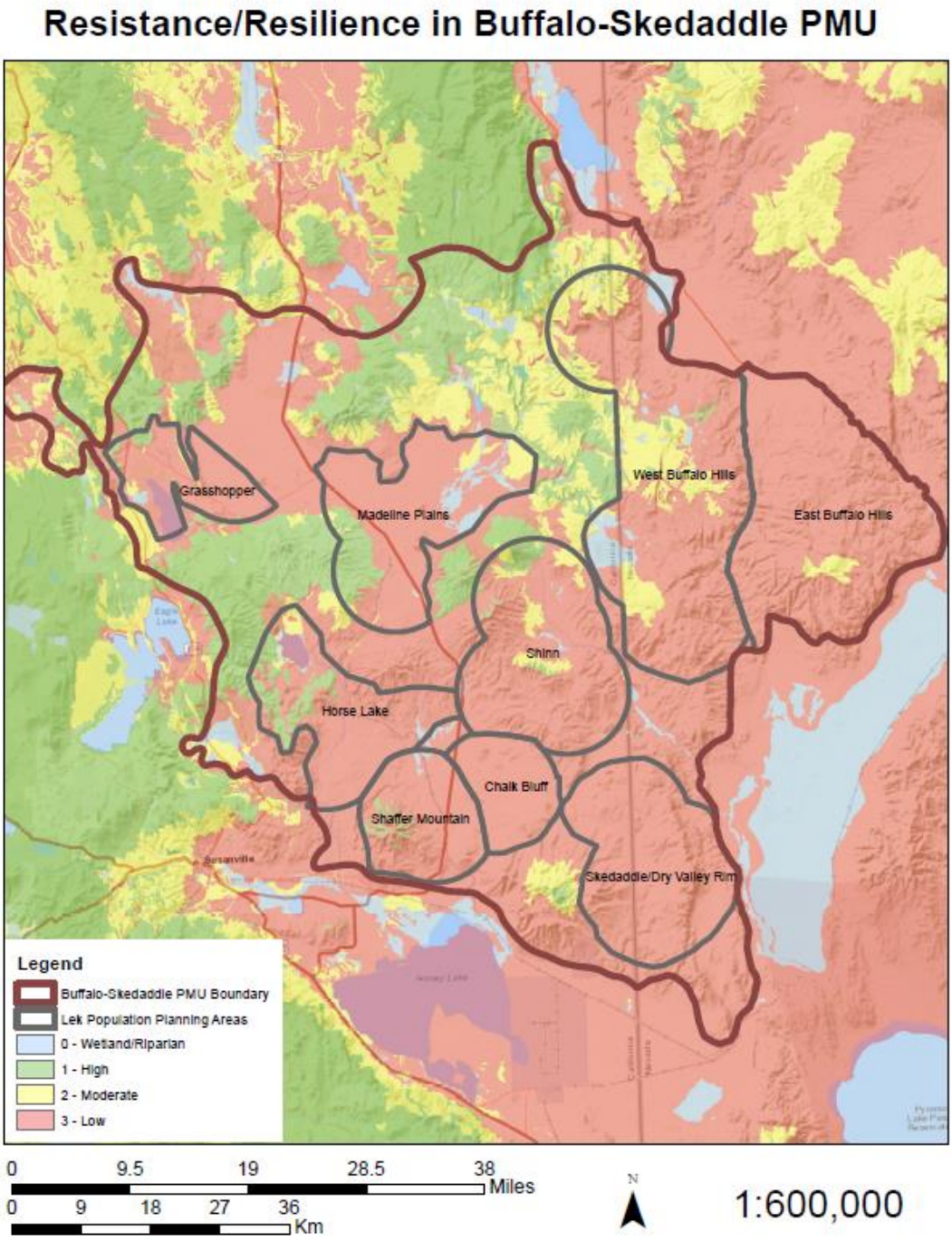

Figure 34. Resistance and resilience classes within the Buffalo-Skedaddle PMU. In an ecological context, resistance is the ability of an ecosystem to remain unchanged when subjected to a disturbance, and resilience is the ability of an ecosystem to recover from a disturbance.

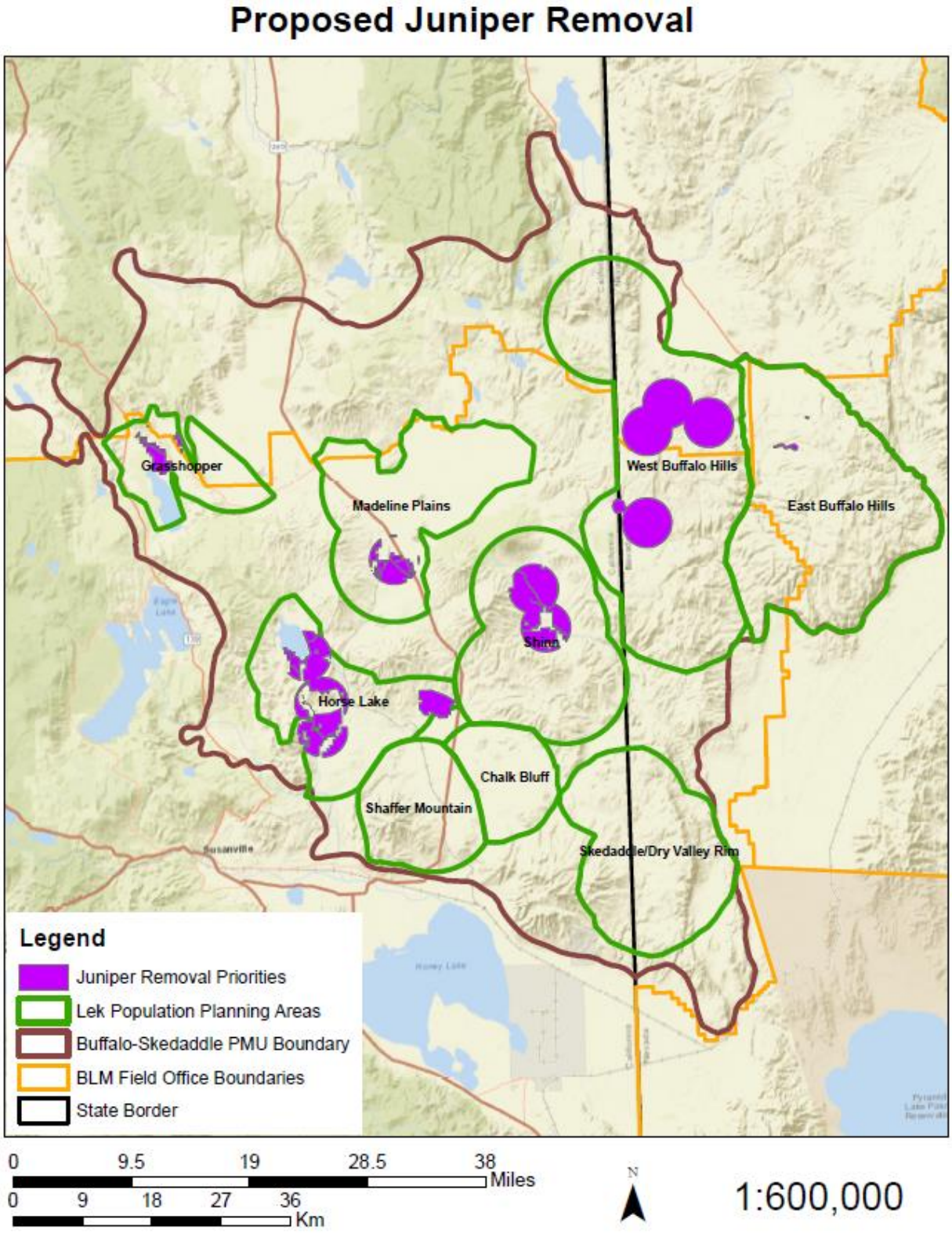

Figure 35. Proposed areas for juniper removal within the Buffalo-Skedaddle PMU.

Appendix D: Summary of Peak Lek Records

Table 1. Summary of peak lek records for leks within the Buffalo-Skedaddle PMU. Active leks are defined as having two or more males present for at least two of the last five years. If 2 or more males were observed only once in the last 5 years with no other visits conducted, the lek is considered "pending active." A lek status of inactive is where 0 or 1 male(s) was observed during every visit (minimum 2 visits) in the last 5 years. A historic lek is where 0 or 1 male(s) was observed during every visit (minimum 5 visits) in the last 30 years. If none of these conditions are met, the lek status is unknown. A status of "not a lek" means no males were ever recorded.

Complex	ID	Last Year Males Recorded	Last year visited	Status	Number of Years Visited from 1953-2021	Number of Non-zero Peak Records from 1953-2021	Percent Birds Present	State
5 Springs	LAS0058	N/A	2012	Not a lek	2	0	0	CA
5 Springs	LAS0059	N/A	2012	Not a lek	1	0	0	CA
Chalk	LAS0071	2021	2021	Active	35	34	97	CA
Chalk	LAS0072	1996	2014	Unknown	6	3	50	CA
Chalk	LAS0055	1973	2014	Unknown	6	2	33	CA
Chalk	LAS0142	1996	2014	Unknown	2	1	50	CA
Chalk	LAS0138	1990	2014	Unknown	2	1	50	CA
Chalk	LAS0139	1990	2014	Unknown	2	1	50	CA
Chalk	LAS0140	1990	2014	Unknown	2	1	50	CA
Chalk	LAS0141	N/A	2014	Not a lek	2	0	0	CA
Chalk	LAS0022	N/A	2002	Not a lek	2	0	0	CA
Chalk	LAS0137	1988	1988	Unknown	1	1	100	CA
Chalk/LMF	LAS0076	1994	2014	Unknown	7	1	14	CA
Chalk/LMF	LAS0075	1991	2014	Unknown	12	5	42	CA
Chalk/LMF	LAS0073	1993	2014	Unknown	8	2	25	CA
Chalk/LMF	LAS0074	1971	2014	Unknown	7	2	29	CA
Chalk/LMF	LAS0136	1990	1990	Unknown	1	1	100	CA
Chicken Ranch	LAS0172	2021	2021	Active	6	6	100	CA
Coyote	LAS0007	1994	2013	Unknown	7	4	57	CA

Complex	ID	Last Year Males Recorded	Last year visited	Status	Number of Years Visited from 1953-2021	Number of Non-zero Peak Records from 1953-2021	Percent Birds Present	State
Coyote Flat	LAS0043	N/A	2013	Not a lek	2	0	0	CA
Demolition	LAS0052	1972	2002	Unknown	2	1	50	CA
Demolition	LAS0053	N/A	2002	Not a lek	1	0	0	CA
Dodge	LAS0069	2003	2017	Unknown	9	3	33	CA
Dodge	LAS0041	1994	2017	Unknown	10	3	30	CA
Dodge	LAS0150	2007	2017	Unknown	7	4	57	CA
Dodge	LAS0156	2006	2017	Unknown	6	3	50	CA
Dodge	LAS0155	2004	2008	Unknown	4	1	25	CA
Dodge	LAS0154	2004	2008	Unknown	4	1	25	CA
Dodge	LAS0152	2004	2008	Unknown	4	1	25	CA
Dodge	LAS0110	N/A	1992	Not a lek	2	0	0	CA
Eastside	LAS0101	N/A	2016	Not a lek	1	0	0	CA
Gilman	LAS0011	2021	2021	Active	36	36	100	CA
Gilman	LAS0127	2011	2011	Unknown	3	2	67	CA
Gilman	LAS0063	1994	2008	Unknown	19	14	74	CA
Gilman	LAS0065	2002	2005	Unknown	3	1	33	CA
Gilman/Shaffer	LAS0165	2020	2021	Active	14	11	79	CA
Gilman/Shaffer	LAS0090	1970	2014	Unknown	9	4	44	CA
Grasshopper	LAS0168	2021	2021	Active	10	9	90	CA
Grasshopper	LAS0105	2011	2020	Inactive	39	29	74	CA
Grasshopper	LAS0044	1964	2006	Unknown	6	1	17	CA
Hall	LAS0057	2021	2021	Active	37	37	100	CA
Hall	LAS0162	2005	2014	Unknown	5	1	20	CA
Hall	LAS0135	2006	2014	Unknown	5	3	60	CA
Hayden	LAS0124	2005	2019	Inactive	17	9	53	CA
Hayden	LAS0148	2004	2019	Inactive	7	1	14	CA
Hayden	LAS0149	2004	2019	Unknown	6	1	17	CA

Complex	ID	Last Year Males Recorded	Last year visited	Status	Number of Years Visited from 1953-2021	Number of Non-zero Peak Records from 1953-2021	Percent Birds Present	State
Hayden	LAS0039	1990	2010	Unknown	5	1	20	CA
Hayden	LAS0038	N/A	2007	Not a lek	3	0	0	CA
Hayden	LAS0024	N/A	2006	Not a lek	2	0	0	CA
Hayden	LAS0023	1990	2006	Unknown	2	1	50	CA
Horse Lake	LAS0106	2021	2021	Active	27	19	70	CA
Horse Lake	LAS0169	2012	2014	Unknown	3	1	33	CA
Horse Lake	LAS0116	2002	2014	Unknown	5	1	20	CA
Horse Lake	LAS0170	N/A	2012	Not a lek	1	0	0	CA
LBM	LAS0159	2021	2021	Active	8	4	50	CA
LBM	LAS0077	2016	2021	Inactive	36	31	86	CA
LMF	LAS0087	1991	2014	Unknown	21	15	71	CA
LMF	LAS0025	1990	2014	Unknown	2	1	50	CA
LMF	LAS0130	1990	2014	Unknown	2	1	50	CA
Madeline	LAS0002	2014	2020	Inactive	29	21	72	CA
Madeline	LAS0003	2002	2016	Unknown	18	11	61	CA
Madeline	LAS0015	2005	2014	Unknown	5	1	20	CA
Madeline	LAS0060	2000	2014	Unknown	10	6	60	CA
Madeline	LAS0062	1990	2014	Unknown	3	1	33	CA
None	LAS0128	2003	2015	Unknown	5	1	20	CA
None	LAS0019	1996	2014	Unknown	8	2	25	CA
None	LAS0089	N/A	2014	Not a lek	3	0	0	CA
None	LAS0086	1953	2014	Unknown	4	1	25	CA
None	LAS0082	1956	2014	Unknown	4	2	50	CA
None	LAS0122	2000	2014	Unknown	2	1	50	CA
None	LAS0113	1956	2014	Unknown	4	2	50	CA
None	LAS0088	1973	2014	Unknown	11	5	45	CA
None	LAS0117	1974	2014	Unknown	2	1	50	CA

Complex	ID	Last Year Males Recorded	Last year visited	Status	Number of Years Visited from 1953-2021	Number of Non-zero Peak Records from 1953-2021	Percent Birds Present	State
None	LAS0081	1990	2014	Unknown	4	3	75	CA
None	LAS0078	N/A	2013	Not a lek	3	0	0	CA
None	LAS0118	1995	2013	Unknown	11	1	9	CA
None	LAS0040	N/A	2013	Not a lek	3	0	0	CA
None	LAS0108	N/A	2008	Not a lek	4	0	0	CA
None	LAS0042	N/A	2003	Not a lek	3	0	0	CA
None	LAS0121	2002	2002	Unknown	1	1	100	CA
None	WAS0009	1993	2002	Unknown	4	1	25	CA
None	LAS0030	N/A	2002	Not a lek	1	0	0	CA
None	LAS0049	N/A	2002	Not a lek	2	0	0	CA
None	LAS0050	N/A	2002	Not a lek	1	0	0	CA
None	LAS0068	N/A	2001	Not a lek	2	0	0	CA
None	LAS0031	1970	2001	Unknown	10	6	60	CA
None	LAS0029	N/A	2001	Not a lek	1	0	0	CA
None	LAS0132	N/A	1994	Not a lek	2	0	0	CA
None	LAS0111	1956	1964	Unknown	6	4	67	CA
None	LAS0027	N/A	1990	Not a lek	1	0	0	CA
None	LAS0028	N/A	1990	Not a lek	1	0	0	CA
None	LAS0032	N/A	Never visited	Not a lek	0	0	N/A	CA
None	LAS0114	N/A	1984	Not a lek	1	0	0	CA
None	LAS0115	N/A	1984	Not a lek	1	0	0	CA
None	LAS0133	N/A	Never visited	Not a lek	0	0	N/A	CA
Pea Creek	LAS0171	2016	2018	Inactive	6	4	67	CA
Pea Creek	LAS0020	1991	2014	Unknown	6	1	17	CA
Pea Creek	LAS0021	1991	2013	Unknown	5	1	20	CA

Complex	ID	Last Year Males Recorded	Last year visited	Status	Number of Years Visited from 1953-2021	Number of Non-zero Peak Records from 1953-2021	Percent Birds Present	State
Pete's Creek	LAS0120	2021	2021	Active	21	20	95	CA
Pete's Valley	LAS0047	1966	2013	Unknown	6	3	50	CA
Pete's Valley	LAS0048	N/A	1965	Not a lek	1	0	0	CA
Rush	LAS0112	2019	2019	Active	22	21	95	CA
Rush	LAS0161	2005	2014	Unknown	5	1	20	CA
Shaffer	LAS0004	2021	2021	Active	55	55	100	CA
Shaffer	LAS0091	1987	2012	Unknown	2	1	50	CA
Shinn	LAS0001	2021	2021	Active	43	42	98	CA
Shinn	LAS0046	1953	2014	Unknown	4	1	25	CA
Shinn	LAS0045	2002	2014	Unknown	6	4	67	CA
Shinn	LAS0014	2001	2014	Unknown	2	1	50	CA
Shinn Dawn	LAS0164	2021	2021	Active	14	13	93	CA
Shinn Dawn	LAS0158	1987	2014	Unknown	2	1	50	CA
Skedaddle	WAS0002	2021	2021	Active	35	35	100	CA
Skedaddle	WAS0009	N/A	2018	Not a lek	1	0	0	CA
Skedaddle	LAS0067	1967	2017	Unknown	6	2	33	CA
Skedaddle	LAS0051	1971	2002	Unknown	5	4	80	CA
Skedaddle	WAS0004	2000	2001	Unknown	4	3	75	CA
Spanish Springs	LAS0080	2019	2021	Active	28	26	93	CA
Spanish Springs	LAS0079	2003	2014	Unknown	15	6	40	CA
Spanish Springs	LAS0109	N/A	2005	Not a lek	2	0	0	CA
Spanish Springs	LAS0056	N/A	2002	Not a lek	1	0	0	CA
Spencer	LAS0119	2000	2014	Unknown	9	1	11	CA
Spencer	LAS0096	1997	2014	Unknown	20	7	35	CA
Spencer	LAS0097	1990	2014	Historic	6	1	17	CA
Spencer	LAS0093	1990	2014	Unknown	4	1	25	CA
Spencer	LAS0016	1972	2014	Unknown	3	1	33	CA

Complex	ID	Last Year Males Recorded	Last year visited	Status	Number of Years Visited from 1953-2021	Number of Non-zero Peak Records from 1953-2021	Percent Birds Present	State
Spencer	LAS0018	N/A	2002	Not a lek	1	0	0	CA
Telephone	LAS0010	2021	2021	Active	5	2	40	CA
Telephone	WAS0001	2010	2020	Inactive	36	15	42	CA
Telephone	LAS0101	2014	2020	Inactive	29	20	69	CA
Telephone	LAS0102	N/A	2003	Not a lek	2	0	0	CA
Telephone	LAS0009	N/A	2001	Not a lek	2	0	0	CA
Telephone	LAS0098	1973	1974	Unknown	5	2	40	CA
Tuledad	LAS0160	2018	2021	Pending Active	16	11	69	CA
Tuledad	LAS0126	2012	2021	Inactive	12	4	33	CA
Tuledad	LAS0034	2013	2020	Unknown	13	7	54	CA
Tuledad	LAS0166	2011	2015	Unknown	4	2	50	CA
Tuledad	LAS0037	1965	2013	Unknown	3	1	33	CA
Tuledad	LAS0054	1971	2004	Unknown	4	1	25	CA
Tuledad	LAS0033	N/A	2002	Not a lek	1	0	0	CA
Viewland	LAS0085	1953	2014	Unknown	4	1	25	CA
Viewland	LAS0084	1972	2014	Unknown	19	14	74	CA
Viewland	LAS0083	1971	2014	Unknown	14	7	50	CA
Chicken Canyon	BUSK-012	2021	2021	Active	15	17	88	NV
Chicken Canyon	BUSK-027	1975	2016	Unknown	5	1	20	NV
Chicken Canyon	BUSK-008	N/A	2015	Not a lek	5	0	0	NV
Garden Lake	BUSK-003	2019	2021	Pending Active	20	17	85	NV
Garden Lake	BUSK-004	2021	2021	Pending Active	13	3	23	NV
Garden Lake	BUSK-009	N/A	2021	Not a lek	5	0	0	NV
Garden Lake	BUSK-002	N/A	2007	Not a lek	3	0	0	NV
Gilman/Red Rock Canyon	BUSK-031	2019	2021	Unknown	5	2	40	NV
Gilman/Red Rock Canyon	BUSK-038	2019	2021	Unknown	4	1	25	NV
Gilman/Red Rock Canyon	BUSK-036	N/A	2017	Not a lek	3	0	0	NV

Complex	ID	Last Year Males Recorded	Last year visited	Status	Number of Years Visited from 1953-2021	Number of Non-zero Peak Records from 1953-2021	Percent Birds Present	State
Granite Canyon	BUSK-013	2021	2021	Active	16	12	75	NV
Granite Canyon	BUSK-015	2019	2021	Active	16	12	75	NV
Jones Flat	BUSK-011	1980	2021	Unknown	8	4	50	NV
Mixie Flat	BUSK-020	2007	2019	Unknown	4	3	75	NV
Mixie Flat	BUSK-021	2021	2021	Active	18	18	100	NV
Mixie Flat	BUSK-019	1979	2015	Unknown	3	1	33	NV
Parker Canyon/ Eastside	BUSK-037	2019	2021	Unknown	7	2	29	NV
Parker Canyon/ Eastside	BUSK-195	2021	2021	Active	5	5	100	NV
Parker Canyon/ Eastside	BUSK-196	2021	2021	Pending Active	2	2	100	NV
Parsnip	BUSK-001	2021	2021	Active	11	10	91	NV
Parsnip	BUSK-022	2019	2021	Active	16	13	81	NV
Parsnip	BUSK-042	2021	2021	Active	9	6	67	NV
Parsnip	BUSK-025	N/A	2007	Not a lek	1	0	0	NV
Parsnip	BUSK-026	N/A	2007	Not a lek	1	0	0	NV
Parsnip	BUSK-024	N/A	2007	Not a lek	2	0	0	NV
Parsnip	BUSK-023	N/A	1980	Not a lek	1	0	0	NV
Rush Creek/Shin Ranch	BUSK-028	2009	2021	Unknown	7	6	86	NV
Rye Patch Canyon	BUSK-006	2016	2018	Unknown	8	1	13	NV
Rye Patch Canyon	BUSK-007	N/A	2021	Not a lek	3	0	0	NV
Rye Patch Canyon	BUSK-005	N/A	2014	Not a lek	4	0	0	NV
Sawmill	BUSK-017	2021	2021	Pending Active	14	11	79	NV
Sawmill	BUSK-016	2007	2021	Unknown	11	3	27	NV
Sawmill	BUSK-018	1981	2021	Historic	8	1	13	NV
Skedaddle South	BUSK-033	2021	2021	Active	32	19	59	NV
Skedaddle South	BUSK-039	2018	2019	Active	5	4	80	NV
Skedaddle South	BUSK-035	2021	2021	Active	33	32	97	NV
Skedaddle South	BUSK-032	N/A	2018	Not a lek	5	0	0	NV

Complex	ID	Last Year Males Recorded	Last year visited	Status	Number of Years Visited from 1953-2021	Number of Non-zero Peak Records from 1953-2021	Percent Birds Present	State
Skedaddle South	BUSK-040	N/A	2018	Not a lek	5	0	0	NV
Skedaddle South	BUSK-041	2021	2021	Pending Active	5	3	60	NV
Stockade Flat	BUSK-014	1953	2021	Unknown	5	1	20	NV
Tuledad/Wire Lake North	BUSK-194	2016	2016	Unknown	4	3	75	NV
Tuledad/Wire Lake North	BUSK-029	2005	2009	Unknown	5	1	20	NV