Rangeland Health Assessment and Evaluation

Achieving the Idaho Standards for Rangeland Health
Bureau of Land Management
Boise District-Owyhee Field Office
Silver City Allotment (00569)

May 2019

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Acronyms

AIM	Assessment, Inventory and Monitoring
ARMPA	Approved Resource Management Plan Amendment
AUM	Animal Unit Month
BLM	Bureau of Land Management
EPA	Environmental Protection Agency
ESA	Endangered Species Act
HAF	Habitat Assessment Framework
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
ISRH	Idaho Standards of Rangeland Health
JLC	Joyce Livestock Co.
MIM	Multiple Indicator Monitoring
MLRA	Major Land Resource Area
NCA	National Conservation Area
NEPA	National Environmental Policy Act
NHD	National Hydrologic Database
NPFT	Nested Plot Frequency Transects
OHV	Off-highway vehicles
PFC	Proper Functioning Condition
PP	Photo Points
RHAE	Rangeland Health Assessments and Evaluation
RMP	Resource Management Plan
S&G	Idaho Standards for Rangeland Health and Guidelines for Livestock Grazing Management
SUA	Seasonal Use Area
TMDL	Total Maximum Daily Loads

Assessment and Evaluation Contributors

STANDARD	SPECIALIST	TITLE
Introduction/Allotment	LeeAnn Pallett	Rangeland Management Specialist (RMS)
Standard 1 - Watersheds	LeeAnn Pallett Jessa Davis	RMS Botanist-Ecologist
Standard 2 – Riparian Areas and Wetlands	Kyle Paffett	Hydrologist
Standard 3 – Stream Channel/ Floodplain	Kyle Paffett	Hydrologist
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Standard 5 - Seedings	LeeAnn Pallett	RMS
Standard 6 – Exotic Plant Communities, other than Seedings	NA	NA
Standard 7 – Water Quality	Alen Mosley	Fisheries Biologist
Standard 8 – Threatened and Endangered Plants and Animals	Jessa Davis Colleen Trese Alen Mosley	Botanist-Ecologist Wildlife Biologist Fisheries Biologist

Achieving the Idaho Standards for Rangeland Health

Field Office: Owyhee Field Office
Allotment Name/Number: Silver City 00569
Name of Permittees: Joyce Livestock CO

1 Introduction

1.1 Standards for Rangeland Health

In accordance with 43 CFR 4180 2(b) the Idaho Standards for Rangeland Health and Guidelines for Livestock Grazing Management (S&Gs) were submitted to the Secretary of the Interior, and were approved August 12, 1997. Subsequently, livestock management practices must be in conformance with these S&Gs.

In 1995, the Fundamentals of Rangeland Health were incorporated into the grazing regulations under 43 CFR 4180. It directs the Bureau of Land Management (BLM) to develop rangeland health standards at the state or local level, that, at a minimum, provide for the four fundamentals of rangeland health as defined in the regulation. In 1997, the Idaho BLM adopted Idaho Standards of Rangeland Health (ISRH) which were developed in coordination with the agency's three Resource Advisory Councils during the previous two years. The ISRH outline the BLM's rangeland management goals for the betterment of the environment and sustained productivity of the range. They were developed with the specific intent of providing for the multiple uses of public lands managed by the BLM within Idaho. Application of the standards should involve collaboration between the authorized officer, interested publics, and resource users.

There are eight ISRH; the standards applied depend upon the resources on a given piece of land. The standards are expressions of the level of physical and biological condition or degree of function required for healthy, sustainable rangelands. Rangelands should be meeting or making significant progress toward meeting the standards through proper nutrient and hydrological cycling and energy flow as determined by reviewing information on a suite of qualitative and quantitative indicators for each standard.

The eight ISRH are:
1. Watersheds
2. Riparian Areas and Wetlands
3. Stream Channel/Floodplain
4. Native Plant Communities
5. Seedings
6. Exotic Plant Communities, other than Seedings
7. Water Quality
8. Threatened and Endangered Plants and Animals

Appropriate to soil type, climate, and landform, indicators are physical and biological factors and processes that can be measured and/or observed in the field. They are used in combination to provide information necessary to determine the health and condition of the rangelands. No single indicator provides sufficient information to determine whether an area is meeting the standard(s),

and indicators considered must be appropriate for the standard and location in which they are applied. The indicators listed below each standard are not intended to be all-inclusive, and the issue of scale must be considered when evaluating each indicator. In some cases, individual isolated sites within a landscape may not be meeting the standards, but broader areas must be in proper functioning condition. Furthermore, fragmentation of habitat that reduces the effective size of large areas must also be evaluated for its consequences.

1.2 Rangeland Health Assessment and Evaluation

The Idaho BLM conducts Rangeland Health Assessments and Evaluations (RHAE) in conformance with 43 CFR 4180 and the ISRH, which include eight standards. The assessment is a synthesis of data and information available for the assessment area, and describes the historic and current management, activities and natural disturbances influencing conditions within the assessment area. The assessment identifies the areas where each standard applies, and describes the current conditions relevant to each applicable standard. Then the evaluation provides conclusions about whether or not the applicable standards are being met. Permittees, interested publics, Tribes, and state agencies are given an opportunity to provide information and data to be considered in the RHAE. The BLM requested data for the Silver City allotment in January 2015 and November 2017.

The evaluation relies upon the assessment to draw conclusions about the status of rangeland health and trends in condition. It answers two major questions:

1. Is the allotment meeting the ISRH?
2. If the allotment is not meeting the ISRH, is it making significant progress toward meeting the ISRH?

Conclusions reached in the evaluation describes all the factors and indicators and the scientific basis for each conclusion. The evaluation rationale contains descriptions of each indicator that contributes to the allotment meeting or not meeting the standards. When the evaluation concludes that one or more Standards are not being met, and significant progress is not being made, a separate Determination of Causal Factors Report is completed. Current livestock grazing management and other uses are evaluated to identify causes of any unsatisfactory conditions. Causal factors may include, but are not limited to: livestock grazing management, invasive species, wildlife, off-highway vehicles (OHV), wildlife concentration, roads and trails, or a combination of factors.

1.3 Allotment Location and Setting

The Silver City allotment (00569) is located south of Highway 78 between the towns of Murphy and Oreana, Idaho in Owyhee County (Figure ALLOT 1). The historic town of Silver City, Idaho is located in the Jordan (#5) pasture of the allotment and encompasses 5,700 acres. The allotment is divided into 11 pastures and consists of approximately 62,657 acres of BLM lands, 2,481 acres of State lands, and 5,759 acres of private lands (Figure ALLOT 2; Table ALLOT 1). The Silver City allotment is located in the Owyhee Field Office and managed under the management guidelines of the Owyhee Resource Management Plan (Owyhee RMP; USDI BLM 1999b), with the exception of 1,450 acres that are within the Morley Nelson Snake River Birds of Prey National Conservation Area (NCA) (Figure Appendix 4.1 Map 1) and are managed under the Snake River Birds of Prey NCA RMP (USDI BLM 2008).

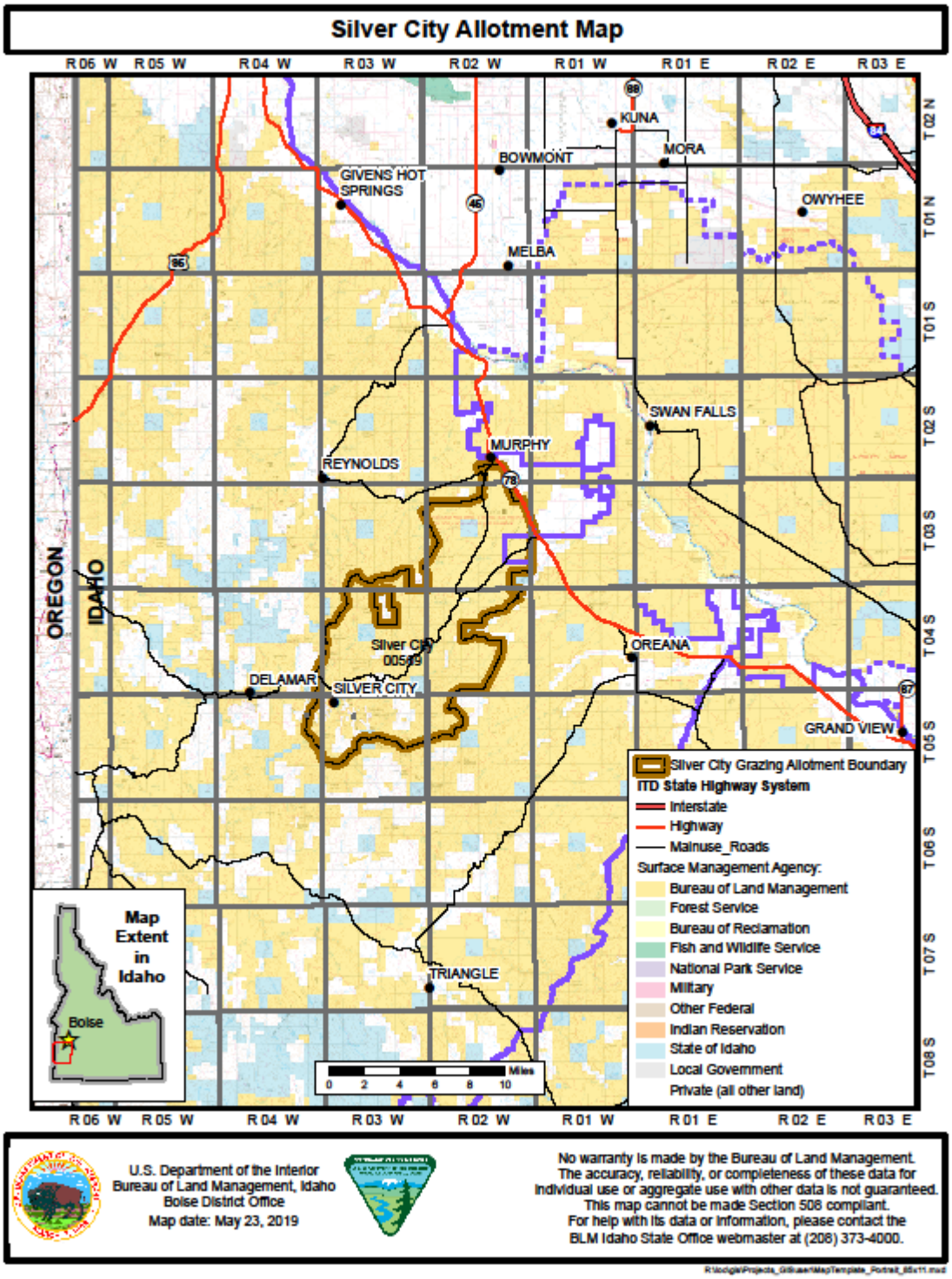

Figure ALLOT 1. Overview of the Silver City allotment

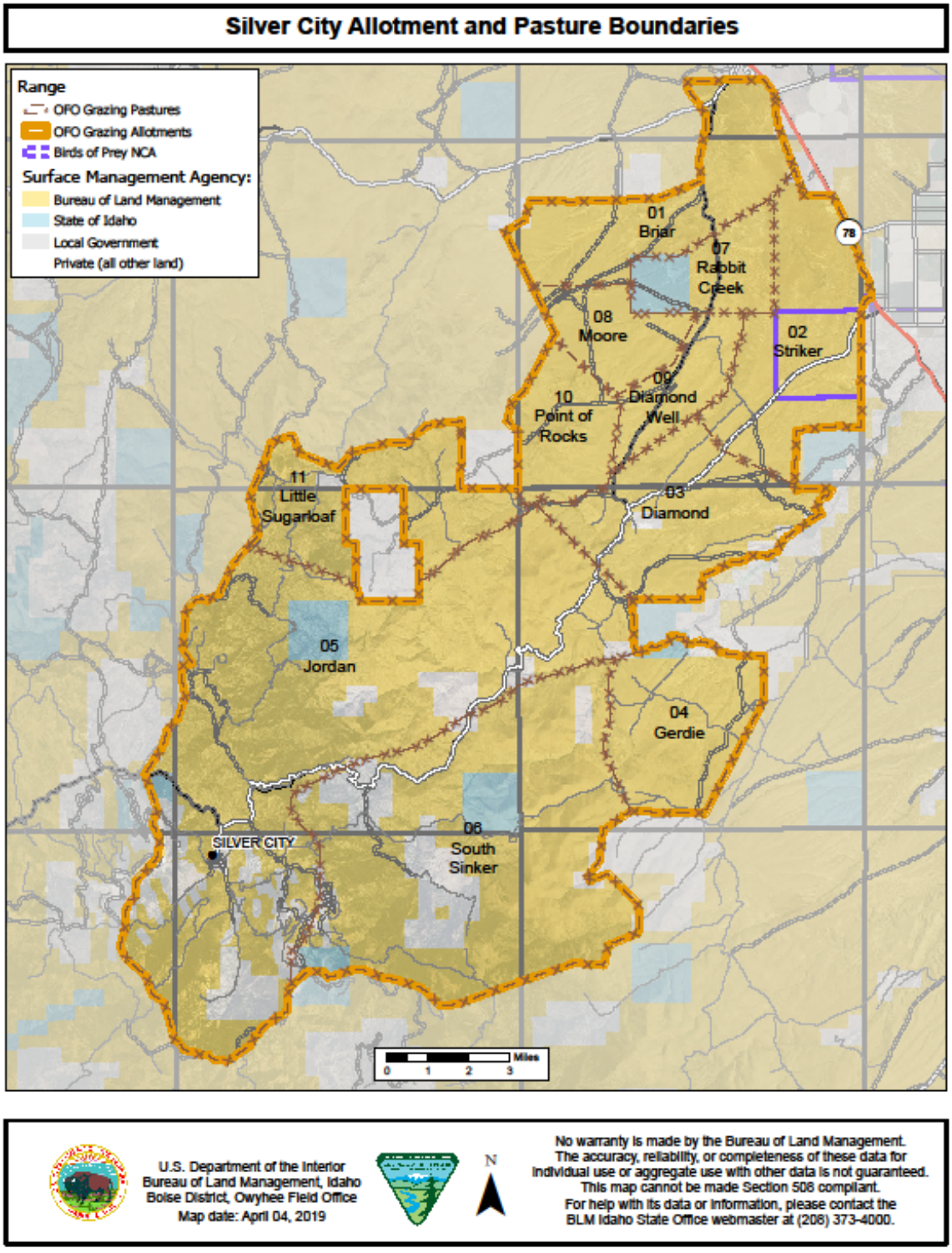

Figure ALLOT 2. Silver City allotment pasture boundaries

Table ALLOT 1. Silver City allotment land status acres by pasture

Pasture Number	Pasture Name	BLM	State	Private	Total
1	Briar	4,686	14	56	4,756
2	Striker	5,436	18	22	5,476
3	Diamond	5,023	0	240	5,263
4	Gerdie	3,907	138	88	4,133
5	Jordan	19,276	794	2,803	22,873
6	South Sinker	12,085	888	2,456	15,429
7	Rabbit Creek	1,496	629	0	2,125
8	Moore	2,016	0	0	2,016
9	Diamond Well	1,817	0	0	1,817
10	Point of Rocks	2,466	0	4	2,470
11	Little Sugar Loaf	4,449	0	90	4,539
Total Acreage		62,657	2,481	5,759	70,897

From the mid 1800s to early 1900s the southern portion of the allotment (near Silver City, Idaho) was extensively mined for silver, gold, and other mineral deposits. Remnants of mining activity are still visible in the allotment today. The southern portion of the allotment is forested with Douglas-fir, and vegetation transitions to sagebrush steppe, then to salt desert shrubs in the northernmost portions (near Murphy, Idaho).

Elevations range from 3,000 feet near Murphy to 8,050 feet on War Eagle Mountain. The elevation break of 4500 feet elevation generally characterizes ecological differences in the northern/lower elevation and the southern/higher elevation portions of the allotment (Figure APP 4.1 MAP 2). The lower elevations in the allotment are generally in USDA Major Land Resource Area (MLRA) 11- Snake River Plain, and the upper elevation areas in MLRA 25-Owyhee High Plateau. There are eight main ecological sites that vary from 8 percent to 17 percent of allotment acreage (see Section 1.5 - Ecological Sites, and Table ALLOT 5 for the ecological sites within the Silver City Allotment). Landforms consist of rolling plateaus, gently sloping basins, and steep mountain slopes. The amount of precipitation is lowest in the eastern part of the area and increases with elevation (see Section 1.11 - Climate, and Table ALLOT 6 for average precipation for the Silver City area). Precipitation occurs primarily as snow in the winter, with some rainfall in the spring and sporadically in the summer.

1.4 Livestock Grazing Management

The 2004 Silver City Allotment Final Decision, combined the Silver City allotment and the Diamond Basin allotment into what is now collectively, the Silver City allotment. At the time of the 2004 Silver City Allotment Final Decision two authorizations existed on the allotment. The two permittees grazed in common on the Silver City allotment until 2017. In 2017, Wintercamp Ranch Trust (authorization 1100455-archived) initiated a grazing preference transfer for 1,583 Animal Unit Months (AUMs)
to Joyce Livestock Co. (JLC) (authorization 1101423) on the Silver City allotment. In February 2019 the grazing preference transfer was finalized and JLC now holds both authorizations (authorization numbers 1101423 and 1100735).

The term livestock grazing permits issued to JLC total 4,771 active AUMs (Table ALLOT 2). Livestock grazing (cattle and horses) is authorized to occur between March 15 and October 31 under a grazing rotation (Table ALLOT 3). For additional information on litigation history for the documents that authorize livestock grazing on Silver City allotment, please refer to Section 1.4.2. – Ligitation History.

Table ALLOT 2. Authorized Livestock Grazing

Document	Livestock Number and Kind	Animal Unit Months (AUMs) of Use			
		Active	Suspended	Temporary Suspended	Permitted[1]
JLC 1101423					
2004 Final Decision	565 Cattle	4,076	5,128	0	9,365
	22 Horses	159	0	0	
10 Year permit 2006	565 Cattle	4,076	5,128	0	9,365
	22 Horses	159	0	0	
2013 Grazing Agreement	565 Cattle	4,076	5,128	0	9,365
	22 Horses	0	0	159	
10 Year permit 2009 to 2019	565 Cattle	4,237	5,128	0	9,524
	22 Horses	0	0	159	
JLC 1100735					
2004 Final Decision	120 Cattle	695	888	0	1,583
2013 Grazing Agreement	138 Cattle	695	888	0	1,583

[1] Permitted AUMs include rounding.

1.4.1 Grazing Rotation

The Silver City allotment grazing rotation is divided into four systems: West-Spring, East-Spring, Early Summer/Fall, and Summer Rotation Systems (Table ALLOT 3). Rotation system labels are a generalization of use periods and are not intended as descriptors for pasture seasons of use. The West-Spring System is rested in odd years and the East-Spring System is rested in even numbered years (Table ALLOT 3). The Early Summer/Fall System is comprised of two pastures and two use areas that are rotated between use periods. The Summer System is comprised of two pastures and one use area, Stobie and South Sinker are rotated throughout the summer months while the Jordan use area is used during the summer each year.

Five separate use areas were delineated inside the larger Jordan (5) and South Sinker (6) pastures to create a grazing rotation in the Early Summer/Fall Rotation and Summer Rotation Systems. This created the Foothills, North Sinker, Stobie, South Sinker, and Jordan use areas (APP 4.1 MAP 3 and MAP 4). However, due to litigation, not all fences were implemented to support the use area system. The result is the Foothills, North Sinker, Stobie, South Sinker, and Jordan use

areas are used concurrently, resulting in a longer season of use for the Jordan and South Sinker use areas.

Table ALLOT 3. Silver City grazing rotation implemented from the 2004 Silver City allotment Final Grazing Decision

Even Years			**Odd Years**		
*West-Spring Rotation System**			*West-Spring Rotation System**		
Pasture	AUMs	Season of Use	Pasture	AUMs	Season of Use
1-Briar	684	3/15 – 4/15	1-Briar	0	Rest
7-Rabbit Creek			7-Rabbit Creek		
8-Moore			8-Moore		
9-Diamond Well			9-Diamond Well		
*East-Spring Rotation System**			*East-Spring Rotation System**		
Pasture	AUMs	Season of Use	Pasture	AUMs	Season of Use
2-Striker	0	Rest	2-Striker	1,004	3/15 – 4/30
3-Diamond			3-Diamond		
4-Gerdie			4-Gerdie		
*Early Summer/Fall System**			*Early Summer/Fall System**		
Pasture	AUMs	Season of Use	Pastures	AUMs	Season of Use
10-Point of Rocks	984	4/16 – 5/31	10-Point of Rocks	331	10/1 – 10/31
11-Little Sugarloaf			11-Little Sugarloaf		
Foothills	331	10/1 – 10/31	Foothills	663	5/1 – 5/31
North Sinker	652	9/1 – 10/31	North Sinker	652	9/1 – 10/31
*Summer System**			*Summer System**		
Pasture	AUMs	Season of Use	Pasture	AUMs	Season of Use
5-Jordan	897	7/5 – 8/15	5-Jordan	897	7/5 – 8/15
Stobie	727	6/1 – 7/4	Stobie	342	8/16 – 8/31
				319	9/1 – 9/30
6-South Sinker	342	8/16 – 8/31	6-South Sinker	727	6/1 – 7/4
	320	9/1 – 9/30			

*Rotation system labels are a generalization of use periods and are not intended as descriptors for pasture seasons of use.

West-Spring Rotation System

The West-Spring rotation system is used from 3/15 to 4/15 while the East-Spring rotation system is rested. This system amounts to 684 AUMs. There is built in flexibility to this system to allow for varying climatic factors (drought years and wet years). The West-Spring rotation is utilized in even numbered years and rested in odd numbered years. The pastures in this system are; Briar, Rabbit Creek, Moore, and Diamond Well.

East-Spring Rotation System
The East-Spring rotation system is used from 3/15 to 4/15 while the West-Spring system is rested. This system amounts to 1,004 AUMs. There is built in flexibility to this system to allow for varying climatic factors (drought years and wet years). The East-Spring rotation system is utilized in odd years and rested in even years. The pastures that are included in this system are Striker, Diamond, and Gerdie.

Early Summer/Fall System
The Early Summer/Fall system is used to defer grazing during the growing season by alternating use periods between the early summer and fall. In the even years this system amounts to 1,967 AUMS and in odd years 1,646 AUMs. In even years pasture Point of Rocks and pasture Little Sugarloaf are used in the early summer 4/16 to 5/31, and in odd years is grazed in the fall 10/1 to 10/31. In even years the Foothills use area is grazed in the fall 10/1 to 10/31, and in odd years from 5/1 to 5/31. The North Sinker pasture is used from 9/1 to 10/31 every year.

Summer System
The summer system is used from 6/1 to 9/30, the Jordan use areas is the only use area in the system not on a rotation. In the even years this system amounts to 2,286 AUMs and 2,285 AUMs in odd years. The Jordan use area is used 7/5 to 8/15 every year. The South Sinker use area is used from 6/1 to 7/4 in odd years and from 8/16 to 9/30 in even years. The Stobie use area is used from 6/1 to 7/4 in even years and from 8/16 to 9/30 in odd years.

Actual Use
Based on actual use reports submitted by the livestock operator, total combined annual use ranged from 3,128 to 4,878 AUMs between 2005 and 2018 (Table ALLOT 4). Total combined active use for the allotment is 4,771 AUMs. Over the past ten years reported actual use was within the total active AUMs for the allotment.

Table ALLOT 4. Actual use for Silver City allotment

YEAR	TOTAL AUMS
2005	4,127
2006	4,209
2007	4,878
2008	4,718
2009	3,128
2010	4,642
2011	4,288
2012	4,418
AVERAGE	4,301
Average for Current Condition (Since Grazing Agreement)	
2013	4,721*
2014	4,768
2015	4,767*
2016	4,772*

YEAR	TOTAL AUMS
2017	4,772*
2018	4,076**
AVERAGE	4,646

*Billed AUMs are shown for years that actual use was not reported.
**Due to the grazing preference transfer no use could be made for authorization number 1100735 in 2018.

1.4.2 Litigation Background

The Silver City Decisions were included in a group of 1997 decisions BLM issued which were found to be in violation of the National Environmental Policy Act (NEPA), known as the Owyhee 68. The permits were re-issued in 2004, however in 2011, Western Watersheds Project filed suit in Federal Court challenging the BLM's renewal of the Silver City Allotment grazing permits, among other allotments in the Bruneau, Owyhee, and Burley Field Offices. The Court found that BLM's decisions were not consistent with their respective land use plans and therefore violated the Federal Land Policy and Management Act. The decisions also failed to make significant progress toward improving conditions for the sage-grouse and thus violated the Fundamentals of Rangeland Health regulations. Finally, the decisions violated NEPA because the agency did not conduct an analysis of the cumulative impacts of grazing over a sufficiently wide area. After issuing its finding, the Court remanded the cases to the BLM for further proceedings consistent with the Court's decision but did not vacate the grazing decisions. In response to the Court's order, BLM submitted a declaration in 2012 stating the intent to complete a range-wide multistate cumulative impact analysis in the form of the Environmental Impact Statement for the Greater Sage-grouse Resource Management Plan Amendments. BLM's 2012 declaration further agreed to renew the grazing permits included in the Battle Creek Litigation within three years of completing the RMP amendment process.

Western Watersheds Project was granted partial summary judgement which resulted in a grazing agreement between the BLM and the permittee that incorporated management guidelines to improve conditions on the allotment as mandatory terms and conditions. In addition, grazing agreement reductions of 159 AUMs for JLC were incorporated on their ten year permit as temporary suspended AUMs (Table ALLOT 2).

1.5 Ecological Sites

The Silver City allotment is within USDA Major Land and Resource Area 25-Owyhee High Plateau and 11-Snake River Plain, and consists of primarily 13 ecological sites (Caudle et al. 2013) (Table ALLOT 5; Figure APP 4.1 MAP 5). Five of the ecological sites account for less than five percent of the BLM acres within the allotment, and are not included in the table below. The ecological site does not represent current vegetation, but expected (potential) vegetation.

Table ALLOT 5. Dominant ecological sites with in the Silver City allotment

Dominant Vegetation	Ecological Site	Pasture Percent											Allotment Percent
		1	2	3	4	5	6	7	8	9	10	11	
Shadscale saltbush-Bud sagebrush/ Indian	Calcareous loam 7-10" R011XY010ID	24	51	30	12	-	-	2	53	4	3	-	11

Dominant Vegetation	Ecological Site	Pasture Percent											Allotment Percent
		1	2	3	4	5	6	7	8	9	10	11	
ricegrass, Thurber's needlegrass													
Wyoming big sagebrush/ Indian ricegrass	Sandy loam 8-12" R011XY014ID	58	29	35	34	3	2	79	-	25	46	-	17
Wyoming big sagebrush/ bluebunch wheatgrass,Thurber's needlegrass	Loamy 8-12" R011XY001ID	18	9	21	-	-	-	19	47	71	3		8
Low sagebrush/ Idaho fescue	Claypan 12-16" R025XY010ID	-	-	4	6	10	29	-	-	-	11	17	11
Mountain big sagebrush/ bluebunch wheatgrass, Idaho fescue	Loamy 13-16" R025XY011ID	-	-	-	-	7	19	-	-	-	-	62	10
Curlleaf mountain mahogany, mountain snowberry/ Idaho fescue, needlegrass	Mahogany savanna 16-22" R025XY018ID	-	-	-	-	37	11	-	-	-	-	7	14
Basin big sagebrush/ bluebunch wheatgrass	Loamy 11-13" R025XY43ID	-	-	-	-	16	10	-	-	-	28	6	8
Doughlas-fir/ Mountain snowberry	Douglas-fir snowberry 22"+ R025XY045ID		-	-	-	21	17	-	-	-	-	2	10

1.6 Soils

Soils in the northern portion (lower elevations) of this area occur on gently sloping to hilly fan terraces, foothills and structural benches. These soils formed in alluvium and residuum derived from sedimentary materials and mixed volcanics which have been influenced heavily by wind blown material. They are shallow to very deep and well drained. These soils have an aridic bordering xeric moisture regime and a mesic soil temperature regime. Major soil series in this area are the McKeeth, Tindahay, Scism, Briabbit, and Hardtrigger. These soils are associated with either a Calcareous Loam 7-10", Loamy 7-10", Sandy Loam 8-12", or Loamy 10-13" ecological site. The erosion potential from wind and/or water is low to high depending on soil surface texture and slope. The type of soil can influence susceptiblity to erosion based on the soil texture. Soil texture is a combination of sand, silt, and clay.

Soils in the southern portion (higher elevations) of this area occur on undulating to steep foothills and mountains. These soils formed in residuum and alluvium derived from intermediate intrusive rock and welded rhyolitic tuff. They are shallow to deep and well drained. These soils have a xeric soil moisture regime and a mesic or frigid soil termperature regime. Major soil series in this area are the Acrelane, Kanlee, Poison Creek, Parkay, and Wareagle. The erosion potential on the soils derived from granitic materials is moderate to very high and for soils formed in welded ryholotic tuff, low to high depending on soil surface texture and slope. Soils information for this area was obtained from the Natural Resources Conservation Service (NRCS) Soil Survey for Owyhee County Area, Idaho (USDA NRCS n.d.).

1.7 Forestry

Pastures 5, 6, and 11, in the southern portion of the Silver City allotment are forested. Stands in pastures 5 and 6 are mostly Douglas-fir with some sub-alpine fir. Pasture 11 is predominately juniper. Aspen is scattered throughout the Douglas-fir forested areas where the micro climate and soils are favorable. The density of conifers in some locations may lead to misrepresentation of total aspen cover than actually occur. There have been two timber sales/prescribed burns that are covered in more detail in the Section 1.12 - Fuels. Please refer to Section 2.1.1.5 –Forestry, for a detailed analysis of historic photographs.

1.8 Mineral Mining

Beginning in the 1860s, southwestern Idaho began to be explored, and the Idaho Territory was charted in 1863. A party of 29 men explored the Owyhee Uplands, and were among those who established Silver City (1864) where rich silver, gold, and mineral deposits were found at the Trade Dollar, Dewey, and Black Jack claims (Press of the Owyhee Avalanche 1898). Silver City and nearby War Eagle settlements contained nearly 1,000 people in 1874, with various boom and bust periods throughout the 1800s. Silver City's lode mining led to major investments to supply the town with electricity, telephone, and a rail line from Nampa, Idaho south toward Murphy, Idaho. Stage and wagon routes connected Silver City and other regional towns to this rail service (Idaho State Historical Society 1993, 1995a). During the 1860s there were discoveries in Silver City, Flint, Delamar, Florida Mountain, and South Mountain that brought Euro-American and Chinese miners to the Owyhee Mountains to extract gold, silver, and lead (Idaho State Historical Society 1987, 1989, 1995b, 1996; Wells 1976). These towns and numerous other mining camps are scattered throughout the region bearing witness to individuals and families working in and supporting economic development in this region (Fowler 2018).

Historic mining impacts are visible today throughout the area in the form of waste rock piles, mercury, adits (horizontal mine openings), shafts (vertical mine openings), and structures. Mercury was used to extract gold from other materials in many gold mining operations prior to the 1960s. The use of water and motion (i.e. sluicing, panning) has since replaced the use of mercury in many gold mining operations, due to discovery of the detrimental impacts to people and the environment from mercury and is no longer used for this purpose in the Silver City area. The BLM initiated Abandoned Mine Land inventory activities during the 1980s and 1990s in an effort to quantify the environmental and physical safety hazards on BLM managed lands. In recent years more than 30 abandoned mine physical safety hazard features have been remediated. The type of remediation implemented depends on the type of opening, the stability of an opening, and wildlife habitat within the workings, historical and/or academic needs. An undetermined number of abandoned mine openings remain within the allotment. Both commercial and recreational mining still occur in the Silver City area with active claims throughout the area.

1.9 Historic Places

The Silver City allotment contains approximately 5,700 acres of the Silver City National Register Historic District (May 19, 1972; Figure APP 4.1 MAP 6). The communities of Marsing, Murphy, Jordan Valley, Grandview, Oreana, Bruneau, and others grew during the gold rush and homesteading period of late 19th and early 20th centuries as farmers and ranchers seized expansive ranching land and fertile valley bottoms. By 1882, records show there were 24,559

head of cattle in Owyhee County (Idaho State Historical Society 1995a). Only seven years later, records indicate a minimum of 100,000 cattle; "Cattle Kings" grew in wealth and influence with the growing herds (Press of the Owyhee Avalanche 1898). Cattle and sheepherders benefitted from the Stock Raising Homestead Act of 1916, which offered a legal section of land to homesteaders for ranching (Fowler 2018).

National economic difficulties in the 20th Century affected mining and ranching industries in Owyhee County. Following a stock market crash in 1929, the United States fell into the Great Depression. New Deal programs were a major part of President Roosevelt's plan to revitalize the country. The Civilian Conservation Corps was a program for unskilled laborers to enter government-funded jobs related to conservation and development of natural resources in rural lands. Their activities in Owyhee County included developing springs and ranching infrastructure, firefighting, planting trees, and building roads, trails, and bridges. Many of these troughs, dams, roads, bridges, and other projects are still in use. Multiple Civilian Conservation Corps camps were established in towns surrounding the Boise area prior to World War II and provided labor for the agriculture and ranching industries, which continue to dominate regional economic pursuits today (Fowler 2018).

1.10 Special Designations

Approximately 1,450 acres of the 483,700 acre Morley Nelson Snake River Birds of Prey National Conservation Area (NCA) occur in Pasture 2 (Figure APP 4.1 MAP 1). The NCA was established in 1993 to protect raptor habitat along the Snake River in Ada, Elmore, Canyon, and Owyhee counties. The area contains the greatest concentration of nesting raptors in North America, consisting of sixteen unique nesting raptor species, with at least eight other raptor species using the area outside of the breeding period.

1.11 Climate

Two locations were used to compile precipitation data for the Silver City allotment due to the variation in climatic factors. Both data sets were generated using PRISM (Parameter-elevation Regressions on Independent Slope Model; PRISM Climate Group n.d.) based at Oregon State University. The first data set (Location A) is representative of the higher elevation portion of the Silver City allotment while, the second data set (Location B) is representative of the lower elevation portion of the Silver City allotment (Table ALLOT 6).

Table ALLOT 6. Precipitation for the Silver City area using PRISM

Date	Location A Elevation 3,409 ft Precipitation (Inches)	Location B Elevation 2,470 ft Precipitation (Inches)
2004	10	6
2005	12	9
2006	11	8
2007	8	6
2008	7	5
2009	10	8
2010	13	8

2011	11	8
2012	8	5
2013	7	5
2014	13	10
2015	10	7
2016	8	6
2017	14	10
Average	10	7

1.12 Fuels

Historically, there has been very little commercial forest management in the area. In the past 10 years there were two small commercial sales (Linehan Flat and War Eagle) that were focused on creating fuel reduction corridors (Table ALLOT 7). Fuels treatments in the form of prescribed burns have occurred on the allotment between 2009-2012.

Table ALLOT 7. Vegetation treatments within the silver city allotment

Date	Treatment Name	Pasture	Acres	Type of Treatment
2009	Silver City WUI	05	286	Prescribed Burn
2011	Linehan Flat	05	31.3	Mechanical Removal
2011	Silver City WUI	05	64.8	Prescribed Burn
2012	War Eagle	05	80.7	Mechanical Removal
2012	Linehan Flat	05	238.6	Prescribed Burn

1.13 Fires

Documentation of historic fires and rehabilitation treatments is limited to those that occurred after 1958. Fire history from 1958 is included in analysis to show areas that have burned multiple times, although fires less than 5 acres were not included (Table ALLOT 8). Fire history is presented in Figure APP 4.1 MAP 7, using the BLM Fire Perimeters History GIS layer (2018).

Table ALLOT 8. Fires within the Silver City allotment 1958-present

Year	Incident Name	Pasture(s)	Acres
1958	North Boulder Flat	11	4,243
1959	Silver City	03/05	6,293
1971	Murphy	02	126
1979	Striker	05/11	171
1986	New York	06	44
1988	Scotch Bob	06	149
1992	Scotch Bob	06	102
1993	Diamond Creek	11	440
1994	Sinker Cr	05/06	49
1994	Drollinger	05/06	667
1996	Rabbit Creek	11	1,000

Year	Incident Name	Pasture(s)	Acres
1997	Gertiehill	06	87
1999	Lil Hart	06	190
2001	Rough Diamond	05/06/11	8,913
2013	Sugga	11	11
2013	Brunn	11	52

1.14 Monitoring and Assessments

This assessment will focus on Utilization, Riparian Area, Trend, Indicators of Rangeland Health, and Sage-grouse Habitat Assessment Framework data collected from 2002 to 2018. In addition to this data, long-term vegetation data (trend), forest orthographic/aerial imagery from between the 1940s and early 2000s, and water quality data dating back to the 1950s are used to establish the baseline for comparisons with current conditions and long-term data trends. Data collection and analysis methods for the RHAE are described in more detail in Appendix 4.3- Monitoring Methods.

Data collected in the Silver City allotment by non-BLM parties was requested. In response, the BLM received data from the permittee (JLC) and the College of Idaho. The permittee submitted utilization data and allotment photos, which are included in the RHAE or in the project file. The College of Idaho submitted riparian plant species inventory list for multiple locations on the allotment, and these data are in the project file.

Utilization Data

The BLM conducted utilization monitoring in the Silver City allotment from 2008 to 2017. Key species method was used for monitoring forage utilization on perennial bunchgrasses. Woody browse was monitored in 2013 and 2014 in pastures 3, 5 and 10.

In December of 2018, JLC submitted utilization monitoring data collected in 2011, 2013, 2014, 2015, 2016, 2017. These utilization data are provided in Appendix 4.4 – Utilization Data. In addition, JLC submitted allotment photos collected over the years and they are in the project file.

Riparian Areas

The BLM conducted riparian and wetland area assessments and monitoring from 2007 to 2018 using the BLM lotic and lentic proper functioning condition (PFC) protocols (USDI BLM 1998, and USDI BLM 1999a; Figures APP 4.1 MAP 8 and 9) and multiple indicator monitoring (MIM) protocol (USDI BLM 2011; Figure APP 4.1 MAP 10). The data provides information on riparian and wetland conditions for Standards 2 and 3.

Trend

In the 1980s, 15 long term vegetation monitoring sites (trend) were established in the allotment (Table ALLOT 9; Figure APP 4.1 MAP 11). Eleven are nested plot frequency transects (NPFT) with photo plots and ground cover (point intercept). Four sites are photo points (PP) exclusively. These sites provide information on long term changes of plant community composition over time. Data collected since the 2003 Rangeland Health Assessment (USDI BLM 2003) are presented in Standards 1 and 4.

Table ALLOT 9. Upland Long-term vegetation monitoring in the Silver City allotment

Pasture Number	Site	Type*	Years Read	Ecological Site Name & Dominant Reference Vegetation	Ecological Site ID
1	02S02W35	NPFT	1986PP, 1991, 2002, 2008, 2013	Sandy loam 8-12” Wyoming big sagebrush/Indian ricegrass	RO11XY014ID
2	03S02W24	NPFT	1982, 1987, 1991, 2002, 2008, 2014	Calcareous loam 7-10” Saltbush-bud sage/Indian ricegrass-Thurber’s needlegrass	RO11XY010ID
3	04S02W04	NPFT	1986PP, 1991, 2002, 2008, 2010, 2014	Loamy 8-12” Wyoming big sagebrush/ bluebunch wheatgrass – Thurber’s needlegrass	RO11XY001ID
4	04S02W27	NPFT	1986, 1991, 2002, 2008, 2014	Loamy 8-12” Wyoming big sagebrush/ bluebunch wheatgrass – Thurber’s needlegrass	RO11XY001ID
5	04S03W19	NPFT	1986PP, 1991, 2002, 2008, 2014	Mahogany savanna 16-22” Mountain mahogany – snowberry/Idaho fescue-needlegrass	RO25XY018ID
6	05S03W09	NPFT	1986PP, 1991, 2002, 2008, 2014	Mountain ridge 14-18” Low sagebrush/ Idaho fescue	RO25XY042ID
7	03S02W15	NPFT	1986PP, 2009, 2013	Sandy loam 8-12” Wyoming big sagebrush/Indian ricegrass	RO11XY014ID
8	03S02W29	NPFT	1986, 2002, 2008, 2014	Calcareous loam 7-10” Saltbush-bud sage/Indian ricegrass-Thurber’s needlegrass	RO11XY010ID
8	03S02W21	PP	2014	Loamy 13 -16" Mountain sagebrush/ bluebunch wheatgrass-Idaho fescue	RO25XY011ID
9	03S02W28	NPFT	1986PP, 2002, 2008, 2014	Loamy 8-12” Wyoming big sagebrush/ bluebunch wheatgrass – Thurber’s needlegrass	RO11XY001ID
10	03S02W30	NPFT	1986PP, 2002PP, 2008, 2014	Sandy loam 8-12” Wyoming big sagebrush/Indian ricegrass	RO11XY014ID
11	04S03W02A	NPFT	1986PP, 2008PP, 2009, 2014	Loamy 13-16” Mountain sagebrush/ bluebunch wheatgrass-Idaho fescue	RO25XY011ID
11	04S03W02B	PP	1993, 2008	Shallow claypan 12-16” Low sagebrush/Idaho fescue	RO25XY010ID
11	04S03W02C	PP	1993, 2009	Shallow claypan 12-16” Low sagebrush/Idaho fescue	RO25XY010ID

Pasture Number	Site	Type*	Years Read	Ecological Site Name & Dominant Reference Vegetation	Ecological Site ID
11	04S03W35	PP	2014	Loamy 8-12” Wyoming big sagebrush/ bluebunch wheatgrass – Thurber’s needlegrass	RO11XY001ID

*PP = Photo Point; NPFT = Nested Plot Frequency Transect

Indicators of Rangeland Health

Thirty-two rangeland health field assessments were conducted in 2015 across the allotment. Indicators were assessed utilizing procedures described in the Interpreting Indicators for Rangeland Health (USDI BLM 2005). The soil site stability and hydrologic function attribute indicators provide information on resource conditions for Standard 1 (Figures APP 4.1 MAP 12 and 13), and biotic integrity attribute indicators are used for Standards 4 and 5 (Figure APP 4.1 MAP 14).

Sage-grouse Habitat Assessment Framework

Data collected to assess sage-grouse habitat suitability at the site-scale (seasonal habitat) follow protocols outlined in the Sage-grouse Habitat Assessment Framework (HAF; Stiver et al. 2015). Data was collected and HAF and BLM Assessment, Inventory and Monitoring (AIM) locations (Figure APP 4.1 MAP 15). The indicators to assess sage-grouse habitat suitability include a variety of vegetation parameters (e.g vegetation foliar cover and height suitability classes), which can also be reviewed for understanding upland vegetation conditions. HAF data provides information of vegetation conditions for Standards 1, 4, 5 and 8.

Assessment, Inventory and Monitoring

AIM data has been collected in the BLM Owyhee Field Office since 2016. Methods are described in the Monitoring Manual for Grassland, Shrubland, and Savanna Ecosystems (Herrick et al 2009). Six sites were available in the allotment due to the infancy of the program in the field office, and are combined with HAF data for analysis in this assessment (Figure APP 4.1 MAP 15). Data collected for AIM inform a number of soil and vegetative characteristics at the landscape scale. Sagebrush shape and height as well as forb abundance were added to the core methods to fufill HAF monitoring requirements. Data are utilized in Standards 1, 4, 5 and 8.

1.15 Information Sources

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2 Standards

2.1 Standard 1: Watersheds

___ Standard Does Not Apply

Watersheds provide for the proper infiltration, retention, and release of water appropriate to soil type, vegetation, climate, and landform to provide for proper nutrient cycling, hydrologic cycling, and energy flow.

Indicators may include but are not limited to:

1. The amount and distribution of ground cover, including litter, for identified ecological site or soil-plant associations are appropriate for site stability.
2. Evidence of accelerated erosion in the form of rills and/or gullies, erosional pedestals, flow patterns, physical soil crusts/ surface sealing, and compaction layers below the soil surface is minimal for soil type and landform.

This assessment of watersheds considers the following indicators and associated information sources (Table WATERSH 1).

Table WATERSH 1. Watershed indicators and associated information sources

INFORMATION SOURCE	INDICATOR	ASSUMPTION
Interpreting Indicators of Rangeland Health (IIRH) Upland Vegetation Monitoring (Trend)	Active erosional features such as rills, gullies, water flow paths, pedestals, and terracettes	Characteristics of these features may indicate soil site stability.
	Plant community composition and distribution.	Indicates the relationship between infiltration, runoff, litter production and associated decomposition.
Interpreting Indicators of Rangeland Health (IIRH)	Soil compaction	Compaction inhibits hydrologic function, limits infiltration, increases surface runoff and erosion
	Soil stability test values	Declines in stability values increase risk of water erosion.
Interpreting Indicators of Rangeland Health (IIRH) Upland Vegetation Monitoring (Trend) Assessment, Inventory and Monitoring (AIM) Habitat Assessment Framework (HAF)	Amount and distribution of plant litter	Stabilizes soil surface, promotes nutrient cycling, and retains soil moisture
	Amount and distribution of biotic soil crust cover	Stabilizes soil surface and promotes nutrient cycling, particularly in warm dry regions
Interpreting Indicators of Rangeland Health (IIRH) Upland Vegetation Monitoring (Trend)	Amount and distribution of bare soil	Bare soil is less stable than covered soil
	Short- and mid-stature perennial grass cover and frequency	Stabilizes soil surface, promotes nutrient, water, and energy cycling
	Shrub foliar cover and frequency	Stabilizes soil surface; retains snow and moisture

INFORMATION SOURCE	INDICATOR	ASSUMPTION
Assessment, Inventory and Monitoring (AIM) Habitat Assessment Framework (HAF)		

2.1.1 Rangeland Health Assessment

2.1.1.1 Indicators of Rangeland Health

Twelve of the seventeen indicators utilized in the rangeland health field assessment relate to Standard 1 – Watersheds (USDI BLM 2005). The analysis of watershed condition considers both soil/site stability and hydrologic function indicators, which are rated based on departure from a natural range of variability of physical and vegetative characteristics (Figures APP 4.1 MAP 12 and 13).

Pasture 1

Table WATERSH 2. Final rating for soil/site stability and hydrologic function in pasture 1

Pasture	Site ID	Ecological Sites	Soil/Site Stability	Hydrologic Function
1-Briar	A	Sandy Loam 8-12” Wyoming big sagebrush/ Indian ricegrass	None to Slight	Moderate
	B	Loamy 8-12” Wyoming Big Sagebrush/Indian Ricegrass/Thurber’s Needlegrass	Slight to Moderate	Moderate
	C	Calcareous Loam 7-10” Shadscale Saltbush-Bud Sagebrush/Indian Ricegrass-Thurber’s Needlegrass	Slight to Moderate	Moderate to Extreme

The three sites in Pasture 1 – Briar are Site A, representing Sandy Loam 8-12 ecological site, Site B representing Loamy 8-12 Basin Big Sagebrush- Bluebunch Wheatgrass ecological site, and Site C representing Calcareous Loam 7-10 ecological site (Table WATERSH 2). Site A was rated in the none to slight range of departure for Soil Site Stability and in the moderate range of departure for Hydrologic Function for the ecological site. Soil Site Stability is within the reference condition for the ecological site. The reduction of deep rooted bunchgrasses increases bare ground. An increase in bare ground increases the risk for establishment of cheatgrass. The root structure of cheatgrass is greatly reduced in comparison to deep rooted bunchgrasses, this reduced root structure impedes water infiltration and increase the risk of water erosion departing the site from the expected condition for Hydrologic Function. Site B was rated in the slight to moderate range of departure for Soils Site Stability and in the moderate range of departure for Hydrologic Function for the ecological site. Soil resistance to erosion is departed from the expected condition for Soil Site Stability. A decrease in deep rooted bunchgrasses reduces the sites ability to slow water flow across the site increasing the risk of erosion from overland flows departing the site from the expected condition for Hydrologic Function. Site C was rated in the slight to moderate range of departure for Soil Site Stability and in the moderate to extreme range of departure for Hydrologic Function for the ecological site. Soil loss is departed from the expected condition for Soil Site Stability. Due to the reduction in deep rooted bunchgrasses

pedestalling will continue to occur on the site as surface flows are unobstructed. Soil surface loss and degradation reduce the sites ability to support deep rooted bunchgrasses departing the site from the expected condition for Hydrologic Function.

Pasture 2

Table WATERSH 3. Final rating for soil/site stability and hydrologic function in pasture 2

Pasture	Site ID	Ecological Sites	Soil/Site Stability	Hydrologic Function
2-Striker	D	Calcareous Loam 7-10" Shadscale Saltbush-Bud Sagebrush/Indian Ricegrass-Thurber's Needlegrass	Slight to Moderate	Moderate
	F	Sandy Loam 8-12" Wyoming Big Sagebrush/Indian Ricegrass	Slight to Moderate	Moderate
	G	Loamy 8-12" Wyoming Big Sagebrush/Bluebunch Wheatgrass-Thurber's Needlegrass	Moderate	Moderate

The three sites in Pasture 2- Striker are Site D representing a Calcareous Loam 7-10 ecological site, Site F representing a Sandy Loam 8-12 Wyoming Big Sagebrush- Indian Rice Grass ecological site, and Site G representing a Loamy 8-12 Wyoming Big Sagebrush-Bluebunch Wheatgrass-Thurber's Needlegrass ecological site (Table WATERSH 3). Site D was rated in the slight to moderate range of departure for Soil Site Stability and in the moderate range of departure for Hydrologic Function for the ecological site. Pedestals, soil loss, and reduction of soil crust are departed from the expected condition for Soil Site Stability. Scarcity of deep rooted bunchgrasses alters infiltration and increases the risk for water erosion. Continued pedestaling exacerbates water erosion by concentrating water flow events departing the site from the expected conditions for Hydrologic Function. Site F was rated in the slight to moderate range of departure for Soil Site Stability and in the moderate range of departure for Hydrological Function for the ecological site. Litter movement, water flow patterns, and soil loss are departed from the expected condition for Soil Site Stability. The scarcity of deep rooted bunchgrasses reduces the sites ability to slow overland flow events resulting in water erosion departing the site from the expected condition for Hydrologic Function. Site G was rated in the moderate range of departure for Soil Site Stability and in the moderate range of departure for Hydrologic Function for the ecological site. A reduction in infiltration increases the risk for soil erosion from overland flow. Pedestals are the result of water eroding around the crown of bunchgrasses and are therefore evidence of water erosion at a site.

Pasture 3

Table WATERSH 4. Final rating for soil/site stability and hydrologic function in pasture 3

Pasture	Site ID	Ecological Sites	Soil/Site Stability	Hydrologic Function
3-Diamond	E	Calcareous Loam 7-10" Shadscale Saltbush –Bud Sagebrush	Slight to Moderate	Moderate
	I	Loamy 8-12"	Slight to Moderate	Moderate

Pasture	Site ID	Ecological Sites	Soil/Site Stability	Hydrologic Function
		Wyoming Big Sagebrush/Bluebunch Wheatgrass-Thurber's Needlegrass		
	J	Sandy Loam 8-12" Wyoming Big Sagebrush-Indian Ricegrass	Moderate	Moderate

The three sites in Pasture 3 – Diamond are Site E representing Calcareous Loam 7-10 Shadscale Saltbush –Bud Sagebrush ecological site, Site I representing Loamy 8-12 Wyoming Big Sagebrush/Bluebunch Wheatgrass-Thurber's Needlegrass ecological site, and J representing Sandy Loam 8-12 Wyoming Big Sagebrush-Indian Ricegrass ecological site (Table WATERSH 4). Site E was rated in the slight to moderate range of departure for Soil Site Stability and in the moderate range of departure for Hydrologic Function for the ecological site. Waterflow patterns, pedestals, bare ground, soil loss, and compaction are departed from the expected condition for Soil Site Stability. An increase in fine litter with no perennial bunchgrasses increases the risk for litter movement. The scarcity of large perennial bunchgrasses and soil crusts has altered the sites ability to infiltrate water departing the site from the expected condition for Hydrologic Function. Site I was rated in the slight to moderate range of departure for Soil Site Stability and in the moderate range of departure for Hydrologic Function for the ecological site. Pedestals, water flow patterns, bare ground, and soil loss are departed from expected conditions for Soil Site Stability. Scarcity of large perennial bunchgrasses and biotic crust reduces the infiltration potential of the site. Reduced infiltration affects water availability limiting the vegetative potential of the site departing the site from the expected condition for Hydrologic Function. Site J was rated in the moderate range of departure for Soil Site Stability and Hydrologic Function for the ecological site. Terracettes and water flow patterns were common and connected, evidence of overland water flows, due to the lack of deep rootedbunchgrasses, which do not provide for sufficient interception of overland flows or water retention. These grasses facilitate infiltration by capturing water and allowing it to percolate down through the soil profile. In comparison, shallow rooted bunchgrasses like Sandberg does not provide for optimal percolation of water through the soil profile for effective use by plants. When precipitation is not able to infiltrate into the soil profile the risk of overland flow events increases, increasing the risk of soil erosion and decreasing the amount of moisture to plant roots

Pasture 4

Table WATERSH 5. Final rating for soil/site stability and hydrologic function in pasture 4

Pasture	Site ID	Ecological Sites	Soil/Site Stability	Hydrologic Function
4-Gerdie	U	Loamy 10-13" Wyoming Big Sagebrush/Bluebunch Wheatgrass	Moderate to Extreme	Moderate
	V	Sandy loam 8-12" Wyoming Big Sagebrush/Indian Ricegrass	Slight to Moderate	Moderate

The two sites in Pasture 4- Gerdie are Sites U representing Loamy 10-13 Wyoming Big Sagebrush/Bluebunch Wheatgrass ecological site and V representing Sandy loam 8-12 Wyoming Big Sagebrush/Indian Ricegrass ecological site (Table WATERSH 5). Site U was rated in the moderate to extreme range of departure for Soil Site Stability and in the moderate range of

departure for Hydrological function for the ecological site. Reduced infiltration increases the risk for overland flow events resulting in water erosion. Pedestals can exacerbate water erosion by concentrating water flow and/or changing infiltration. Concentrated water flow and/or changing infiltration can elevate and/or create new pedestals effectively increasing water erosion. Site V was rated in the slight to moderate range of departure for Soil Site Stability and in the moderate range of departure for Hydrologic Function for the ecological site. Pedestals, soil loss, bare ground, and soil surface resistance to erosion are departed from the expected condition for Soil Site Stability. Reduced infiltration increases the risk for overland flow events resulting in water erosion. Pedestals can exacerbate water erosion by concentrating water flow and/or changing infiltration. Concentrated water flow and/or changing infiltration can elevate and/or create new pedestals effectively increasing water erosion departing the site from the expected condition for Hydrologic Function.

Pasture 5

Table WATERSH 6. Final rating for soil/site stability and hydrologic function in pasture 5

Pasture	Site ID	Ecological Sites	Soil/Site Stability	Hydrologic Function
5-Jordan	GG	Mountain Ridge 14-18” Low Sagebrush/Bluebunch Wheatgrass	Slight to Moderate	Slight to Moderate
	O	Mahogany Savanna 16-22” Curl-leaf Mountain Mahogany-Moutain Snowberry/Idaho Fescue- Needlegrass	Slight to Moderate	Slight to Moderate
	P	Loamy 16+ Mountain Big Sagebrush /Idaho Fescue	None to Slight	Slight to Moderate
	T	Mahogany Savana 16-22” Curl-leaf Mountain Mahogany- Moutain Snowberry/Idaho Fescue- Needlegrass	Moderate	Slight to Moderate
	Y	Loamy 16+ Mountain Big Sagebrush/Idaho Fescue	Slight to Moderate	Moderate
	Z	Mahogany Savanna 16-22” Curl-leaf Mountain Mahogany- Moutain Snowberry/Idaho Fescue- Needlegrass	Slight to Moderate	Moderate

The six sites in Pasture 5- Jordan are Site P representing Loamy 16+ Mountain Big Sagebrush /Idaho Fescue ecological site, Site O representing Mahogany Savanna 16-22 Curl-leaf Mountain Mahogany-Moutain Snowberry/Idaho Fescue- Needlegrass ecological site, Site T representing Mahogany Savana 16-22 Curl-leaf Mountain Mahogany- Moutain Snowberry/Idaho Fescue-Needlegrass ecological site, Site Y representing Loamy 16+ Mountain Big Sagebrush Idaho Fescue ecological site, Site Z representing Mahogany Savanna 16-22 Curl-leaf Mountain Mahogany- Moutain Snowberry/Idaho Fescue- Needlegrass ecological site, and Site GG representing Mountain Ridge 14-18 Little Sagebrush/Bluebunch Wheatgrass ecological site (Table WATERSH 6). Site P was rated in the none to slight range of departure for Soil Site Stability and in the slight to moderate range of departure for Hydrologic Function for the ecological site. Soil Site Stability is within the reference condition for the ecological site. Infiltration and erosion resistance are departed from expected condition for Hydrologic Function. Site O was rated in the slight to moderate range of departure from expected conditions for Soil Site Stability and Hydrologic Function for the ecological site. Infiltration, soil erosion, pedestals,

and water flow patterns are departed from expected conditions for Soil Site Stability and Hydrologic Function. Site T was rated in the moderate range of departure for Soil Site Stability and Hydrologic Function for the ecological site. A reduction in infiltration limits the amount of water that can percolate into the soil profile. When absorption of water into the soil profile is reduced water flow patterns are created increasing the risk of soil erosion. Site Y was rated in the slight to moderate range of departure for Soil Site Stability and in the moderate range of departure for Hydrologic Function for the ecological site. Soil departure, water flow patterns, pedestals, and soil loss are departed from expected condition for Soil Site Stability. A reduction in deep rooted bunchgrasses hinders infiltration as deep rooted bunchgrasses allow water to percolate down through the soil profile. Reduced infiltration at a site increases the risk for soil erosion as water moves readily across the site. Further a reduction in deep rooted bunchgrasses reduces the number of obstructions able to slow water flow across the site. Site Z was rated in the slight to moderate range of departure for Soil Site Stability and in the moderate range of departure for Hydrologic Function for the ecological site. Rills, water flow patterns, pedestals, and soil loss are departed from expected condition for Soil Site Stability. A reduction in deep rooted bunchgrasses hinders infiltration as water is able to percolate down through the soil profile. Reduced infiltration increases the risk of overland flow events and the potential for water erosion to occur. Soil movement is evident by the forming of pedestals. Pedestals increase the risk of soil loss during overland flow events as water is able to move through the site unobstructed. Site GG was rated in the slight to moderate range of departure for Soil Site Stability and Hydrologic Function for the ecological site. While rocks and vegetation are protecting the soil, soil erosion was observed leaving the site departed from the expected condition.

Pasture 6

Table WATERSH 7. Final rating for soil/site stability and hydrologic function in pasture 6

Pasture	Site ID	Ecological Sites	Soil/Site Stability	Hydrologic Function
6-South Sinker	FF	Douglas-fir/mountain snowberry 22-32”	None to slight	None to Slight
	R	Loamy 13-16” Mountain Big Sagebrush/Bluebunch Wheatgrass-Idaho Fescue	Moderate	Moderate
	S	Loamy 13-16” Mountain Big Sagebrush/Bluebunch Wheatgrass-Idaho Fescue	Slight to Moderate	Moderate

The three sites in Pasture 6- South Sinker are Site R representing Loamy 13-16 Wyoming Big Sagebrush/Bluebunch Wheatgrass- Idaho Fescue ecological site, S representing Loamy 13-16 Wyoming Big Sagebrush/Bluebunch Wheatgrass-Idaho Fescue ecological site, and FF Douglas-fir/mountain snowberry 22-32 ecological site (Table WATERSH 7). Site R was rated in the moderate range of departure for Soil Site Stability and Hydrologic Function for the ecological site. Scarcity of deep rooted bunchgrasses has reduced infiltration increasing the risk of water erosion. Water erosion leads to pedestalling and water flow patterns proliferating erosion and reducing the sites ability to support deep rooted bunchgrasses. Site S was rated in the slight to moderate range of departure for Soil Site Stability and in the moderate range of departure for

Hydrologic Function for the ecological site. Soil loss and litter movement are departed from expected condition for Soil Site Stability. Scarcity of deep rooted bunchgrasses reduces infiltration increasing the risk of water erosion subsequently increasing the risk of soil loss departing the site from the expected condition for Hydrologic Function. Site FF was rated in the none to slight range of departure for Soil Site Stability and for Hydrologic Function for the ecological site. Both Soil Site Stability and Hydrologic Function are within the reference condition for the ecological site.

Pasture 7

Table WATERSH 8. Final rating for soil/site stability and hydrologic function in pasture 7

Pasture	Site ID	Ecological Sites	Soil/Site Stability	Hydrologic Function
7-Rabbit Creek	L	Loamy 8-12" Wyoming Big Sagebrush/Bluebunch Wheatgrass-Thurber's Needlegrass	Moderate	Moderate to Extreme
	M	Sandy Loam 8-12" Wyoming Big Sagebrush/Indian Ricegrass	Slight to Moderate	Moderate

The two sites in Pasture 7-Rabbit Creek are Sites L representing Loamy 8-12 Wyoming Big Sagebrush/Bluebunch Wheatgrass-Thurber's Needlegrass ecological site and Site M representing Sandy Loam 8-12 Wyoming Big Sagebrush/Bluebunch Wheatgrass-Thurber's Needlegrass ecological site (Table WATERSH 8). Site L was rated in the moderate range of departure for Soil Site Stability and in the moderate to extreme range of departure for Hydrologic Function for the ecological site. Scarcity of deep rooted bunchgrasses, forbs, and biotic crusts reduces infiltration increasing the risk for water erosion. Vegetation provides obstruction for overland flows slowing the rate at which water travels across the site reducing water erosion. Soil stability relies on proper infiltration of water to reduce the velocity and quantity of water traveling across the site. Site M was rated in the slight to moderate range of departure for Soil Site Stability and in the moderate range of departure for Hydrologic Function for the ecological site. Water flow patterns, gullies, and soil surface are departed from expected condition for Soil Site Stability. Scarcity of perennial bunchgrasses reduces infiltration. Reduced infiltration increases the risk for water erosion as water is not efficiently absorbed by the soil and allowed to move across the site departing the site from the expected condition for Hydrologic Function.

Pasture 8

Table WATERSH 9. Final rating for soil/site stability and hydrologic function in pasture 8

Pasture	Site ID	Ecological Sites	Soil/Site Stability	Hydrologic Function
8-Moore	N	Loamy 8-12" Wyoming Big Sagebrush/Bluebunch Wheatgrass-Thurber's Needlegrass	Moderate to Extreme	Moderate to Extreme
	Q	Calcareous loam 7-10" Shadscale Saltbush-Bud Sagebrush/Indian Ricegrass-Thurber's Needlegrass	Moderate	Moderate

The two sites in Pasture 8-Moore are Sites N representing Loamy 8-12 Wyoming Big Sagebrush/Bluebunch Wheatgrass-Thurber's Needlegrass ecological site and Site Q representing Calcareous loam 7-10 Shadscale Saltbush-Bud Sagebrush/Indian Ricegrass-Thurber's Needlegrass ecological site (Table WATERSH 9). Site N was rated in the moderate to extreme range of departure for Soil Site Stability and Hydrologic Function for the ecological site. Soil instability results from a scarcity of deep rooted bunchgrasses. The large unground root structure of deep rooted perennial bunchgrasses stabilizes soil and facilitates infiltration. Reduced infiltration increases the risk of soil erosion from overland flow events departing the site from the expected condition for Hydrologic Function. Site Q was rated in the moderate range of departure for Soil Site Stability and Hydrologic Function for the ecological site. Soil compaction reduces the infiltration of a site as field capacity is reached after a smaller volume of water has percolated down the soil profile. Once field saturation has occur overland flow events take place moving litter and sediment and depositing them in lower lying areas.

Pasture 9

Table WATERSH 10. Final rating for soil/site stability and hydrologic function in pasture 9

Pasture	Site ID	Ecological Sites	Soil/Site Stability	Hydrologic Function
9-Diamond Well	H	Loamy 8-12" Wyoming Big Sagebrush/Bluebunch Wheatgrass	Moderate	Moderate
	K	Sandy Loam 8-12" Wyoming Big Sagebrush/Indian Ricegrass	Moderate	Moderate

The two sites in Pasture 9-Diamond Well are Sites H representing Loamy 8-12 Sagebrush-Bluebunch Wheatgrass ecological site and Site K representing Sandy Loam 8-12 Wyoming Big Sagebrush/Indian Ricegrass (Table WATERSH 10). Site K was rated in the moderate range of departure for Soil Site Stability and Hydrologic Function for the ecological site. A reduction in deep rooted bunchgrasses reduces infiltration increasing the risk for water erosion and subsequent soil erosion. Site H was rated in the moderate range of departure for Soil Site Stability and Hydrologic Function for the ecological site. A reduction in deep rooted bunchgrasses reduces infiltration increasing the risk for water erosion and subsequent soil erosion.

Pasture 10

Table WATERSH 11. Final rating for soil/site stability and hydrologic function in pasture 10

Pasture	Site ID	Ecological Sites	Soil/Site Stability	Hydrologic Function
10-Point of Rocks	AA	Sandy Loam 8-12" Wyoming Big Sagebrush/Indian Ricegrass	Moderate	Moderate
	BB	Loamy 11-13" Basin Big Sagebrush/Bluebunch Wheatgrass	Moderate	Moderate

The two site in Pasture 10- Point of Rocks are Site AA representing Sandy Loam 8-12 ecological site and BB representing Loamy 11-13 Basin Big Sagebrush/Bluebunch Wheatgrass ecological

site (Table WATERSH 11). Site AA was rated in the moderate range of departure Soil Site Stability and Hydrologic Function for the ecological site. Deep rooted bunchgrasses are an obstruction for water flow reducing the risk for erosion. A reduction in deep rooted bunchgrasses increases the risk for water erosion from overland flow and pedestalling. Site BB was rated in the moderate range of departure for Soil Site Stability and Hydrologic Function from the expected conditions for the ecological site. Alteration of plant community effect a sites ability to capture and dissipate water through a site. A reduction in plant community reduces the sites ability to slow the rate at which water moves across a site and results in water erosion.

Pasture 11

Table WATERSH 12. Final rating for soil/site stability and hydrologic function in pasture 11

Pasture	Site ID	Ecological Sites	Soil/Site Stability	Hydrologic Function
11-Little Sugarloaf	CC	Loamy 13-16" Mountain Big Sagebrush /Bluebunch Wheatgrass-Idaho Fescue	Slight to Moderate	Slight to Moderate
	DD	Loamy 13-16" Mountain Big Sagebrush/Bluebunch Wheatgrass-Idaho Fescue	Slight to Moderate	Slight to Moderate
	EE	Shallow Claypan 12-16" Low Sagebrush/Idaho Fescue	Slight to Moderate	Moderate
	X	Sandy Loam 8-12" Wyoming Big Sagebrush/Indian Ricegrass	Slight to Moderate	Moderate

The four sites in Pasture 11- Little Sugarloaf are Site CC representing Loamy 13-16 Mountain Big Sagebrush /Bluebunch Wheatgrass-Idaho Fescue ecological site, Site DD representing Loamy 13-16 Mountain Big Sagebrush/Bluebunch Wheatgrass-Idaho Fescue ecological site, Site EE representing Shallow Claypan 12-16 ecological site, and Site X representing Sandy Loam 8-12 Wyoming Big Sagebrush/Indian Ricegrass ecological site (Table WATERSH 12). Site X was rated in the slight to moderate range of departure for Soil Site Stability and in the moderate range of departure for Hydrologic Function for the ecological site. Pedestals, water flow patterns, litter movement, and soil loss are departed from expected condition for Soil Site Stability. A reduction in deep rooted bunchgrasses alters infiltration and therefore increases the risk of water erosion departing the site from the expected condition for Hydrologic Function. Site CC was rated in the slight to moderate range of departure for Soil Site Stability and Hydrologic Function from the expected condition for the ecological site. Pedestals, soil resistance, and surface loss are departed from expected condition for Soil Site Stability. Site DD was rated in the slight to moderate range of departure for Soil Site Stability and Hydrologic Function from expected conditions for the ecological site. While there is not a lot of erosion or soil loss and shrub cover is high, there is heavy disturbance and a lack of deep rooted perennial grasses departing from the expected condition for Soil Site Stability and Hydrologic Function. Site EE was rated in the slight to moderate range of departure for Soil Site Stability and in the moderate range of departure for Hydrologic Function for the ecological site. Although there is a reduction in deep rooted bunchgrasses, shallow rooted bunchgrasses along with rocks obstruct water flow therefore reducing the risk for water erosion departing the site from the expected condition for Hydrologic Function.

2.1.1.2 Ground Cover

Ground cover is derived from the line point intercept (LPI) method conducted with Trend (Table ALLOT 9; Figure APP 4.1 MAP 11) and HAF/AIM monitoring points (Figure APP 4.1 MAP 15), and is categorized as bare mineral soil, rock (gravel, cobbles, bedrock, etc.), basal vegetation and litter. These metrics inform overall site stability and disposition to surface disturbance. Biotic soil crusts (cyanobacteria, mosses and lichens) are omitted from the analysis due to collection inconsistency from year to year in the HAF/AIM data. However, biotic soil crust data are brought forward for analysis from Trend. Ground cover is important for overall site stability and hydrologic function. Plant litter and biotic soil crusts help reduce overland flow and facilitate infiltration. However, high amounts of plant litter (>25%) attributed to invasive annual grasses, either standing or thatch, can prevent germination of perennial species, compete for abiotic resources and increase fuel loading during wildfire. Basal vegetation supports soils/site stability through cover and intercepting overland flow and the associated roots facilitate infiltration through the soil profile.

Ground cover categories for HAF/AIM data include bare mineral soil; litter is herbaceous material such as leaf litter from above or adjacent plants; rock has been re-classified into a single category for analysis purposes from multiple size categories to a single group which describes all rock cover classes; and basal vegetation which is from perennial species which stabilize the site. Ground cover categories for trend are similar with the exception of persistent litter versus non-persistent litter. Persistent litter describes woody litter, such as fallen branches from shrubs/trees, while non-persistent litter describes both herbaceous litter and standing annual grasses (cheatgrass, medusahead). For AIM/HAF points, shrub canopy, canopy gap and or basal gap are also included in ground cover, derived from various canopy/basal cover protocols. They are important metrics for overall site stability and ability to withstand disturbance.

Ground cover derived from trend locations portray variability over time. Ground cover from HAF/AIM represent one point in time, these plots are random and spatially balanced, placed each year and represent general vegetation characteristics. Therefore, HAF/AIM monitoring does not show vegetation trend, but instead are reflective of current ecological condition. Trend data have been statistically analyzed; static indicates no statistically significant change ($p > 0.05$), although cover may have changed over time. Change is considered to be statistically significant when the p-value is less than 0.05. It is important to note, that statistical significance does not always represent biological significance. P-values presented are for the change over the most recent and the earliest reading of a plot, which is relevant to the life of the grazing permit. See Section 1.14 Monitoring and Assessments and Appendix 4.3 Monitoring Methods for more in depth descriptions of methods.

Pasture 1

Table WATERSH 13. Ground cover from HAF/AIM methods for sites in pasture 1

Pasture 1 - Ground Cover (%)						
Year	**Bare Soil**	**Litter**	**Rock**	**Basal Vegetation**	**Shrub Canopy**	**Number of Sites**
RO11XY001ID – Loamy 8-12” Wyoming big sagebrush/Indian ricegrass-Thurber’s needlegrass						
2012	30	39	11	13	-	2
2014	44	46	2	6	2	1
RO11XY010ID – Calcareous loam 7-10” Saltbush-bud sage/Indian ricegrass-Thurber’s needlegrass						
2014	31	11	23	19	5	1
RO11XY014ID – Sandy loam 8-12” Wyoming big sagebrush/Indian ricegrass						
2012	12	19	33	6	-	1
2014	58	13	8	6	5	1
					Total Sites	6

Across assessment sites within Pasture 1, bare soil was moderately high (12 to 58 percent), and shrub canopy was low (2 to 5 percent) (Table WATERSH 13). For large statured sagebrush communities, expected shrub canopy is approximately 40 percent. There was a defoliation event within the allotment in 2013/2014, likely due to aroga moth which contributed to low sagebrush cover. At the Loamy 8-12” sites, litter was high (39 to 46 percent), which helps maintain soil stability, but at such high levels can be prohibitive to seedling recruitment. Furthermore, when litter is located within the interspaces, it can create a fuel continuum, making fire more likely and more difficult to suppress. Basal vegetation cover for the Loamy 8-12” sites was 6 to 13 percent. Although there is no standard metric for basal vegetation cover, it can be assumed that lower values represent a higher invasion/erosion potential. Using basal vegetation cover and canopy cover in concert yields a more comprehensive depiction of the site. In the Loamy 8-12” sites in pasture 1, it can be assumed there is a high invasion/erosion potential due to the generally low basal cover and low canopy cover.

Litter cover was lower than expected at the Sandy Loam sites (13 to 19 percent), and rock cover (8 to 33 percent) was higher than expected based on the ecological site description. The high rock cover can likely be attributed to minor soil inclusions which contain greater rock content. Basal vegetation was consistently low across these sites (6 percent), with low canopy cover (5 percent). At the Calcareous loam 7-10” site, bare soil was within reference conditions (31 percent), which can occasionally exceed 40 percent, with lower litter cover (11 percent) and moderate surface rock fragments (23 percent). Basal vegetation was at 19 percent, with low canopy cover (5 percent).

Table WATERSH 14. Ground cover from trend monitoring site 02S02W35 in pasture 1

Cover Type	Cover (%)			Difference between 2013 and 2002	p-value
	2002	2008	2013		
Basal Perennial Vegetation	0.25	0.25	0.00	-0.25	0.37
Persistent Litter	8.00	3.75	2.25	-5.75	0.00
Non-persistent Litter	57.00	50.00	69.00	12.00	0.04
Rock	8.75	5.25	6.00	-2.75	0.34
Bare Ground	16.00	29.75	20.00	4.00	0.22
Biotic Crust	9.50	11.00	2.75	-6.75	0.02

There was statistically significant change in persistent litter, non-persistent litter and biotic soil crusts for the time period (Table WATERSH 14; Figure WATERSH 1). Persistent litter decreased by nearly six percent, while biotic soil crusts decreased by approximately seven percent. Non-persistent litter increased by 12 percent which correlates to the decrease in biotic crust cover. All other values were static. Basal perennial vegetation is exceptionally low for this site, meaning there is little robust vegetation to capture precipitation to percolate through the soil profile. Additionally, the decrease in persistent litter illustrates further decline in woody debris to stabilize the site. Non-persistent litter indicates the continued proliferation of cheatgrass on the site which is outcompeting native species for resources.

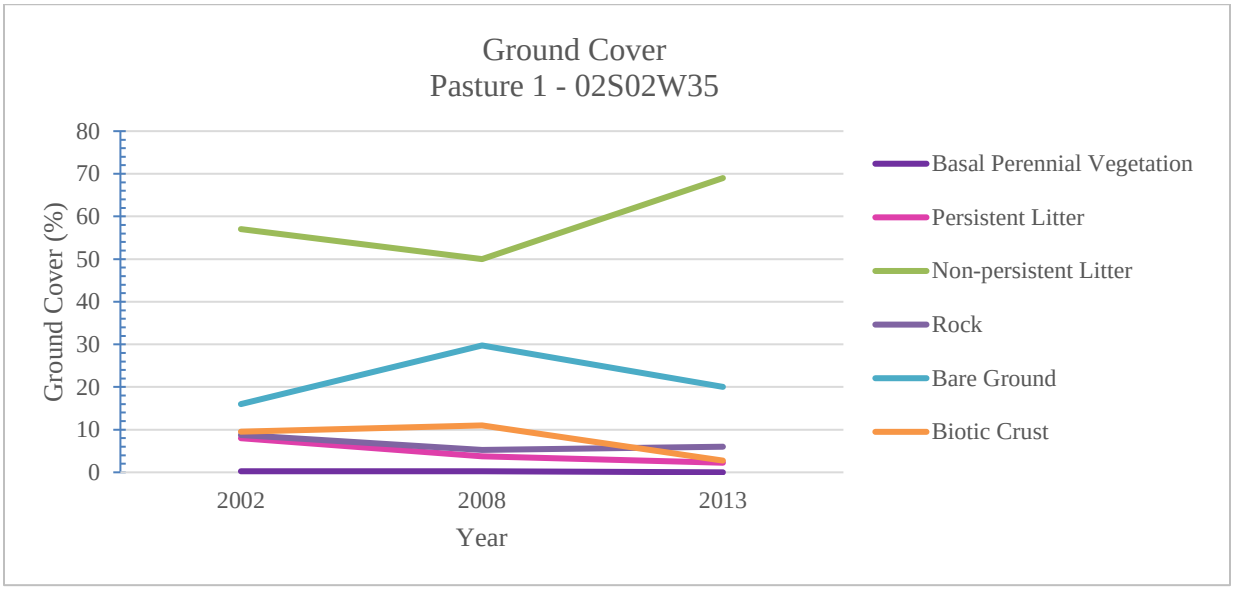

Figure WATERSH 1. Ground cover trends from monitoring site 02S02W35 in pasture 1

Overall for Pasture 1, non-persistent litter types are variable (11 to 69 percent, average 28 percent) across monitoring methods and ecological sites. Shrub cover is low, but due to a defoliation event which has caused shrub mortality and decadence across the pasture. Bare ground is moderate to high across ecological sites, and within acceptable conditions at the trend location.

Pasture 2

Table WATERSH 15. Ground cover from HAF/AIM methods for sites in pasture 2

Pasture 2 - Ground Cover (%)						
Year	**Bare Soil**	**Litter**	**Rock**	**Basal Vegetation**	**Shrub Canopy**	**Number of Sites**
RO11XY001ID – Loamy 8-12” Wyoming big sagebrush/Indian ricegrass-Thurber’s needlegrass						
2012	37	41	7	10	-	2
2014	16	23	18	11	4	2
RO11XY010ID – Calcareous loam 7-10” Saltbush-bud sage/Indian ricegrass-Thurber’s needlegrass						
2012	56	44	10	4	-	1
2014	31	11	23	19	2	1
RO11XY014ID – Sandy loam 8-12” Wyoming big sagebrush/Indian ricegrass						
2014	25	31	0	6	4	1
					Total Sites	7

Bare soil was higher than anticipated at the Loamy 8-12” sites (16 to 37 percent), although litter cover was moderate (23 to 41 percent) with variable rock cover (7 to 18 percent) (Table WATERSH 15). Litter cover is slightly higher than expected for the site, but within the range of variability. Rock cover was also within expected conditions. Basal cover was 10 to 11 percent, with low shrub canopy (4 percent).

The Calcareous loam 7-10” sites had slightly higher bare ground than reference (31 to 56 percent), and either low or moderate basal vegetation cover (4, 9 percent). The one site monitored in 2012 had high bare soil and low basal vegetation, with high litter cover, which demonstrates a susceptibility to erosion from wind/water and potential weedy invasion. Although rock cover is expected for the site (10 percent), it is insufficient to mitigate for additional disturbance, continuing departed conditions. The one location monitored in the Sandy loam 8-12” site was within expected conditions for the majority of ground cover metrics, although shrub canopy was extremely low. Shrub canopy was low across sites monitored (2 to 4 percent) due to an aroga moth defoliation event.

Table WATERSH 16. Ground cover from trend monitoring site 03S02W24 in pasture 2

Cover Type	Cover (%)			Difference between 2014 and 2002	p-value
	2002	2008	2014		
Basal Perennial Vegetation	0.50	1.75	0.75	0.25	0.37
Persistent Litter	16.00	13.75	9.75	-6.25	0.05
Non-Persistent Litter	50.25	36.50	43.25	-7.00	0.23
Rock	5.50	14.25	4.75	-0.75	0.70
Bare Ground	3.25	0.15	0.24	-3.01	0.00
Biotic Crust	24.50	19.00	17.25	-7.25	0.30

Non-persistent litter was consistently high across all years at this site, ranging from 36 to 50 percent, due to an increase in cheatgrass (Table WATERSH 16; Figure WATERSH 2). Overall, the trend for non-persistent litter was static, while persistent litter had a downward trend. Persistent litter, which helps stabilize the soil surface, decreased from 16 to 10 percent from 2002 to 2014. This could be indicative of overall loss of shrubs which provide persistent litter. This trend site is within a Calcareous loam 7-10" site which is expected to have upwards of 25 percent bare ground in some instances. The low bare ground coupled with the high non-persistent litter cover illustrate an invaded community. All indicators except basal perennial vegetation decreased, though only bare ground and persistent litter have statistically significant changes.

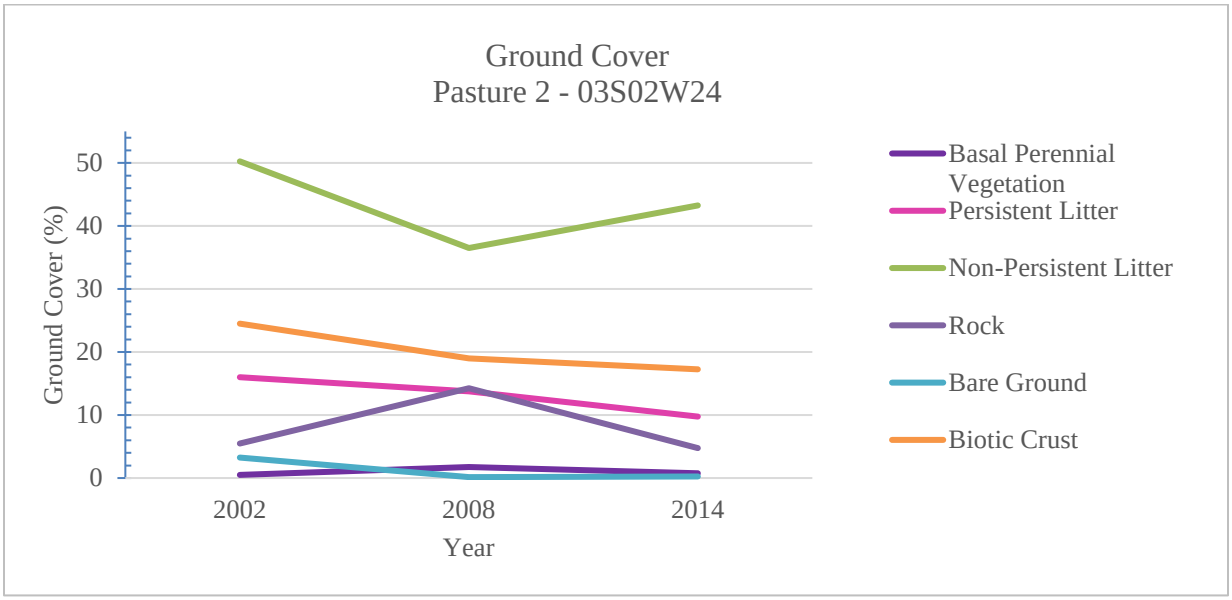

Figure WATERSH 2. Ground cover trends from monitoring site 03S02W24 in pasture 2.

Pasture 3

Table WATERSH 17. Ground cover from HAF/AIM methods for sites in pasture 3

Pasture 3 - Ground Cover (%)								
Year	**Bare Soil**	**Litter**	**Rock**	**Basal Vegetation**	**Shrub Canopy**	**Canopy Gap**	**Basal Gap**	**Number of Sites**
RO11XY001ID – Loamy 8-12” Wyoming big sagebrush/Indian ricegrass-Thurber’s needlegrass								
2012	24	24	4	28	-	-	-	1
2014	19	20	26	16	6	-	-	1
RO11XY010ID – Calcareous loam 7-10” Saltbush-bud sage/Indian ricegrass-Thurber’s needlegrass								
2012	34	38	10	0	-	-	-	1
2014	18	34	9	9	2	-	-	1
RO11XY014ID – Sandy loam 8-12” Wyoming big sagebrush/Indian ricegrass								
2012	40	36	0	14	-	-	-	1
2014	28	11	5	21	1	-	-	1
2016	10	58	22	4	-	12	75	1
							Total Sites	7

Across sagebrush ecological sites (Loamy 8-12”/Sandy loam 8-12”), bare soil is generally within reference condition, with one site being on the high end of reference (40 percent), and one being low (10 percent) (Table WATERSH 17). Litter is moderate to high across these sites as well (11 to 58 percent), with rock content being variable, which is anticipated for these sites (0 to 22 percent). Basal vegetation is also variable (0 to 28 percent), with minimal shrub canopy (1 to 6 percent). Largely, the Loamy 8-12” sites have greater site stability and ability withstand invasion/erosion due to basal vegetation cover, rock content and acceptable amounts of litter. The Sandy loam 8-12” sites are more variable, with a mixed capacity for invasion/erosion.

The saltbush site (Calcareous loam 7-10”) has moderate litter (34 to 38 percent), and variable bare soil (18 to 34 percent) which is expected for the ecological site. Rock is typical for the site, although basal vegetation and shrub canopy are low (0 to 9 percent, 2 percent respectively). Overall lack of basal vegetation and shrub canopy combined leave this site prone to weedy invasion and erosion. Although the amount of litter can be a stabilizing element, the lack of basal vegetation is indicative of degraded conditions.

Table WATERSH 18. Ground cover from trend monitoring site 04S02W04 in pasture 3

Cover Type	Cover (%)				Difference between 2014 and 2002	p-value
	2002	2008	2010	2014		
Basal Perennial Vegetation	7.00	1.75	4.50	3.25	-3.75	0.18
Persistent Litter	9.25	8.50	12.25	9.25	0.00	1.00
Non-Persistent Litter	27.75	41.25	17.75	31.50	3.75	0.13
Rock	13.50	16.50	16.50	4.75	-8.75	0.03
Bare Ground	18.25	22.75	21.75	33.50	15.25	0.00
Biotic Crust	24.25	9.25	27.25	17.75	-6.50	0.15

Non-persistent litter was moderate at this site, ranging from 18 to 41 percent (Table WATERSH 18; Figure WATERSH 3). Overall, the trend for non-persistent and persistent litter (8 to 12 percent) was determined to be static. Rock cover decreased from a high of 16 percent down to nearly 5 percent. This change was determined to be statistically significant, which additionally correlates to a dramatic increase in bare ground on the site, which was also determined to be statistically significant (18 to 33 percent). Although they were determined to not be statistically significant, a decrease in both biotic soil crust and basal perennial vegetation was shown, and is likely to be biologically significant (7 to 3 percent, 24 to 18 percent, respectively). This trend location is in a Loamy 8-12" ecological site. This location is more apt to invasion with the decrease in rock cover and increase in bare ground, although biotic crust cover is still substantial.

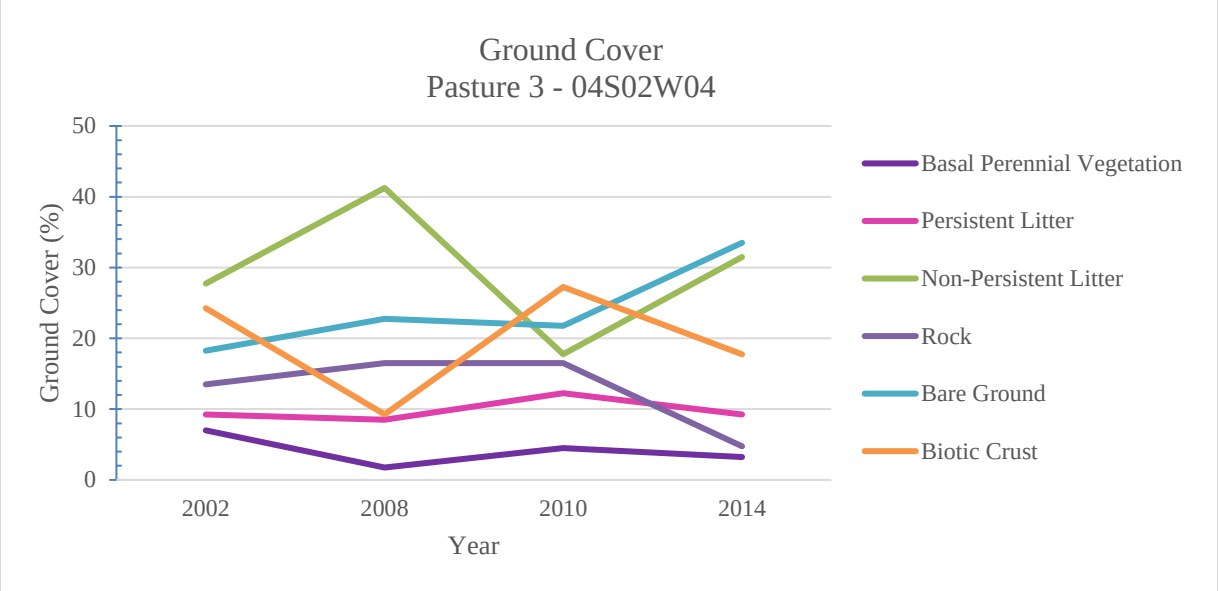

Figure WATERSH 3. Ground cover trends from monitoring site 02S02W04 in pasture 3

Pasture 4

Table WATERSH 19. Ground cover from HAF/AIM methods for sites in pasture 4

Pasture 4 - Ground Cover (%)								
Year	**Bare Soil**	**Litter**	**Rock**	**Basal Vegetation**	**Shrub Canopy**	**Canopy Gap**	**Basal Gap**	**Number of Sites**
RO11XY001ID – Loamy 8-12” Wyoming big sagebrush/Indian ricegrass-Thurber’s needlegrass								
2012	36	26	14	8	-	-	-	1
RO11XY014ID – Sandy loam 8-12” Wyoming big sagebrush/Indian ricegrass								
2012	36	25	10	16	-	-	-	3
2014	31	8	17	14	3	-	-	1
RO25XY019ID – Loamy 10-13” Wyoming big sagebrush/bluebunch wheatgrass								
2012	32	54	4	8	-	-	-	1
2014	19	18	12	21	8	-	-	1
2016	5	43	49	2	-	43	82	1
RO25XY048ID - Shallow Claypan 11-13" Low sagebrush/bluebunch wheatgrass								
2012	32	32	6	14	-	-	-	1
							Total Sites	9

HAF/AIM sites monitored in Pasture 4 were all in sagebrush ecological sites, predominately species of big sagebrush, with one site in low sagebrush (Shallow claypan 11-13”) (Table WATERSH 19). Ground cover metrics are generally within the range of acceptable conditions, with one site in Loamy 10-13” having low bare ground (5 percent) and high litter cover (43 percent). This site also had low basal vegetation (2 percent), which is substantiated by the moderate canopy gaps (43 percent) and high basal gaps (82 percent). Although canopy/basal gap was not measured at the other sites, the other measures do not indicate such a high departure in overall ground cover. Litter was high at one other plot in the same ecological site (54 percent), with moderately low basal vegetation cover (8 percent). However, bare soil is more typical of the site. Ground cover metrics for this pasture illustrate variable conditions, with the Loamy 10-13” ecological site representing more evidence of compromised ecological conditions. There was also a defoliation event from aroga moth in this pasture which is consistent with the low shrub canopy observed.

Table WATERSH 20. Ground cover from trend monitoring site 04S02W27 in pasture 4

Cover Type	Cover (%)			Difference between 2014 and 2002	p-value
	2002	2008	2014		
Basal Perennial Vegetation	5.00	2.25	7.25	2.25	0.39
Persistent Litter	16.00	15.75	10.50	-5.50	0.16
Non-Persistent Litter	27.00	43.25	25.25	-1.75	0.21
Rock	19.75	15.25	18.00	-1.75	0.63
Bare Ground	17.00	16.00	24.50	7.50	0.12
Biotic Crust	14.50	7.50	14.50	0.00	1.00

Across monitoring years at this trend site, basal perennial vegetation is low, although it did increase marginally over the evaluation period (5 to 7 percent) (Table WATERSH 20; Figure WATERSH 4). Bare ground increased on the site, from 17 to 24 percent, although that was determined to not be statistically significant. However, it may be biologically significant. There was an increase in non-persistent litter from 2002 to 2008 (27 to 43 percent), but then a decrease from 2008 to 2014 (43 to 25 percent), with a net decrease of approximately 2 percent over the evaluation period. All other metrics remained largely the same over the evaluation period and are generally within acceptable conditions for a typical loamy sagebrush site.

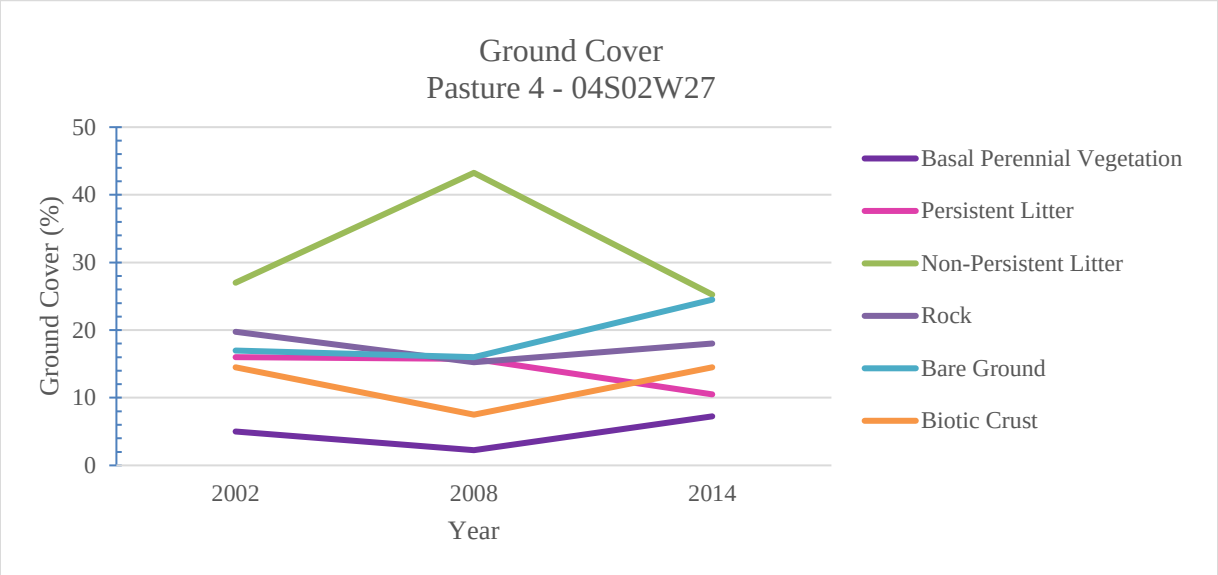

Figure WATERSH 4. Ground cover trends from monitoring site 02S02W27 in pasture 4

Monitoring in Pasture 4 indicates variable conditions, especially in the Loamy 10-13” ecological site. Other sites are more typical with some variance. This is further substantiated by the trend data which remained largely unchanged for the evaluation period. At the trend site, however, some changes in bare ground and persistent litter may be biologically significant, but are within the range of variability for the site. The AIM/HAF data also demonstrate this.

Pasture 5

Table WATERSH 21. Ground cover from HAF/AIM methods for sites in pasture 5

Pasture 5 - Ground Cover (%)								
Year	**Bare Soil**	**Litter**	**Rock**	**Basal Vegetation**	**Shrub Canopy**	**Canopy Gap**	**Basal Gap**	**Number of Sites**
RO11XY014ID – Sandy Loam 8-12” Wyoming big sagebrush/Indian ricegrass								
2012	17	42	27	12	-	-	-	2
2014	31	17	16	13	13	-	-	2
RO25XY010ID – Claypan 12-16” Low sagebrush/Idaho fescue								
2017	1	86	15	7	-	0	67	1
RO25XY018ID – Mahogany Savanna 16-22” Curlleaf mountain mahogany – mountain snowberry/Idaho fescue - needlegrass								
2014	22	26	14	3	56	-	-	1
RO25XY042ID – Mountain Ridge 14-18” Low sagebrush/bluebunch wheatgrass								
2014	5	7	51	24	15	-	-	1
RO25XY043ID – Loamy 11-13” Basin big sagebrush/bluebunch wheatgrass								
2016	5	78	32	1	-	2	91	1
RO25XY048ID - Shallow Claypan 11-13" Low sagebrush/bluebunch wheatgrass								
2014	25	19	11	13	12	-	-	1
							Total Sites	9

AIM/HAF sites within Pasture 5 are in low and big sagebrush, as well as mountain mahogany ecological sites (Table WATERSH 21). Most of the plots are located in Wyoming/basin big sagebrush at lower elevations in the pasture (Sandy loam 8-12”, Loamy 11-13”). For the Loamy 11-13” site monitored in 2016, litter was high (78 percent), with low bare ground (5 percent), low shrub canopy (2 percent) and high basal gap (91 percent). The Wyoming sagebrush plots indicate less ground disturbance, and less erosion/invasion potential than the basin big sagebrush plot. Although there was only one plot in the Loamy 11-13”, it is consistent with ground cover metrics in pastures 1-3 in large statured sagebrush communities. The lower elevation portions of pasture 5 (<4,500 ft), have burned repeatedly since 1959. The most recent fire, Rough Diamond, was in 2001, and burned over 8,000 acres. This also re-burned many of the previous fire locations (Table ALLOT 8, Figure APP 4.1 MAP 7). Conditions observed are related to the repeated burning of these areas, leaving them prone to soil erosion and weedy invasion through lack of perennial basal vegetation, shrub cover and a dominance of annual grasses.

The low sagebrush sites (Claypan 12-16/Mountain ridge 14-18”/Shallow claypan 11-13”) were also variable. Low to moderate bare ground is expected as the sites tend to have greater surface rock fragments, although the site in Claypan 12-16” had both low bare ground (1 percent), and low rock fragment (15 percent). This coupled with the high amount of litter (86 percent) and

high basal gap (67 percent) is a large departure from reference. The mahogany site had low basal vegetation (3 percent), while other metrics are within the anticipated range.

Table WATERSH 22. Ground cover from trend monitoring site 04S03W19 in pasture 5

Cover Type	Cover (%)			Difference between 2014 and 2002	p-value
	2002	2008	2014		
Basal Perennial Vegetation	11.00	9.06	5.00	-6.00	0.33
Persistent Litter	16.25	13.44	10.00	-6.25	0.26
Non-Persistent Litter	56.25	57.81	64.75	8.50	0.04
Rock	5.75	2.81	6.00	0.25	0.92
Bare Ground	10.25	15.94	14.00	3.75	0.15
Biotic Crust	0.50	0.94	0.25	-0.25	0.70

At the trend site in Pasture 5, basal perennial vegetation, persistent litter and biotic soil crust decreased, although not significantly (Table WATERSH 22; Figure WATERSH 5). The decrease in basal vegetation declined steadily over the evaluation period, so these changes may be biologically significant and likely to continue. Similar can be said of persistent litter. Non-persistent litter increase from 56 percent to 65 percent, which was determined to be statistically significant. Bare ground also increased (10 percent to 14 percent), but was not statistically significant. This site is located in the Mahogany Savanna ecological site which typically has greater rock content and less non-persistent litter.

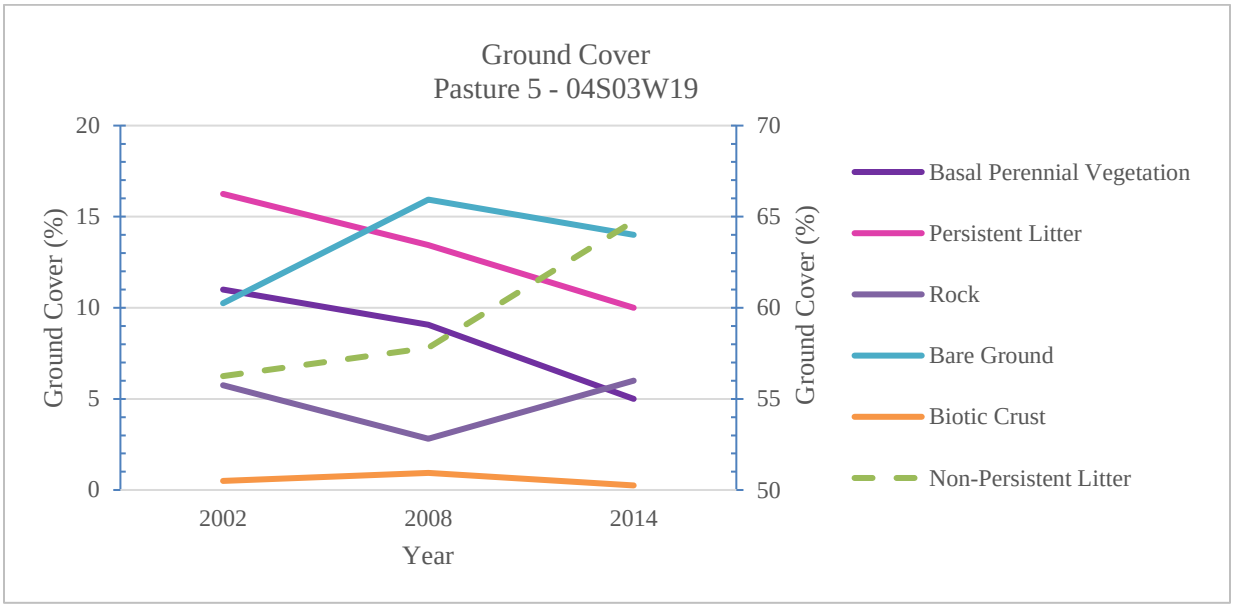

Figure WATERSH 5. Ground cover trends from monitoring site 04S03W19 in pasture 5. Basal perennial vegetation, persistent littler, rock, bare ground and biotic crust are charted on the left axis, while non-persistent litter is charted on the right axis.

Overall in Pasture 5, ground cover metrics are largely variable. Of the 10 sites monitored within the pasture, four had substantial departures from expected in multiple ground cover indicators.

Pasture 6

Table WATERSH 23. Ground cover from HAF/AIM methods for sites in pasture 6

Pasture 6 - Ground Cover (%)								
Year	**Bare Soil**	**Litter**	**Rock**	**Basal Vegetation**	**Shrub Canopy**	**Canopy Gap**	**Basal Gap**	**Number of Sites**
RO11XY014ID – Sandy Loam 8-12” Wyoming big sagebrush/Indian ricegrass								
2012	13	56	9	20	-	-	-	2
RO25XY011ID – Loamy 13-16” Mountain big sagebrush/bluebunch wheatgrass – Idaho fescue								
2014	12	18	23	23	27	-	-	2
RO25XY018ID – Mahogany Savanna 16-22” Curlleaf mountain mahogany – mountain snowberry/Idaho fescue - needlegrass								
2017	4	87	8	1	-	18	99	1
RO25XY043ID – Loamy 11-13” Basin big sagebrush/bluebunch wheatgrass								
2014	6	21	10	11	15	-	-	2
RO25XY045ID – Douglas Fir-Mountain Snowberry 22”+								
2016	4	82	14	2	-	13	100	1
							Total Sites	8

AIM/HAF sites across Pasture 6 are variable, with consistently low bare ground (4 to 13 percent) and high amounts of litter (21 to 87 percent) (Table WATERSH 23). Low bare ground is expected for the mahogany and Douglas-fir community types, but both sites monitored in those ecological sites had exceptionally high litter cover, low basal vegetation (1 to 2 percent), low canopy gap (13 to 18 percent) and high basal gap (99 to 100 percent). This is indicative of a dense over story which outcompetes shorter statured vegetation and suppresses recruitment with high amounts of leaf litter. The loamy sites (big sagebrush) are also variable, but the sites in the Sandy Loam 8-12” averaged substantial litter cover (56 percent). Although basal vegetation is closer to expected across the loamy sites (11 to 23 percent).

Table WATERSH 24. Ground cover from trend monitoring site 05S03W09 in pasture 6

Cover Type	Cover (%)			Difference between 2014 and 2002	p-value
	2002	2008	2014		
Basal Perennial Vegetation	14	11	18	4.00	0.46
Persistent Litter	6	9	5	-1.25	0.14
Non-Persistent Litter	31	39	32	1.00	0.72
Rock	44	36	35	-8.75	0.00
Bare Ground	6	5	10	4.50	0.05
Biotic Crust	1	1	1	0.50	0.48

Ground cover indicators at the trend site in Pasture 6 are largely static and consistent with a low sagebrush site (Table WATERSH 24; Figure WATERSH 6). Rock cover did decrease from 44 to 35 percent, which was determined to be statistically significant. This does correlate to the increase in bare ground, which was marginally not statistically significant. Overall, this monitoring location is consistent with other low sagebrush locations (AIM/HAF).

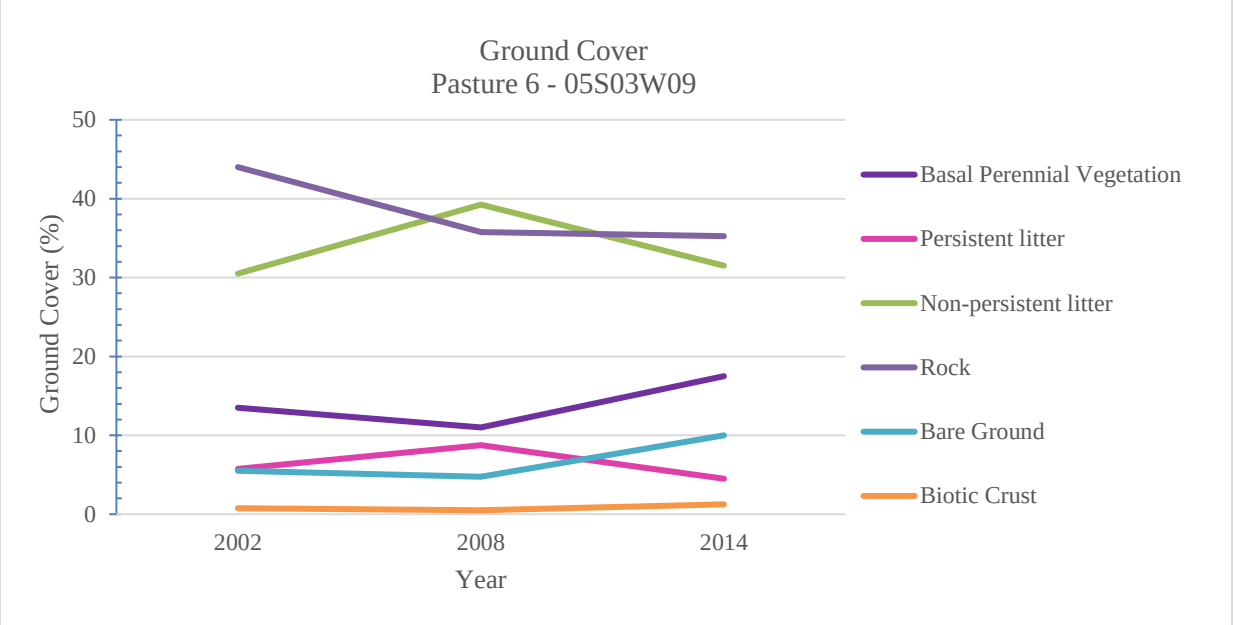

Figure WATERSH 6. Ground cover trends from monitoring site 05S03W09 in pasture 6

Pasture 6 has moderate to high amounts of litter across ecological sites and monitoring types (18 to 87 percent). The large statured shrub/tree ecological sites (mahogany and Douglas-fir) harbor the most litter, but is above reference and prohibitive to other species.

Pasture 7

Table WATERSH 25. Ground cover from HAF/AIM methods for sites in pasture 7

Pasture 7 - Ground Cover (%)						
Year	**Bare Soil**	**Litter**	**Rock**	**Basal Vegetation**	**Shrub Canopy**	**Number of Sites**
RO11XY001ID – Loamy 8-12” Wyoming big sagebrush/Indian ricegrass-Thurber’s needlegrass						
2012	20	54	0	14	-	1
2014	19	32	6	7	4	1
RO11XY014ID – Sandy Loam 8-12” Wyoming big sagebrush/Indian ricegrass						
2012	35	55	5	2	-	2
2014	33	24	0	10	12	1
					Total Sites	5

Both ecological sites monitored by AIM/HAF in Pasture 7 are in Wyoming sagebrush communities. Bare soil and rock cover are within the range of variability, although sites monitored in 2012 have consistently high litter cover (55 percent) (Table WATERSH 25). Basal vegetation cover was also variable (2 to 14 percent), and generally low shrub canopy (4 to 12 percent). For Wyoming sagebrush communities, shrub canopy is generally greater than 20 percent, and less than 40 percent in a healthy, structured site.

Table WATERSH 26. Ground cover from trend monitoring site 03S02W15 in pasture 7

Cover Type	Cover (%)		Difference between 2013 and 2009	p-value
	2009	2013		
Basal Perennial Vegetation	0.00	1.75	1.75	0.05
Persistent Litter	14.50	0.03	-14.47	0.05
Non-Persistent Litter	30.75	47.25	16.50	0.03
Rock	14.75	14.50	-0.25	0.93
Bare Ground	35.75	29.50	-6.25	0.25
Biotic Crust	1.75	3.75	2.00	0.20

The trend site in Pasture 7 is also located in Wyoming sagebrush community. Ground cover indicators were largely static between reads, with the exception of non-persistent and persistent litter (Table WATERSH 26; Figure WATERSH 7). Non-persistent litter increased from 31 to 47 percent which was statistically significant, while persistent litter decreased from 14 percent to nearly 0. There was marginal decreases in rock cover and bare ground, and increases in perennial vegetation and biotic soil crust.

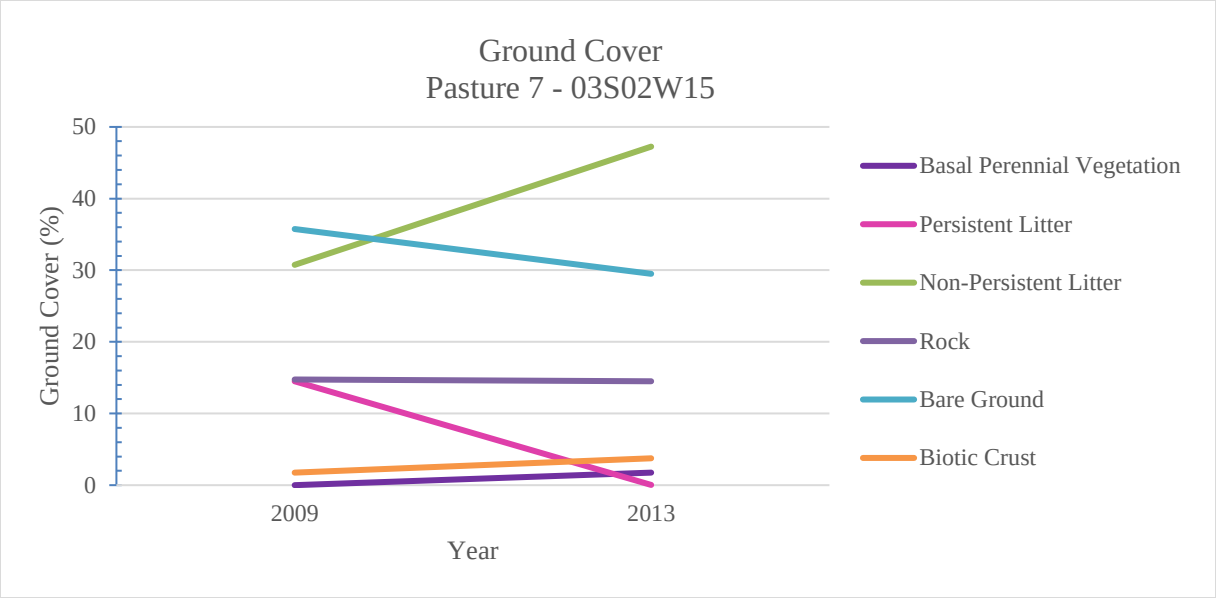

Figure WATERSH 7. Ground cover trends from monitoring site 03S02W15 in pasture 7

Consistently across Pasture 7, litter cover is high and generally increasing. Shrub canopy is low, while other ground cover indicators are within range of variability.

Pasture 8

Table WATERSH 27. Ground cover from HAF/AIM methods for sites in pasture 8

Pasture 8 - Ground Cover (%)						
Year	**Bare Soil**	**Litter**	**Rock**	**Basal Vegetation**	**Shrub Canopy**	**Number of Sites**
RO11XY001ID – Loamy 8-12” Wyoming big sagebrush/Indian ricegrass-Thurber’s needlegrass						
2012	23	30	29	14	-	2
2014	25	17	15	17	7	2
RO11XY010ID – Calcareous loam 7-10” Saltbush-bud sage/Indian ricegrass-Thurber’s needlegrass						
2014	26	14	19	19	3	1
					Total Sites	5

Sites monitored in Pasture 8 are in Loamy 8-12” and Calcareous loam 7-10” ecological sites. Bare soil was within reference for both community types (23 to 26 percent), as was litter, though it was more variable (14 to 30 percent) (Table WATERSH 27). Basal vegetation was moderate (14 to 19 percent) for the sites, while shrub canopy was low for both (3 to 7 percent). Data from both ecological sites illustrate communities with with minimal shrub cover, although both have robust rock and basal vegetation cover to protection from erosion.

Table WATERSH 28. Ground cover from trend monitoring site 03S02W29 in pasture 8

Cover Type	Cover (%)			Difference between 2014 and 2002	p-value
	2002	2008	2014		
Basal Perennial Vegetation	5.50	8.75	7.75	2.25	0.29
Persistent litter	8.75	0.04	0.06	-8.69	0.42
Non-persistent litter	34.00	32.25	25.50	-8.50	0.06
Rock	9.00	14.75	8.75	-0.25	0.89
Bare Ground	22.25	26.00	34.50	12.25	0.12
Biotic Crust	20.50	14.00	17.25	-3.25	0.68

All metrics did not change statistically, however, there were notable changes in litter types and bare ground which are likely biologically significant. Persistent litter decreased from roughly 9 percent to 0, while non-persistent litter decreased from 34 to 25 percent (Table WATERSH 28; Figure WATERSH 8). Bare ground also increased steadily from 22 to 34 percent. This monitoring location is the Calcareous loam 7-10" ecological site; data are consistent with those from HAF/AIM.

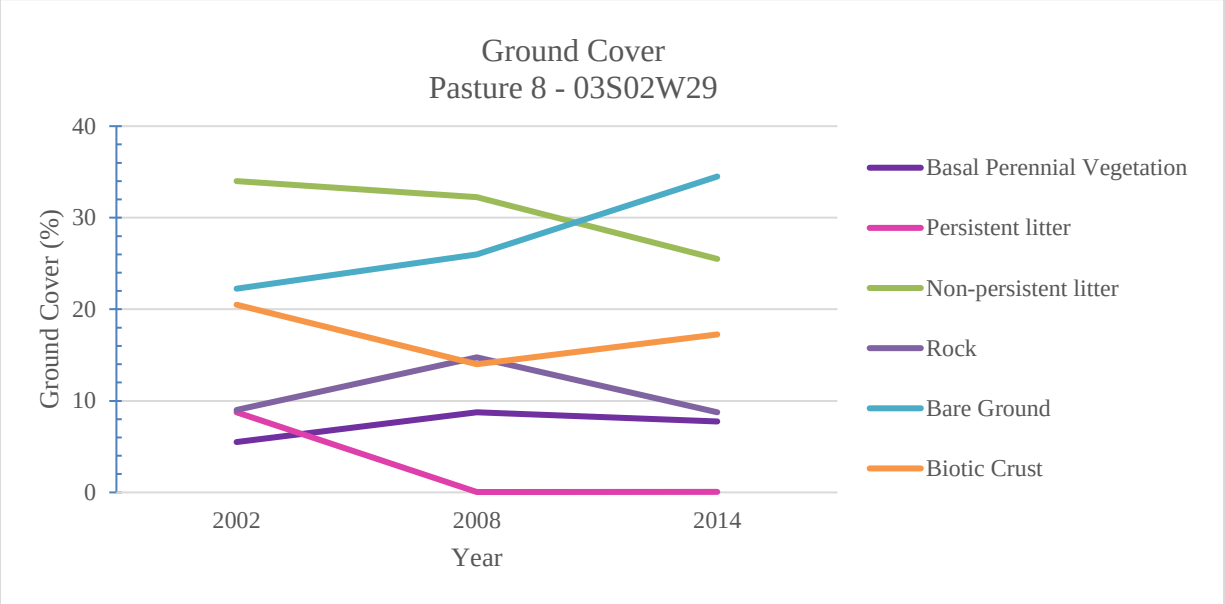

Figure WATERSH 8. Ground cover trends from monitoring site 03S02W29 in pasture 8

The majority of ground cover indicators in Pasture 8 are within the expected range for the ecological sites present. The bare ground shown in the trend monitoring, is similar to AIM/HAF although it demonstrates an increase. Presently, those values are still within acceptable range for saltbush ecological sites.

Pasture 9

Table WATERSH 29. Ground cover from HAF/AIM methods for sites in pasture 9

Pasture 9 - Ground Cover (%)						
Year	**Bare Soil**	**Litter**	**Rock**	**Basal Vegetation**	**Shrub Canopy**	**Number of Sites**
RO11XY001ID – Loamy 8-12” Wyoming big sagebrush/Indian ricegrass-Thurber’s needlegrass						
2012	45	33	4	11	-	2
2014	41	19	20	3	1	2
RO11XY014ID – Sandy Loam 8-12” Wyoming big sagebrush/Indian ricegrass						
2014	22	18	12	10	9	1
					Total Sites	5

Sites monitored within Pasture 9 are within Wyoming sagebrush communities. Bare soil is generally high (22 to 45 percent), while litter is within acceptable condition (18 to 33 percent) (Table WATERSH 29). Basal vegetation is low to moderate (3 to 11 percent). Shrub canopy is generally low (1 to 9 percent). The high bare soil combined with the moderate to litter cover and low shrub canopy indicate a high probability of weedy invasion/erosion despite some rock content.

Table WATERSH 30. Ground cover from trend monitoring site 03S02W28 in pasture 9

Cover Type	Cover (%)			Difference between 2014 and 2002	p-value
	2002	2008	2014		
Basal Perennial Vegetation	2.25	6.75	2.25	0.00	1.00
Persistent litter	4.50	6.25	3.00	-1.50	0.11
Non-persistent litter	39.00	27.50	37.75	-1.25	0.71
Rock	6.25	11.25	3.25	-3.00	0.20
Bare Ground	31.25	30.50	34.00	2.75	0.68
Biotic Crust	16.75	17.75	19.75	3.00	0.64

The trend site in Pasture 9 remained largely unchanged over the evaluation period. No ground cover indicators experienced statistically significant change (Table WATERSH 30; Figure WATERSH 9). Overall, non-persistent litter has moderately high cover (38 percent), with moderate bare ground (34 percent). Biotic soil crust on this site was high (20 percent). The range of values are typical for those of a Wyoming sagebrush site.

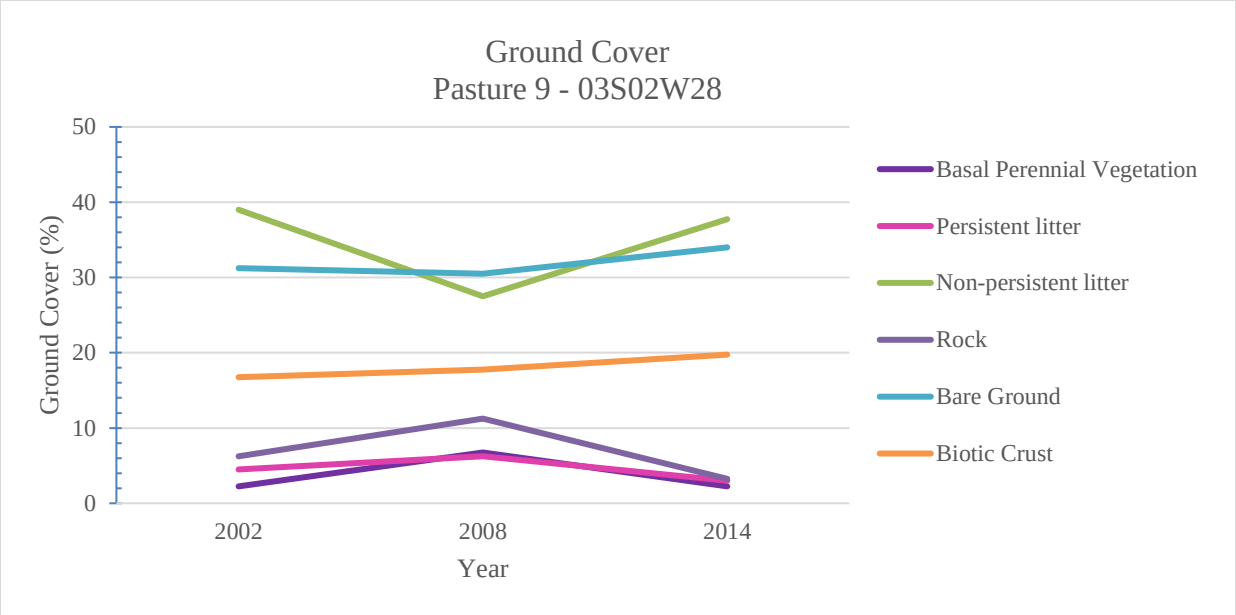

Figure WATERSH 9. Ground cover trends from monitoring site 03S02W28 in pasture 9

Pasture 10

Table WATERSH 31. Ground cover from HAF/AIM methods for sites in pasture 10

Pasture 10 - Ground Cover (%)						
Year	**Bare Soil**	**Litter**	**Rock**	**Basal Vegetation**	**Shrub Canopy**	**Number of Sites**
RO11XY014ID – Sandy Loam 8-12” Wyoming big sagebrush/Indian ricegrass						
2012	18	52	10	10	-	1
2014	31	14	6	23	11	2
RO25XY043ID – Loamy 11-13” Basin big sagebrush/bluebunch wheatgrass						
2012	42	42	0	14	-	1
2014	21	13	18	29	13	1
					Total Sites	5

Monitoring locations in Pasture 10 are in Sandy loam 8-12” and Loamy 11-13” ecological sites. Bare soil is within the expected range for all sites, with the exception of one site being high (42 percent) (Table WATERSH 31). The same site also has high litter (42 percent), along with high litter at another location (52 percent). Basal vegetation is within the expected range (10 to 29 percent), as is rock cover (0 to 18 percent).

Table WATERSH 32. Ground cover from trend monitoring site 03S02W30 in pasture 10

Cover Type	Cover (%)		Difference between 2014 and 2008	p-value
	2008	2014		
Basal Perennial Vegetation	10.00	11.50	1.50	0.49
Persistent Litter	11.00	9.25	-1.75	0.60
Non-Persistent Litter	50.50	52.25	1.75	0.83
Rock	7.25	5.00	-2.25	0.05
Bare Ground	12.50	16.50	4.00	0.35
Biotic Crust	8.75	5.50	-3.25	0.27

All ground cover metrics derived from trend had no statistically significant change. There were marginal increases or decreases in the cover types. However, bare ground did increase from 12 percent to 16 percent over the evaluation period, and rock cover decreased from 7 to 5 percent, which was marginally statistically insignificant (Table WATERSH 32; Figure WATERSH 10). Overall, non-persistent litter is high for a Sandy loam 8-12" site (52 percent), while other indicators are within the expected range.

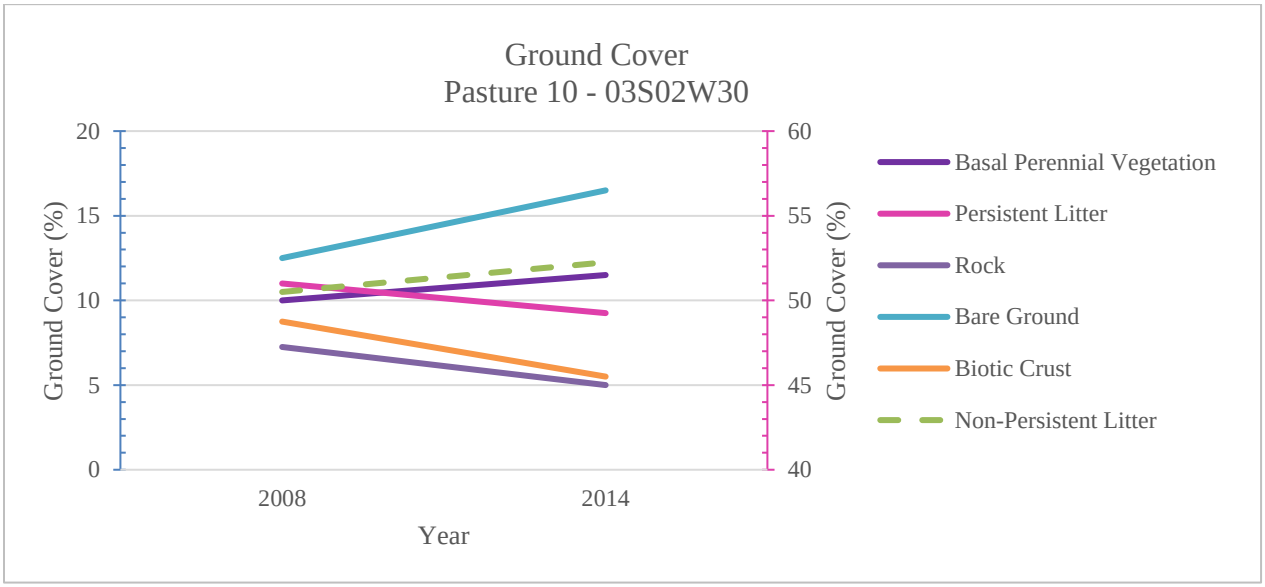

Figure WATERSH 10. Ground cover trends from monitoring site 03S02W30 in pasture 10. Basal perennial vegetation, persistent littler, rock, bare ground and biotic crust are charted on the left axis, while non-persistent litter is charted on the right axis.

Overall in Pasture 10, half the sites monitored had high litter cover. The other ground cover indicators are within the expected range, but the trend data indicates there are steady declines across cover types.

Pasture 11

Table WATERSH 33. Ground cover from HAF/AIM methods for sites in pasture 11

Pasture 11 - Ground Cover (%)						
Year	**Bare Soil**	**Litter**	**Rock**	**Basal Vegetation**	**Shrub Canopy**	**Number of Sites**
RO11XY014ID – Sandy Loam 8-12” Wyoming big sagebrush/Indian ricegrass						
2014	20	24	6	18	14	2
RO25XY011ID – Loamy 13-16” Mountain big sagebrush/bluebunch wheatgrass – Idaho fescue						
2012	20	58	4	16	-	2
2014	11	22	19	14	23.74*	3
					Total Sites	7

*Includes ~1% juniper cover

Monitoring occurred in big sagebrush (both Wyoming and mountain) communities within Pasture 11. Bare soil was within acceptable range (11 to 20 percent), as was litter (22 to 24 percent) (Table WATERSH 33). Monitoring in 2012 yielded a higher litter average across plots than is appropriate for the ecological site (58 percent). Rock and basal vegetation were within the expected range for big sagebrush communities. Of note is the one percent juniper canopy in in the 2014 monitoring in the Loamy 13-16” ecological site. Juniper has the potential to invade the site, and is often indicative of suppressed fire and drying conditions most affiliated with habitual livestock grazing. This is also closely related to the replacement of deep rooted bunchgrasses by shallowed rooted species, i.e. Sandberg bluegrass.

Table WATERSH 34. Ground cover from trend monitoring site 04S03W02A in pasture 11

Cover Type	Cover (%)		Difference between 2014 and 2009	p-value
	2009	2014		
Basal Perennial Vegetation	0.75	21.25	20.50	0.00
Persistent Litter	4.50	4.00	-0.50	0.77
Non-Persistent Litter	64.25	44.50	-19.75	0.01
Rock	16.00	9.25	-6.75	0.14
Bare Ground	14.00	20.75	6.75	0.23
Biotic Crust	0.50	0.25	-0.25	0.37

The trend site in Pasture 11 is in a mountain big sagebrush community. Basal perennial vegetation and non-persistent litter changed significantly over the evaluation period (~1 to 21 percent, 64 to 44 percent respectively) (Table WATERSH 34; Figure WATERSH 11). Rock cover also decreased substantially, although it was not statistically significant (16 to 9 percent), while bare ground increased (14 to 20 percent). These changes are likely to be biologically significant, especially if they continue their current projections.

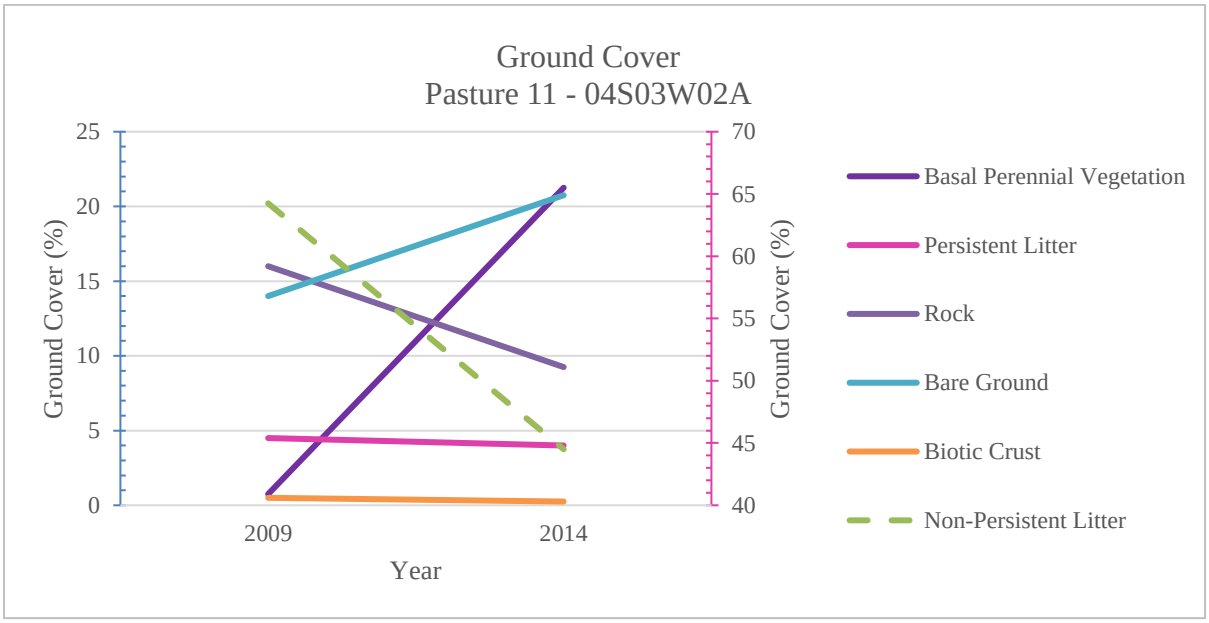

Figure WATERSH 11. Ground cover trends from monitoring site 04S03W02A in pasture 11. Basal perennial vegetation, persistent littler, rock, bare ground and biotic crust are charted on the left axis, while non-persistent litter is charted on the right axis.

2.1.1.3 Foliar Cover

Foliar cover is important for overall site stability as well. Foliar cover intercepts rainfall before it hits the ground, helps retain soil moisture and temperature, making moisture available to adjacent plants. Typically, foliar cover of 20 to 25 percent for sagebrush is expected, large bunchgrasses 20 percent and forbs 5 percent in a sagebrush ecological site, approximately. Similar conditions are expected in saltbush communities, while higher elevation mahogany/Douglas-fir types are more productive, with greater foliar cover.

Due to the variability in collection of forb data, analyzing trends in this data is largely inappropriate. Furthermore, the timing of data collection at particularly trend locations is highly variable, which can be misleading; such as an abundance of forbs in one read, and a complete lack in another read, if the plots were read at different times of year. Flora which have been observed are largely perennial, but were not generally identified to the species level. Such genera include lupine, phlox, penstemon, biscuitroot (*Lomatium*) and astragalus. On earlier reads (generally occurring in May), *Eriastrum* and *Draba verna* are noted, and occasionally storksbill (*Eriodium cicutarium*). Similar issues arise in the forb data collected for HAF. Genus level identifications are the standard, which are not an indicator of overall diversity, as there can be multiple species in the same genus within a site. However, with the limited available data, only a handful of genera are detected, which speaks to larger lack of floral diversity, which is additionally substantiated by the homogenous shrub and graminoid data.

Foliar cover was grouped into the vegetation type categories for analysis purposes. Forbs, both annual and perennial, were omitted due to inconsistent trends and or negligible cover. For additional discussion on species diversity, see Standard 4 – Native Plant Communities.

Pasture 1

Table WATERSH 35. Foliar cover from AIM/HAF methods for sites in pasture 1

Pasture 1 - Foliar Cover (%)						
Year	**Sagebrush**	**Other Shrubs**	**Perennial Grass**	**Sandberg Bluegrass**	**Annual Invasive Grass**	**Number of Sites**
RO11XY001ID – Loamy 8-12” Wyoming big sagebrush/Indian ricegrass-Thurber’s needlegrass						
2012	27	4	3	31	7	2
2014	3	1	4	8	26	1
RO11XY010ID – Calcareous loam 7-10” Saltbush-bud sage/Indian ricegrass-Thurber’s needlegrass						
2014	0	6	5	28	15	1
RO11XY014ID – Sandy Loam 8-12” Wyoming big sagebrush/Indian ricegrass						
2012	24	0	16	0	38	1
2014	3	7	0	0	25	1
					Total Sites	6

For the Wyoming big sagebrush ecological sites, foliar cover is moderate (27 percent) to low (3 percent) across the 5 sites monitored (Table WATERSH 35). Other shrubs are variable with 0 to 7 percent foliar cover across sites, with a nominal component of deep rooted perennial bunchgrasses (0 to 4 percent), with the exception of one site with 16 percent. Cheatgrass is generally the dominant grass species (7 to 38 percent, 20 percent average). Shallow rooted bunchgrasses (Sandberg bluegrass), is also highly variable ranging from 0 to 31 percent, 8 percent average. The overall lack of sagebrush foliar cover in the 2014 reads can be linked to an aroga moth infestation. The Loamy 8-12” site lacked perennial bunchgrasses, which have been functionally replaced by Sandberg bluegrass. This reduces the ability for water to be captured and effectively utilized within the soil profile.

The Calcareous loam 7-10” site had minimal shrub cover (6 percent), a trace amount of perennial grasses (5 percent), high amounts of Sandberg bluegrass (28 percent) and moderate cover of cheatgrass (15 percent). Although only one site was monitored in this pasture, data are consistent with those in other pastures on the same ecological site.

Pasture 2

Table WATERSH 36. Foliar cover from AIM/HAF methods for sites in pasture 2

Pasture 2 - Foliar Cover (%)						
Year	**Sagebrush**	**Other Shrubs**	**Perennial Grass**	**Sandberg Bluegrass**	**Annual Invasive Grass**	**Number of Sites**
RO11XY001ID – Loamy 8-12” Wyoming big sagebrush/Indian ricegrass-Thurber’s needlegrass						
2012	22	1	0	26	46	2
2014	8	0	1	24	23	2
RO11XY010ID – Calcareous loam 7-10” Saltbush-bud sage/Indian ricegrass-Thurber’s needlegrass						
2012	0	20	2	8	28	1
2014	0	2	0	18	0	1
RO11XY014ID – Sandy Loam 8-12” Wyoming big sagebrush/Indian ricegrass						
2014	3	0	0	0	29	1
					Total Sites	7

Perennial bunchgrasses represent a trace component across the three ecological sites monitored in Pasture 2 (0 to 2 percent) (Table WATERSH 36). They have been replaced largely by Sandberg bluegrass (0 to 26 percent, 11 percent average across ecological sites) and annual invasive grass (0 to 46 percent, 18 percent average). The Calcareous loam 7-10” has variable saltbush cover (2 to 20 percent), and trace amounts of perennial grasses, although it has lesser amounts of Sandberg bluegrass than the Wyoming sites in the pasture. The replacement of deep rooted bunchgrasses with Sandberg bluegrass is consistent with conditions in other pastures.

Pasture 3

Table WATERSH 37. Foliar cover from AIM/HAF methods for sites in pasture 3

Pasture 3 - Foliar Cover (%)						
Year	**Sagebrush**	**Other Shrubs**	**Perennial Grass**	**Sandberg Bluegrass**	**Annual Invasive Grass**	**Number of Sites**
RO11XY001ID – Loamy 8-12” Wyoming big sagebrush/Indian ricegrass-Thurber’s needlegrass						
2012	16	0	14	56	0	1
2014	12	2	5	33	1	1
RO11XY010ID – Calcareous loam 7-10” Saltbush-bud sage/Indian ricegrass-Thurber’s needlegrass						
2012	0	14	16	42	0	1
2014	0	4	0	33	4	1
RO11XY014ID – Sandy Loam 8-12” Wyoming big sagebrush/Indian ricegrass						

Pasture 3 - Foliar Cover (%)						
Year	**Sagebrush**	**Other Shrubs**	**Perennial Grass**	**Sandberg Bluegrass**	**Annual Invasive Grass**	**Number of Sites**
2012	24	6	0	38	8	1
2014	3	0	0	0	29	1
2016	17	0	4	38	17	1
					Total Sites	7

Sagebrush cover is variable (3 to 24 percent), generally lower than expected, cover of additional shrubs is either trace or low at the Loamy and Sandy Loam 8-12" sites (Table WATERSH 37). This can be linked to an aroga moth infestation within the allotment. Low to moderate cover of perennial grass cover (0 to 14 percent), has been functionally replaced by Sandberg bluegrass which has high foliar cover (0 to 56 percent, 33 percent average). Cheatgrass is trace to moderate (0 to 29 percent) on the sagebrush sites. The Calcareous loam 7-10" site has lower than expected shrub cover (4 to 14 percent), low deep-rooted perennial grass cover (0 to 16 percent) but moderate to high Sandberg bluegrass cover (33 to 42 percent). Cheatgrass is low (0 to 4 percent). Across all ecological sites in this pasture, there is reduced capacity for water/snow capture due to lack of shrub and deep rooted perennial grass cover.

Pasture 4

Table WATERSH 38. Foliar cover from AIM/HAF methods for sites in pasture 4

Pasture 4 - Foliar Cover (%)						
Year	**Sagebrush**	**Other Shrubs**	**Perennial Grass**	**Sandberg Bluegrass**	**Annual Invasive Grass**	**Number of Sites**
RO11XY001ID – Loamy 8-12" Wyoming big sagebrush/Indian ricegrass-Thurber's needlegrass						
2012	14	0	2	54	14	1
RO11XY014ID – Sandy Loam 8-12" Wyoming big sagebrush/Indian ricegrass						
2012	24	2	3	55	0	2
2014	2	1	15	42	4	1
RO25XY019ID – Loamy 10-13" Wyoming big sagebrush/bluebunch wheatgrass						
2012	16	0	10	34	34	1
2014	10	0	8	56	22	1
2016	0	13	0	5	74	1
RO25XY048ID - Shallow Claypan 11-13" Low sagebrush/bluebunch wheatgrass						
2012	18	0	12	54	0	1
					Total Sites	8

Monitoring sites are located predominately within big sagebrush (Wyoming/Basin) communities, with one plot in low sagebrush. Sagebrush cover is variable across ecological sites (0 to 24 percent) (Table WATERSH 38). Across all sites perennial grass cover was low to moderate (0 to 15 percent), while Sandberg bluegrass was high (34 to 56 percent) across all monitoring locations except one (5 percent). Other shrubs were trace (0 to 2 percent) Annual invasive grass is variable (0 to 74 percent).

Pasture 5

Table WATERSH 39. Foliar cover from AIM/HAF methods for sites in pasture 5

Pasture 5 - Foliar Cover (%)						
Year	**Sagebrush**	**Other Shrubs**	**Perennial Grass**	**Sandberg Bluegrass**	**Annual Invasive Grass**	**Number of Sites**
RO11XY014ID – Sandy Loam 8-12” Wyoming big sagebrush/Indian ricegrass						
2012	23	3	20	31	24	2
2014	1	0	8	26	3	1
RO25XY010ID – Claypan 12-16” Low sagebrush/Idaho fescue						
2017	5	0	14	49	74	1
RO25XY018ID – Mahogany Savanna 16-22” Curlleaf mountain mahogany – mountain snowberry/Idaho fescue - needlegrass						
2014	13	49	16	12	5	1
RO25XY042ID – Mountain Ridge 14-18” Low sagebrush/bluebunch wheatgrass						
2014	18	4	36	8	0	1
RO25XY043ID – Loamy 11-13” Basin big sagebrush/bluebunch wheatgrass						
2016	0	0	12	26	59	1
RO25XY048ID - Shallow Claypan 11-13" Low sagebrush/bluebunch wheatgrass						
2014	16	2	6	19	40	1
					Total Sites	8

Foliar cover across the Sandy loam 8-12” and Loamy 11-13” ecological sites is variable, ranging from 0 to 23 percent (Table WATERSH 39). Other shrubs in these sites, such as horsebrush or rabbitbrush are low (0 to 3 percent). Perennial grasses range from 8 to 20 percent, with Sandberg bluegrass more abundant (26 to 31 percent). Annual invasive grass is also variable, ranging from 3 to 59 percent foliar cover.

The Claypan 12-16” and Shallow claypan 11-13” sites have variable sagebrush foliar cover (5 to 18 percent). This is generally lower than anticipated. Other shrubs are low on these sites, ranging from 0 to 4 percent. Perennial grass cover is also variable, ranging from 6 to 36 percent: the Mountain ridge 14-18” site is within expected (36 percent), while the other two low sage sites are lower than expected. Sandberg bluegrass is also variable, but generally more than deep

rooted perennial species (8 to 49 percent). Invasive annual grasses range from 0 to 74 percent on these sites.

The Mahogany savanna 16-22" site has high foliar cover of other shrubs (mountain mahogany, 49 percent), with a small component of sagebrush (13 percent). Perennial grass is moderate at 16 percent, while Sandberg bluegrass is at 12 percent. Annual invasive grasses are present on the site at 5 percent foliar cover.

Across the pasture, Sandberg bluegrass is the dominant perennial grass species, although there is much higher deep rooted perennial grass cover in this pasture than in others. It does illustrate the potential for Sandberg bluegrass to become more dominant, however. Lower elevation portions of the pasture (<4,500 ft) are invaded by cheatgrass due to repeated wildfire.

Pasture 6

Table WATERSH 40. Foliar cover from AIM/HAF methods for sites in pasture 6

Pasture 6 - Foliar Cover (%)						
Year	**Sagebrush**	**Other Shrubs**	**Perennial Grass**	**Sandberg Bluegrass**	**Annual Invasive Grass**	**Number of Sites**
RO11XY014ID – Sandy Loam 8-12" Wyoming big sagebrush/Indian ricegrass						
2012	22	2	17	36	11	2
RO25XY011ID – Loamy 13-16" Mountain big sagebrush/bluebunch wheatgrass – Idaho fescue						
2014	28	11	11	24	39	2
RO25XY018ID – Mahogany Savanna 16-22" Curlleaf mountain mahogany – mountain snowberry/Idaho fescue - needlegrass						
2017	3	13	0	0	2	1
	*juniper (23), spruce (29), Douglas-fir (40)					
RO25XY043ID – Loamy 11-13" Basin big sagebrush/bluebunch wheatgrass						
2014	16	3	38	46	15	2
RO25XY045ID – Douglas Fir-Mountain Snowberry 22"+						
2016	5	34	13	0	0	1
	*mountain mahogany (45), juniper (2), Douglas-fir (22)					
					Total Sites	8

For the sagebrush sites, perennial grass cover ranges from 11 to 38 percent, while sagebrush foliar cover is from 16 to 28 percent (Table WATERSH 40). These values are generally within the expected range for large statured sagebrush communities. Other shrubs constituted 2 to 11 percent cover, with two of the three sites monitored being lower than anticipated (2 to 3 percent). Sandberg bluegrass dominated the grass foliar cover, which is generally subdominant to other perennial species (24 to 46 percent). Invasive annual grass ranges from 11 to 39 percent. These attributes illustrate overall slightly modified vegetative communities, particularly with the

dominance of Sandberg bluegrass and the high cover of annual invasive grasses. Overall, these areas have good vegetative structure which is capable of snow capture and reduces overland flow events.

For the treed ecological sites, sagebrush was a minor component (3 to 5 percent). Trees, which would typically be minor components on the mahogany site, dominate the over story: Douglas-fir (40 percent), spruce (29 percent) and juniper (23 percent) replaced the mahogany. The Douglas-fir/snowberry site is 45 percent mahogany, 2 percent juniper and 22 percent Douglas-fir foliar cover. Other shrubs on these sites vary from 13 to 34 percent. Both the Douglas-fir and the mahogany sites had higher than expected foliar cover of woody species. The mahogany site has no perennial grass nor Sandberg bluegrass foliar cover, with 2 percent annual invasive grass foliar cover. The Douglas-fir site has 13 percent perennial grass cover, with no other grass cover detected. These sites are densely vegetated in the overstory, which is limiting resources for other herbaceous species in the understory.

Pasture 7

Table WATERSH 41. Foliar cover from AIM/HAF methods for sites in pasture 7

Pasture 7 - Foliar Cover (%)						
Year	**Sagebrush**	**Other Shrubs**	**Perennial Grass**	**Sandberg Bluegrass**	**Annual Invasive Grass**	**Number of Sites**
RO11XY001ID – Loamy 8-12” Wyoming big sagebrush/Indian ricegrass-Thurber’s needlegrass						
2012	22	0	2	26	26	1
2014	10	0	0	0	40	1
RO11XY014ID – Sandy Loam 8-12” Wyoming big sagebrush/Indian ricegrass						
2012	23	6	5	0	71	2
2014	16	0	0	0	54	1
					Total Sites	5

Monitoring in Pasture 7 occurs in Wyoming sagebrush communities. Perennial grass cover is trace across all sites (0 to 5 percent), with only one site containing Sandberg bluegrass (26 percent) (Table WATERSH 41). Annual invasive grass is the dominant grass component across all sites (26 to 71 percent). Sagebrush cover is variable (10 to 23 percent), with only one site having foliar cover of another shrub (6 percent). These communities in Pasture 7, despite having anticipated sagebrush cover are devoid of deep rooted perennial grass species, with Sandberg bluegrass being the dominant perennial grass species. Sandberg bluegrass is a shallow rooted species, which is not as effective at water capture as deep rooted species, and also has a tendency to pedestal, creating additional hydrologic and erosional issues.

Pasture 8

Table WATERSH 42. Foliar cover from AIM/HAF methods for sites in pasture 8. Perennial grass values are an average by species across sites to show non-native/seeded species.

Pasture 8 - Foliar Cover (%)						
Year	**Sagebrush**	**Other Shrubs**	**Perennial Grass**	**Sandberg Bluegrass**	**Annual Invasive Grass**	**Number of Sites**
RO11XY001ID – Loamy 8-12” Wyoming big sagebrush/Indian ricegrass-Thurber’s needlegrass						
2012	23	2	2 (PSSP)* 14 (AGCR)*	34	0	2
2014	12	2	2 (AGCR)	48	0	2
RO11XY010ID – Calcareous loam 7-10” Saltbush-bud sage/Indian ricegrass-Thurber’s needlegrass						
2014	1	5	18	22	18	1
					Total Sites	5

*PSSP = *Psuedoroegneria spicata* – bluebunch wheatgrass
*AGCR = *Agropyrum cristatum* – crested wheatgrass

The monitoring sites in Pasture 8 are within Loamy 8-12” and Calcareous loam 7-10” ecological sites. Sagebrush cover in the Loamy 8-12” ranges from 12 to 23 percent, while other shrubs are in trace amounts (2 percent) (Table WATERSH 42). Perennial grasses at these locations are dominated by crested wheatgrass (2 to 14 percent), with minimal native species cover (2 percent). Sandberg bluegrass is the dominant grass species (34 to 48 percent), with no annual invasive grass cover. The Calcareous loam site has minimal shrub cover of any kind (1 to 5 percent), with 18 percent perennial grass foliar cover, and 22 percent Sandberg bluegrass. Annual invasive grass foliar cover is 18 percent. This pasture was seeded in 1963-64, and has remained largely a seeded community.

Pasture 9

Table WATERSH 43. Foliar cover from AIM/HAF methods for sites in pasture 9

Pasture 9 - Foliar Cover (%)						
Year	**Sagebrush**	**Other Shrubs**	**Perennial Grass**	**Sandberg Bluegrass**	**Annual Invasive Grass**	**Number of Sites**
RO11XY001ID – Loamy 8-12” Wyoming big sagebrush/Indian ricegrass-Thurber’s needlegrass						
2012	12	6	27 (AGCR)*	12	7	2
2014	3	0	0	19	0	2
RO11XY014ID – Sandy Loam 8-12” Wyoming big sagebrush/Indian ricegrass						

Pasture 9 - Foliar Cover (%)						
Year	**Sagebrush**	**Other Shrubs**	**Perennial Grass**	**Sandberg Bluegrass**	**Annual Invasive Grass**	**Number of Sites**
2012	14	0	3 (AGCR)	17	0	1
					Total Sites	5

*AGCR = *Agropyrum cristatum* – crested wheatgrass

Sites monitored in Pasture 9 are in Wyoming sagebrush communities. The perennial grass component in this pasture is crested wheatgrass (3 to 27 percent); no other deep rooted species were detected (Table WATERSH 43). Sandberg bluegrass was between 12 and 19 percent foliar cover, while annual invasive grasses ranged from 0 to 7 percent. Other shrubs constituted a minor component of the Loamy 8-12" site (6 percent). This pasture was also seed in 1963-64, and has remained a seeded community with some native species present.

Pasture 10

Table WATERSH 44. Foliar cover from AIM/HAF methods for sites in pasture 10

Pasture 10 - Foliar Cover (%)						
Year	**Sagebrush**	**Other Shrubs**	**Perennial Grass**	**Sandberg Bluegrass**	**Annual Invasive Grass**	**Number of Sites**
RO11XY014ID – Sandy Loam 8-12" Wyoming big sagebrush/Indian ricegrass						
2012	20	10	4	48	24	1
2014	15	1	2	56	0	2
RO25XY043ID – Loamy 11-13" Basin big sagebrush/bluebunch wheatgrass						
2012	20	14	6	16	12	1
2014	14	11	7	59	11	1
					Total Sites	5

Sites monitored in Pasture 10 are in Sandy loam 8-12" and Loamy 11-13" ecological sites. Grass foliar cover is composed of predominately Sandberg bluegrass (16 to 59 percent), while deep rooted perennial species range from 2 to 7 percent (Table WATERSH 44). Functional replacement of deep rooted perennial grass species with Sandberg bluegrass compromises the hydrologic capability of the pasture, and reduces water capture and infiltration in the soil profile. Annual invasive grasses are variable with between 0 and 24 percent across monitoring sites. Sagebrush cover is slightly lower than expected (14 to 20 percent), with a robust component of other shrubs (1 to 14 percent).

Pasture 11

Table WATERSH 45. Foliar cover from AIM/HAF methods for sites in pasture 11

Pasture 11 - Foliar Cover (%)						
Year	**Sagebrush**	**Other Shrubs**	**Perennial Grass**	**Sandberg Bluegrass**	**Annual Invasive Grass**	**Number of Sites**
RO11XY014ID – Sandy Loam 8-12” Wyoming big sagebrush/Indian ricegrass						
2014	17	0	8	50	40	2
RO25XY011ID – Loamy 13-16” Mountain big sagebrush/bluebunch wheatgrass – Idaho fescue						
2012	17	6	14	31	25	2
2014	22	16	18	28	12	3
					Total Sites	7

Sites monitored in Pasture 11 are in Sandy loam 8-12” and Loamy 13 to 16” ecological sites. Sagebrush cover is within the expected range (17 to 22 percent), with variable cover from other shrubs (0 to 16 percent) (Table WATERSH 45). Perennial grasses range from 8 to 18 percent, while Sandberg bluegrass is the dominant perennial grass component (28 to 50 percent). Annual invasive grass cover range from 12 to 40 percent. Again, deep rooted perennial species have been replaced the shallow rooted Sandberg bluegrass. Functionally, they are not equivalent which can lead to compromised hydrologic function and decreased site stability.

2.1.1.4 Shrub Density

Shrub density, taken at trend locations, is also an indicator of overall soil/site stability and hydrologic function. Maintaining persistence through root stability and facilitating snow capture and maintaining water on site through slow release (melting). Although there is not a reference metric for shrub density, density data is used in concert with other methods to illustrate overall vegetative structure. Major categories analyzed are sagebrush, rabbitbrush, juniper/trees and other shrubs which can include spiny hopsage (*Grayia spinosa*), saltbush (*Atriplex sp.*), and snowberry (*Symphoricarpus sp.*).

Pasture 1

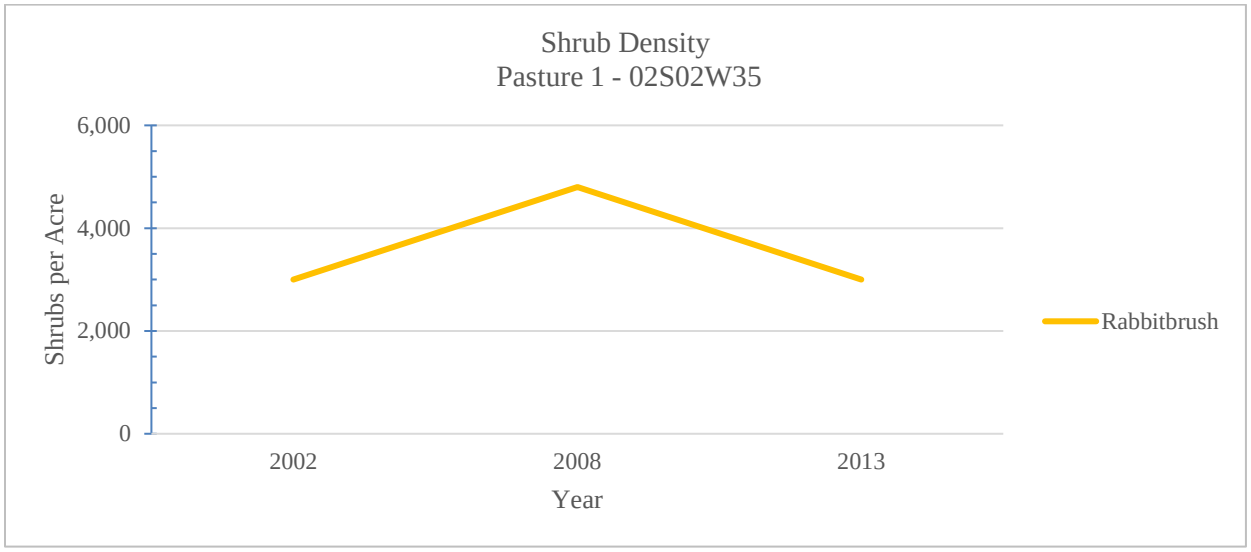

Figure WATERSH 12. Shrub density for trend site 02S02W35 in pasture 1.

Shrub density is unchanged between 2002 and 2013 at 3,000 rabbitbrush per acre, with a spike to 4,800 in 2008 (Figure WATERSH 12). This is likely due to some microsite site variability, which is consistent with previous assessments. This indicates overall persistence of shrubs on the site.

Pasture 2

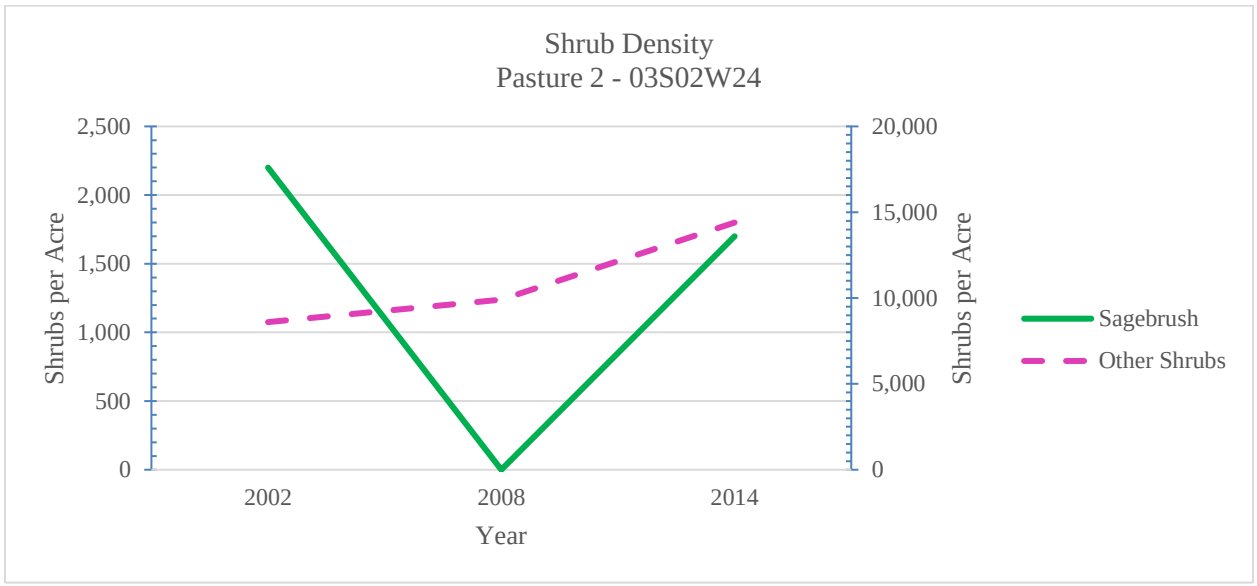

Figure WATERSH 13. Shrub density for trend site 03S02W24 in pasture 2. Sagebrush is charted on the left axis, while Other Shrubs are charted on the right axis.

Sagebrush density in Pasture 2 is quite variable, ranging from 2,200 shrubs per acre in 2002 to 1,700 in 2014 (Figure WATERSH 13). Other shrubs (saltbush) increased steadily from 8,600

shrubs per acre in 2002 to 14,000 in 2014. It is likely that sagebrush was misidentified during this method, hence the extreme variability. Bud sage is present on the site, and can be misidentified for immature saltbush in early growth phases. Photos from the plot as well as frequency data confirm this assumption. Slight increases in overall shrub cover indicate an increased capacity for snow capture at this site. Please also see Standard 4 for frequency data.

Pasture 3

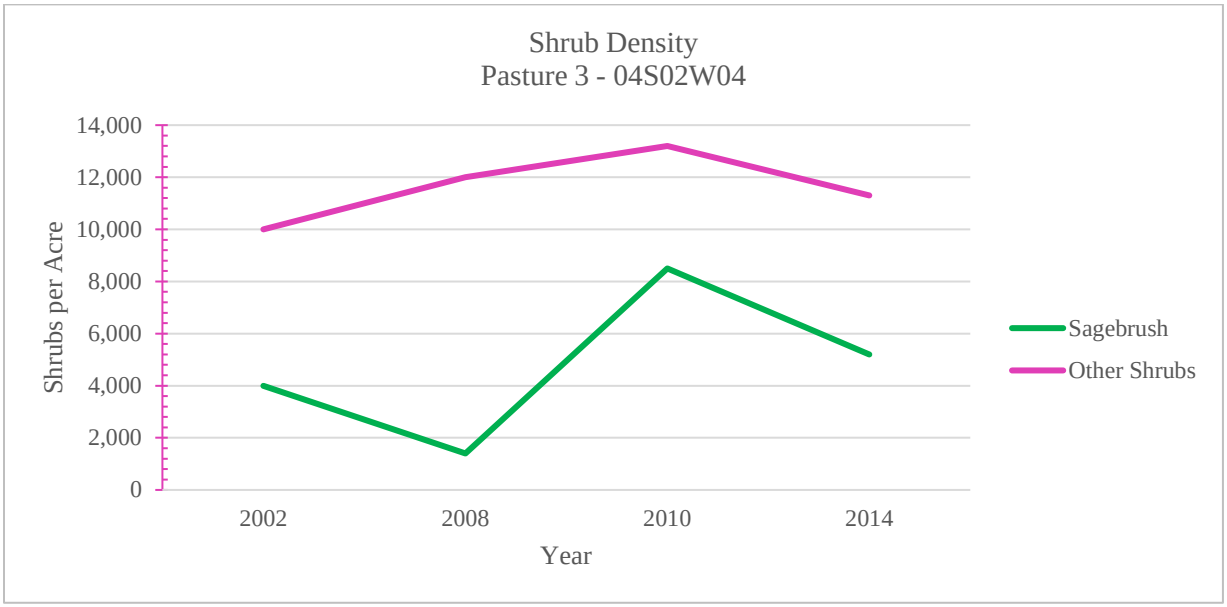

Figure WATERSH 14. Shrub density for trend site 04S02W04 in pasture 3.

The trend site is in a saltbush community, with minor components of budsage and Wyoming sagebrush. Saltbush (other shrubs) increased from 2002 to 2010 (10,000 to 13,200) and dipped in 2014 (11,300) (Figure WATERSH 14). The dominant sagebrush is budsage (*Artemisia spinescens*), with a few Wyoming sagebrush. Overall, the sagebrushes increased from 2002 to 2010 (4,000 to 8,500 shrubs/acre) and decreased in 2014 (5,200). No budsage was recorded in 2008, and was misidentified as spiny hopsage (*Grayia spinosa*) and likely saltbush. A few Wyoming sagebrush were recorded at the plot (1,400 shrubs/acre). Overall, there was a net increase across all shrub types, which increases the capacity for snow capture on the site, and overall stability.

Pasture 4

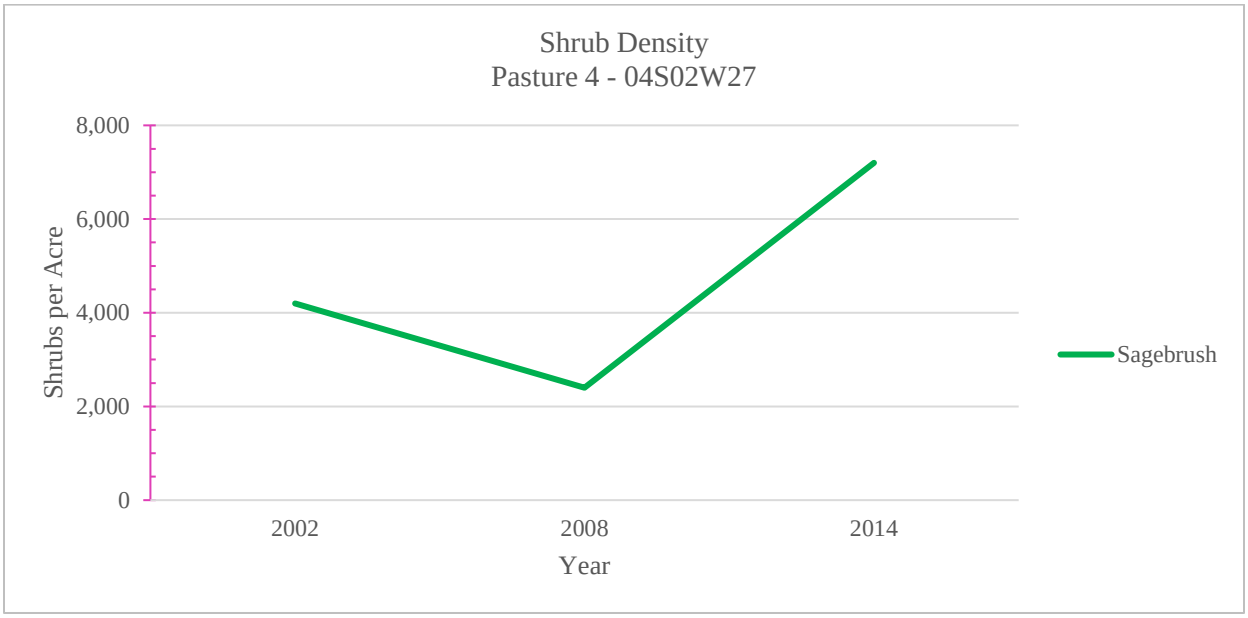

Figure WATERSH 15. Shrub density for trend site 04S02W27 in pasture 4.

The Wyoming sagebrush at the trend site in Pasture 4 overall increased from 2002 to 2014 from 4,200 to 7,200 shrubs per acre (Figure WATERSH 15). There was a decrease in from 2002 to 2008 from 4,200 to 2,400 shrubs per acre. The decrease can be attributed to the aroga moth infestation in 2008, making shrubs more difficult to differentiate from woody debris, or generally less consipicuous. This would have cause some decline in shrubs, but the dramatic increase between 2008 and 2014 indicates less greater survivorship from the infestation. This increase contributes to overall site stability.

Pasture 5

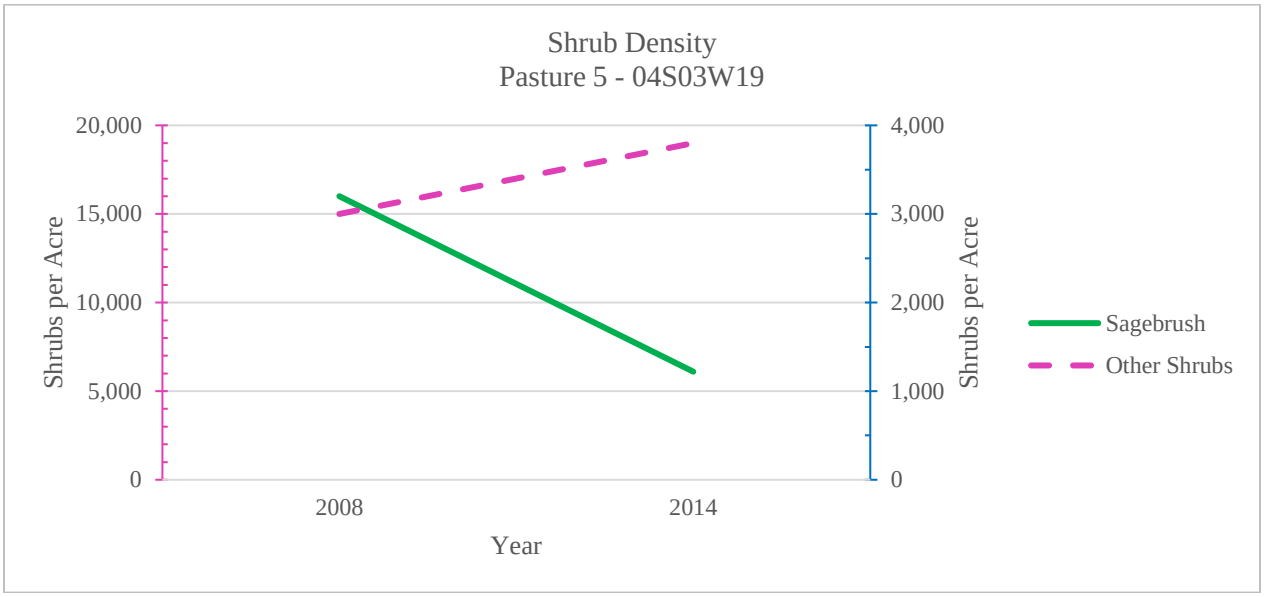

Figure WATERSH 16. Shrub density for trend site 04S03W19 in pasture 5. Sagebrush is charted on the left axis, while Other Shrubs are charted on the right axis.

The trend site in Pasture 5 has two shrub groups: sagebrush (mountain), and juniper and other shrubs (snowberry). Sagebrush declined significantly from 16,000 to 6,100 shrubs per acre from 2008 to 2014, while snowberry increased from 3,000 to 3,800 (Figure WATERSH 16). Juniper had previously been observed on the site in 1991, but was not observed in the 2008 and 2014 readings. Overall, this indicates decrease site stability and ability to capture water due to decreased sagebrush density.

Pasture 6

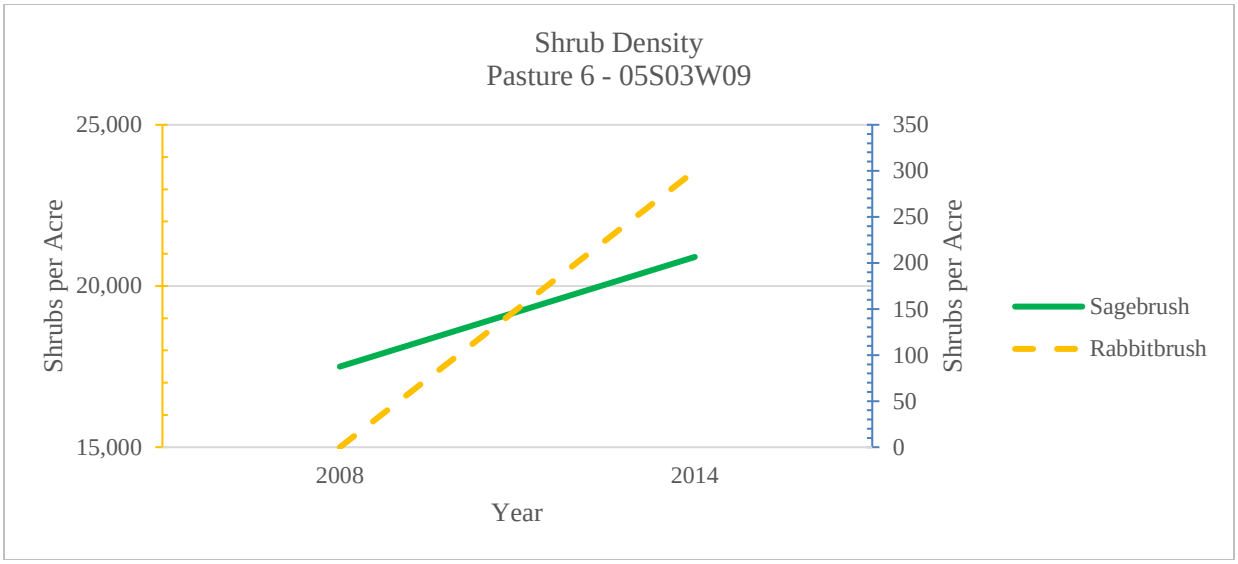

Figure WATERSH 17. Shrub density for trend site 05S03W09 in pasture 6. Sagebrush is charted on the left axis, while rabbitbrush is charted on the right axis.

The Pasture 6 trend site experienced increase in both sagebrush and rabbitbrush from 2008 to 2014. Sagebrush increases from 17,500 to 20,900 shrubs per acres, while rabbitbrush increases from 0 to 300 shrubs per acres (Figure WATERSH 17). Rabbitbrush had been detected in previous monitoring efforts, but in minute quantities. An increase in rabbitbrush increased disturbance on the site, with potential for this trend to continue.

Pasture 7

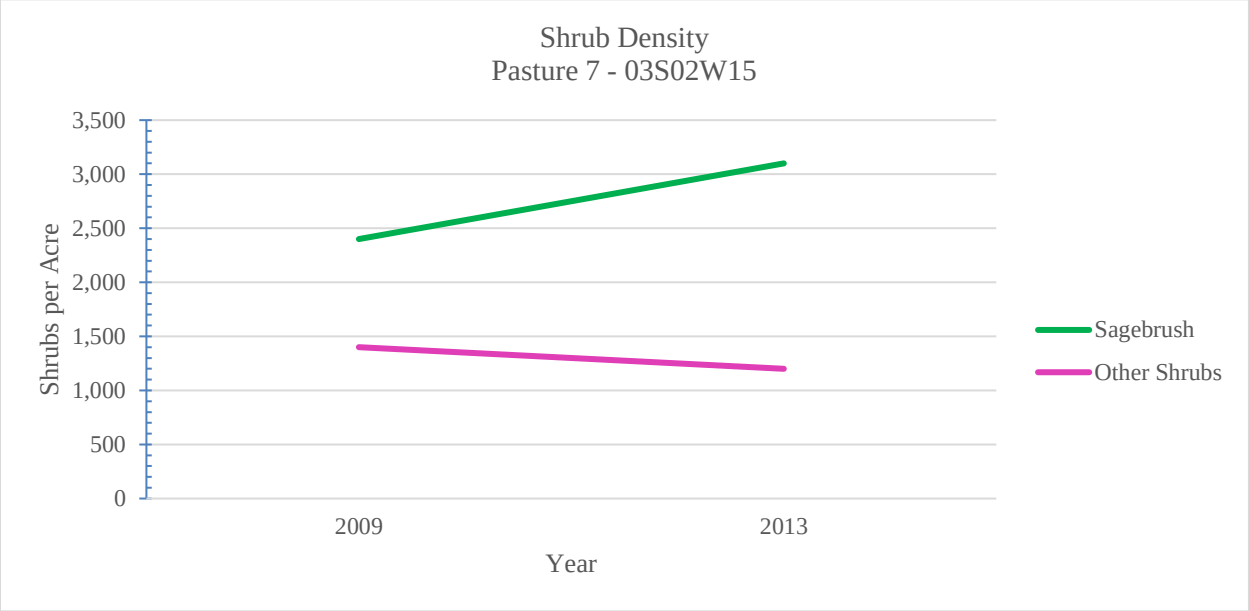

Figure WATERSH 18. Shrub density for trend site 03S02W15 in pasture 7.

Shrub density in Pasture 7 has experienced some change. Sagebrush (Wyoming) increased from 2009 to 2013 from 2,400 to 3,100 shrubs per acre, while other shrubs decreased slightly from 1,400 to 1,200 shrubs per acre (Figure WATERSH 18).

Pasture 8

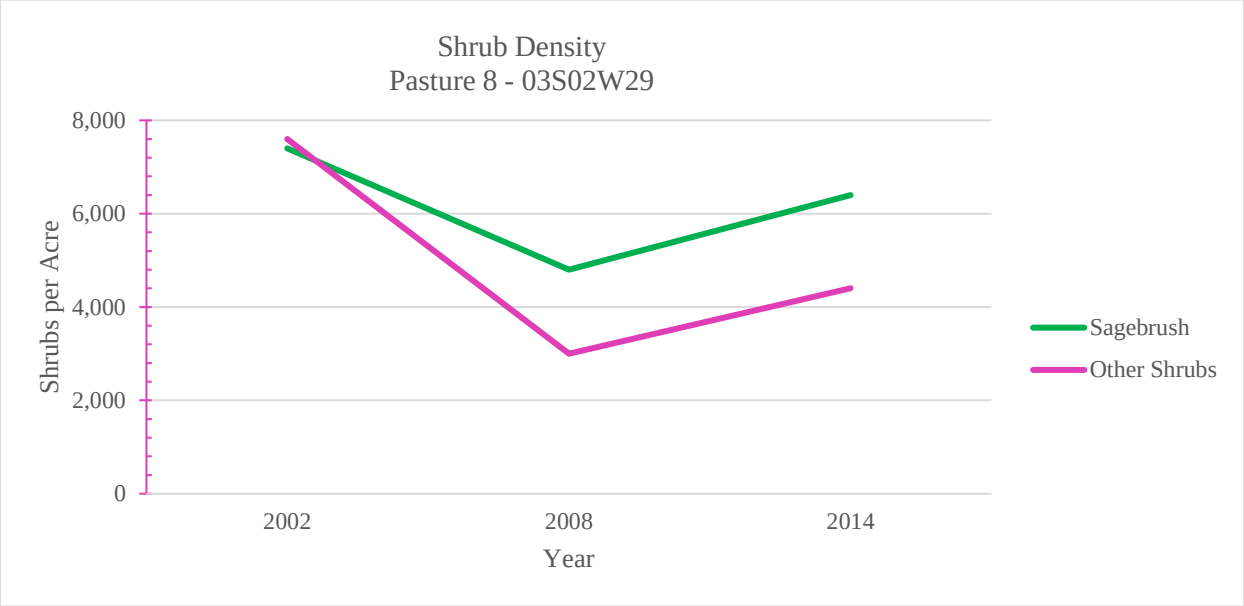

Figure WATERSH 19. Shrub density for trend site 03S02W29 in pasture 8.

Sagebrush at the monitoring site in Pasture 8 decreased slightly from 2002 to 2014 (Figure WATERSH 19). The decline in 2008 in both sagebrush and other shrubs appears to be a data anomaly, as the recovery in shrub density was dramatic from 2008 to 2014. Overall, sagebrush decreased from 7,400 to 6,400, while other shrubs decreased from 7,600 to 4,400 shrubs per acre. There is an overall net decrease in shrub density at this location which can reduce site stability in the long term should trends continue.

Pasture 9

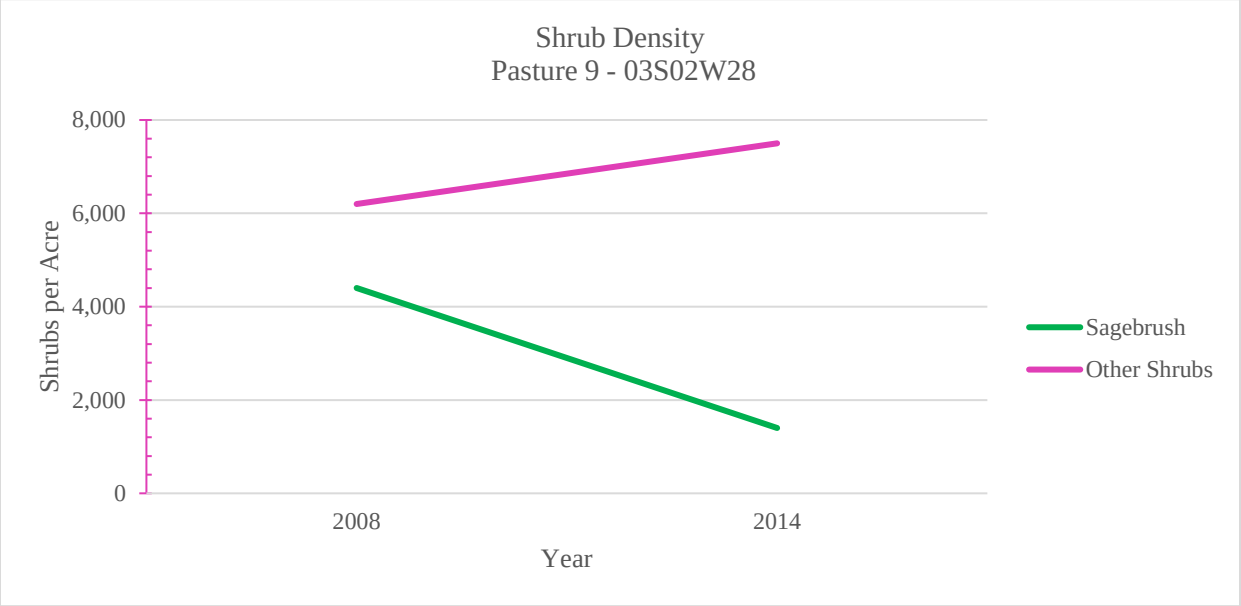

Figure WATERSH 20. Shrub density for trend site 03S02W28 in pasture 9.

Sagebrush (budsage) declined at the trend site in Pasture 9 from 4,400 shrubs per acre down to 1,400. Other shrubs (saltbush), increased from 6,200 shrubs per acre to 7,500 (Figure WATERSH 20). Although other data types (i.e. frequency), shrub density was not taken in 2002. There is a net loss of shrubs at this location, with the decline of budsage. This indicates a slight decrease is soil/site stability.

Pasture 10

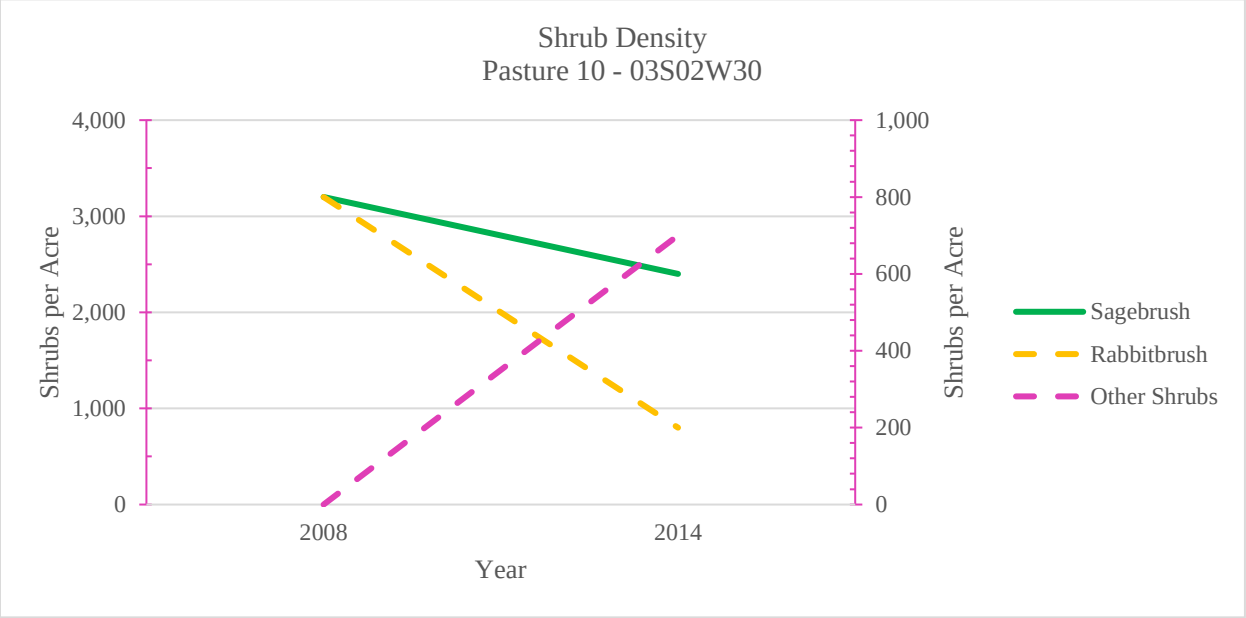

Figure WATERSH 21. Shrub density for trend site 03S02W30 in pasture 10. Sagebrush is charted on the left axis, while rabbitbrush and other shrubs are charted on the right axis.

Sagebrush and rabbitbrush declined in Pasture 10 at the trend location, while other shrubs (horsebrush) increased (Figure WATERSH 21). Sagebrush declined from 3,200 to 2,400 shrubs per acre; rabbitbrush declined from 800 to 200 shrubs per acre; horsebrush increased from 0 to 700. It is likely that rabbitbrush and horsebrush were misidentified (for one another), therefore, there was no actualized increase or decrease between the two.

Pasture 11

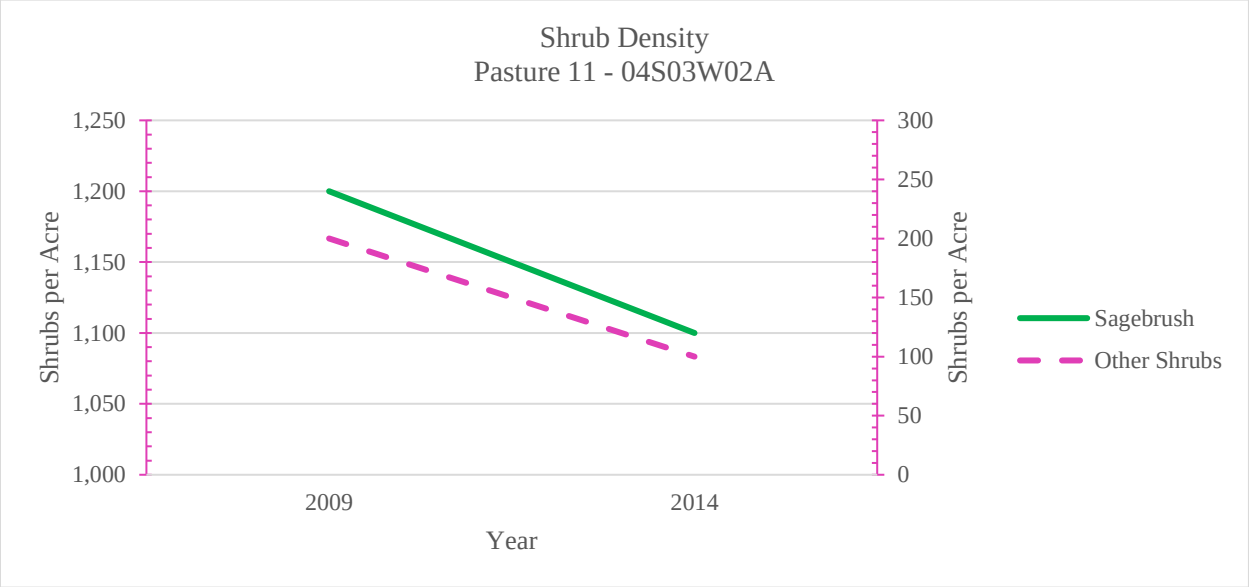

Figure WATERSH 22. Shrub density for trend site 04S03W02A in pasture 11. Sagebrush is charted on the left axis, while other shrubs are charted on the right axis.

Both sagebrush and other shrubs declined at the trend site in Pasture 11. Sagebrush decreased from 1,200 to 1,100 shrubs per acre, while other shrubs decreased from 200 to 100 shrubs per acre (Figure WATERSH 22).

2.1.1.5 Forestry

The forested and woodland stands surrounding the Silver City, Idaho have remained relatively unburned in recent years (Figure APP 4.1 MAP 7). During the late 1800s, the Silver City settlement and mining boom, and the demand for wood products, led to significant deforestation of the forest stands in the surrounding area. However, a lack of fire and reduction in mining activities has allowed for stand replenishment.

Historic United States Geologic Service (USGS) images from 1963 were photomosaically composed as a layer features in ARCMap to show long term changes in Douglas fir and juniper stands in Silver City allotment. This layer was used to compare the 2017 NAIP imagery (National Agriculture Imagery Program). Three sites were selected for comparison based on the availability of other data such as AIM/HAF monitoring sites, AIM Site Forest 172, HAF Site O, and HAF Site S. Single picture frames from the 1963 imagery were identified for each site and geo-referenced to overlay the monitoring location. Historic photos and NAIP imagery analysis areas were selected based on major geographical features that could be identified in both imagery datasets.

Pasture 5

Site O is in a mahogany savannah community (R025XY018ID). Monitoring at the HAF/AIM sites indicate the site is close to the reference community (Figure WATERSH 23). For more detailed analysis please see Table WATERSH 21.

In the 1963 imagery, HAF Site O (R025XY018ID, Mahogany Savanna 16-22”; Figure WATERSH 24 and Figure WATERSH 26) tree stands were isolated to the ridgeline, or the northeastern corner of the analysis area. The stand extends down the ridgeline but no trees are visible in the southern portion of the major ridgeline. The western portion of the analysis area shows few visible trees isolated to the northern portion of the analysis area. The 2017 NAIP imagery shows trees scattered in the western portion of the analysis area (Figure WATERSH 25 and Figure WATERSH 27). The north western portion of the analysis area shows increased density of the stands present in the 1963 imagery, as well as trees filling in the drainage north of Site O.

Figure WATERSH 23. HAF site O, 2014 monitoring, pasture 5

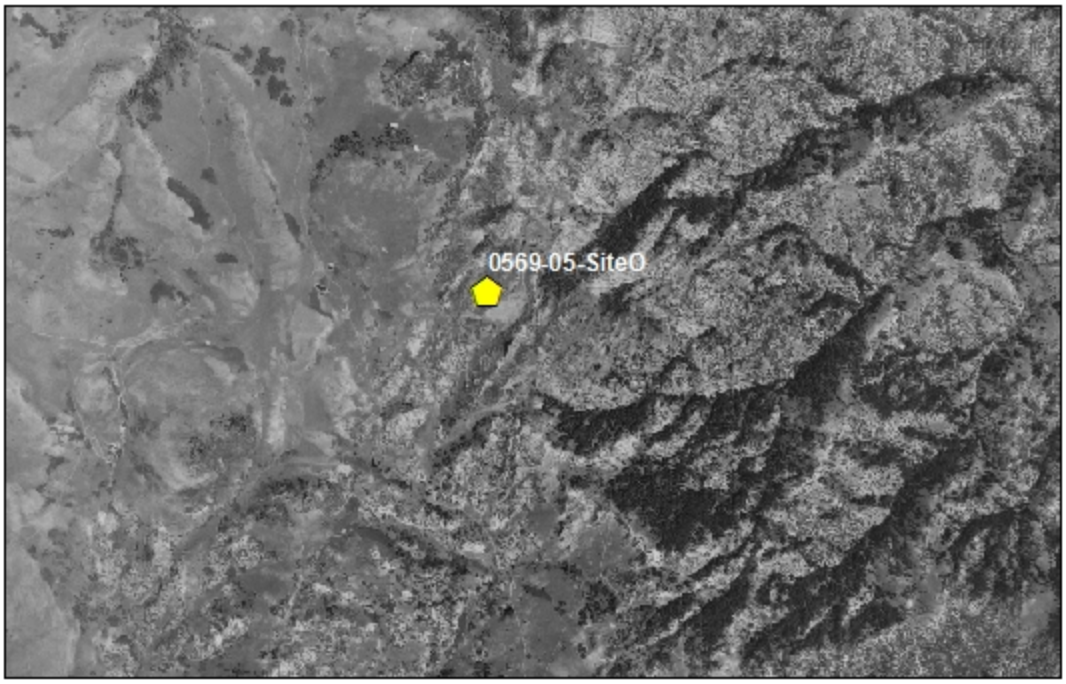

Figure WATERSH 24. HAF site O, 1963 imagery, scale 1:35,000, pasture 5

Figure WATERSH 25. HAF site O, NAIP 2017 imagery, scale 1:35,000, pasture 5

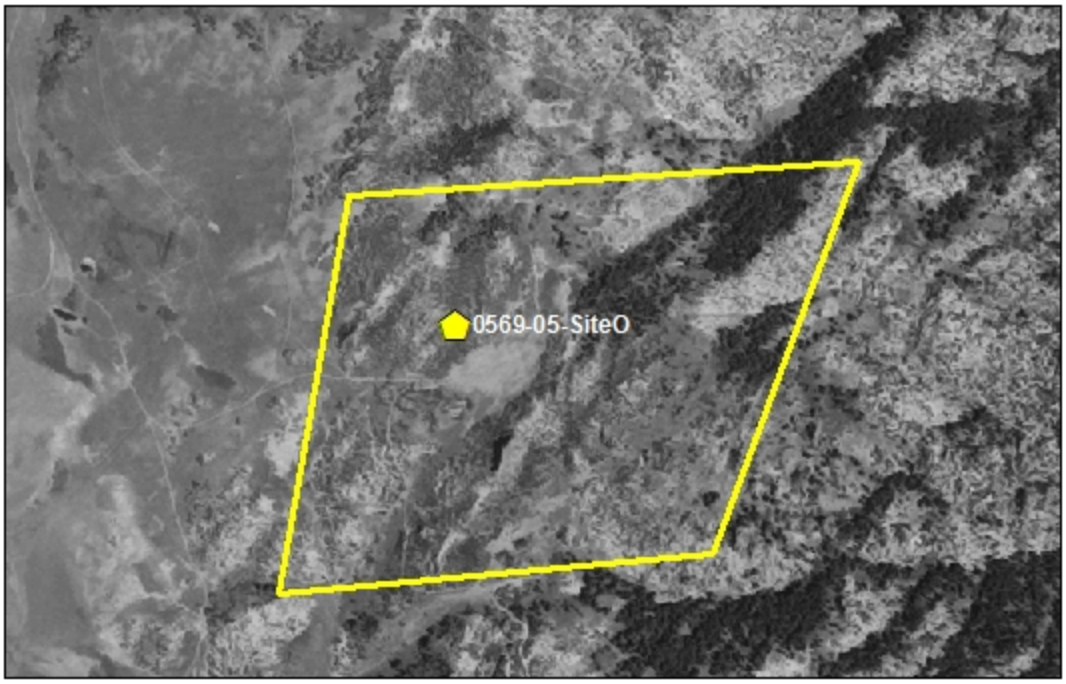

Figure WATERSH 26. HAF site O analysis area, 1963 imagery, scale 1:15,000

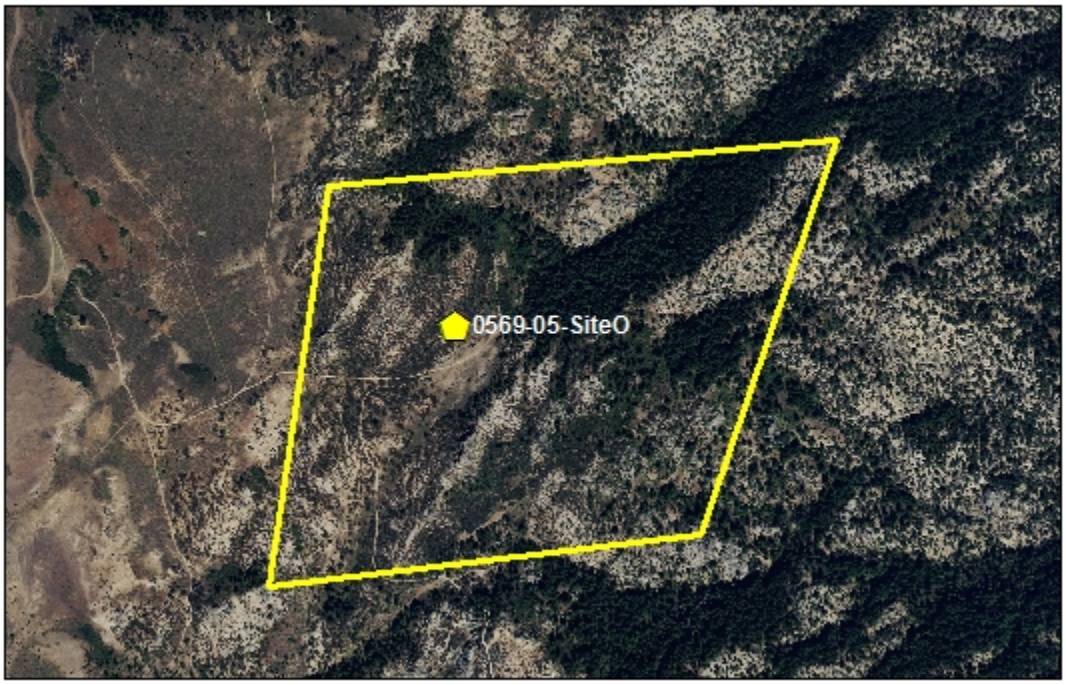

Figure WATERSH 27. HAF Site O analysis area, NAIP 2017 imagery, scale 1:15,000

Pasture 6

AIM site Forest-172 is in Douglas Fir-Mountain Snowberry 22"+ (R025XY045ID) (Figure WATERSH 28). For more detailed analysis please see Table WATERSH 23.

In the 1963 imagery, the ridgelines are densely forested with trees moving down from the ridgeline into the lower lying areas (Figure WATERSH 29 and Figure WATERSH 31). There are large areas in the imagery that are either treeless or scarcely treed at the lower valley bottoms. The 2017 NAIP imagery shows more dense stands in the lower lying valley bottoms that appear to be the result of trees moving down the ridgeline and radiating out into the valley bottoms in areas (Figure WATERSH 30 and Figure WATERSH 32). The location of the AIM Forest –172 site is on the outer edge of an area where trees are encroaching.

Tree density of the Douglas Fir-Mountain Snowberry ecological site (R025XY045ID) would typically be a minor component, however currently the tree component of the site is the dominant community comprised of Douglas-fir, Engelmann spruce and western juniper. This shift in dominant community at the site can be explained through the change in distribution of tree density between the 1963 and 2017 imagery.

Figure WATERSH 28. AIM site Forest-172, 2016 monitoring, direction 0 degrees north, pasture 6

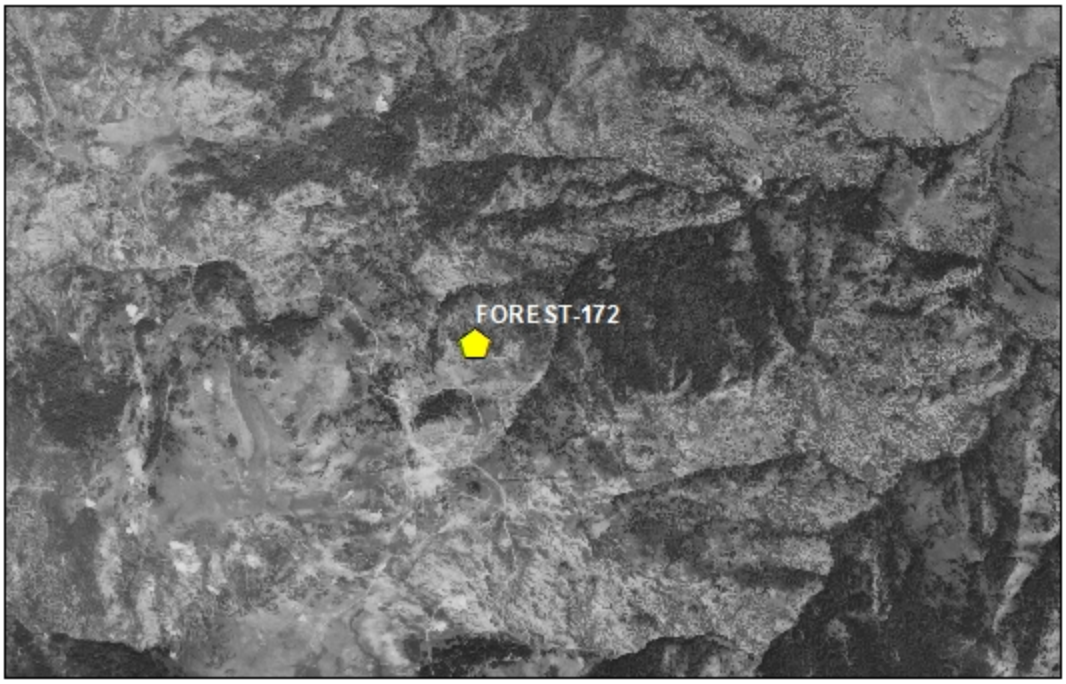

Figure WATERSH 29. AIM site Forest-172, 1963 imagery, scale 1:35,000, pasture 6

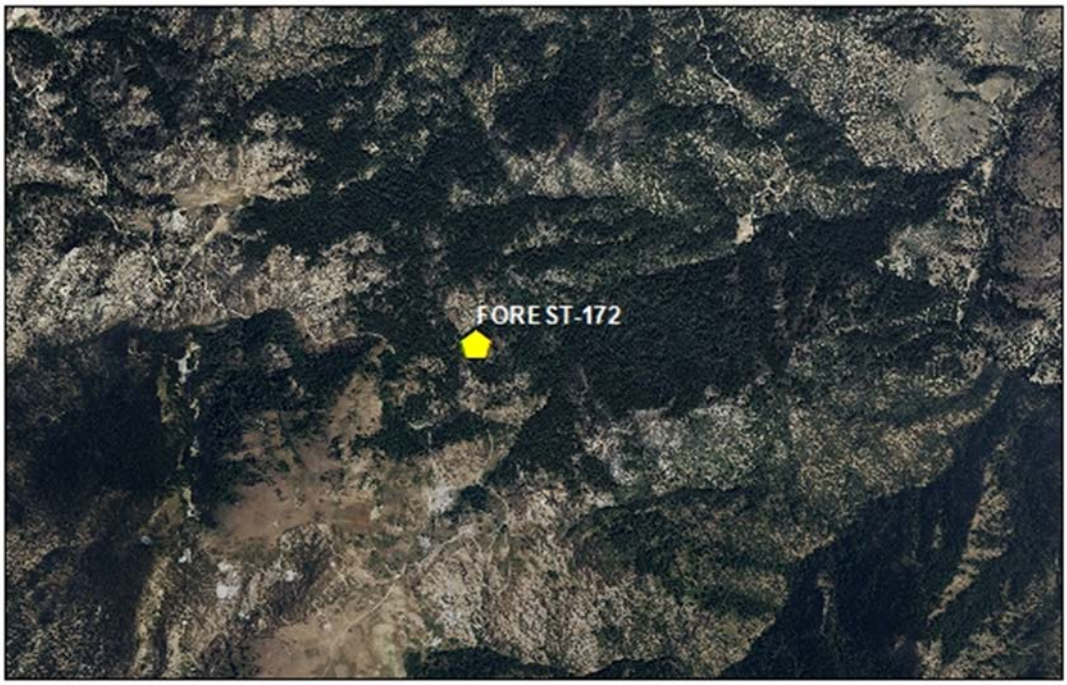

Figure WATERSH 30. AIM site Forest-172, NAIP 2017 imagery, scale 1:35,000, pasture 6

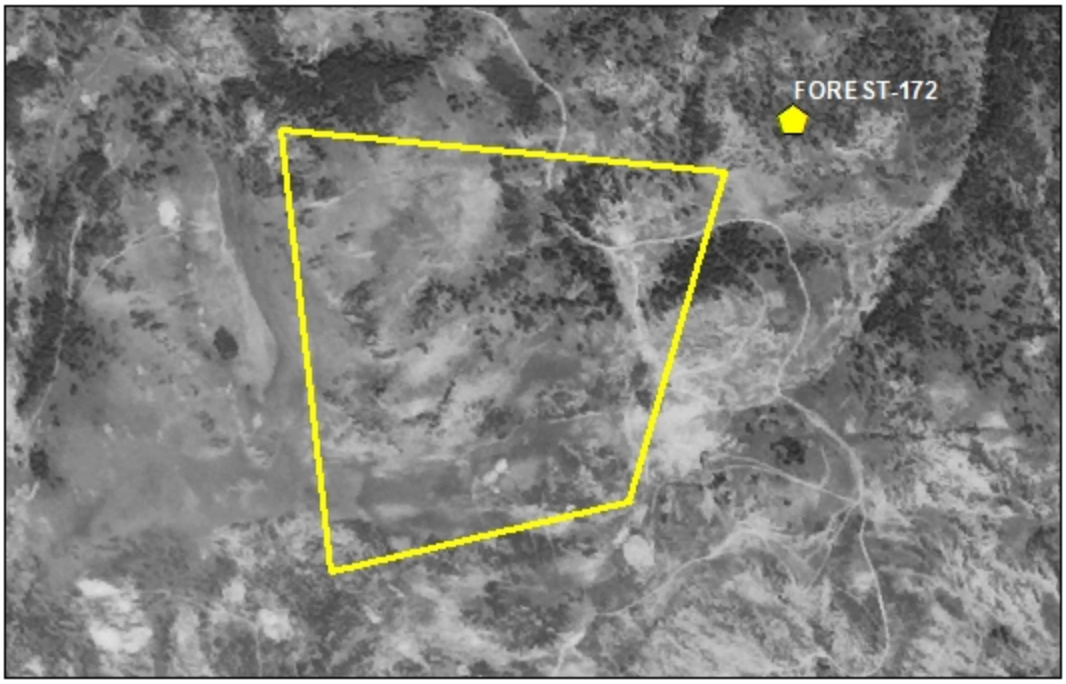

Figure WATERSH 31. AIM site Forest-172 analysis area, 1963 imagery, scale 1:15,000

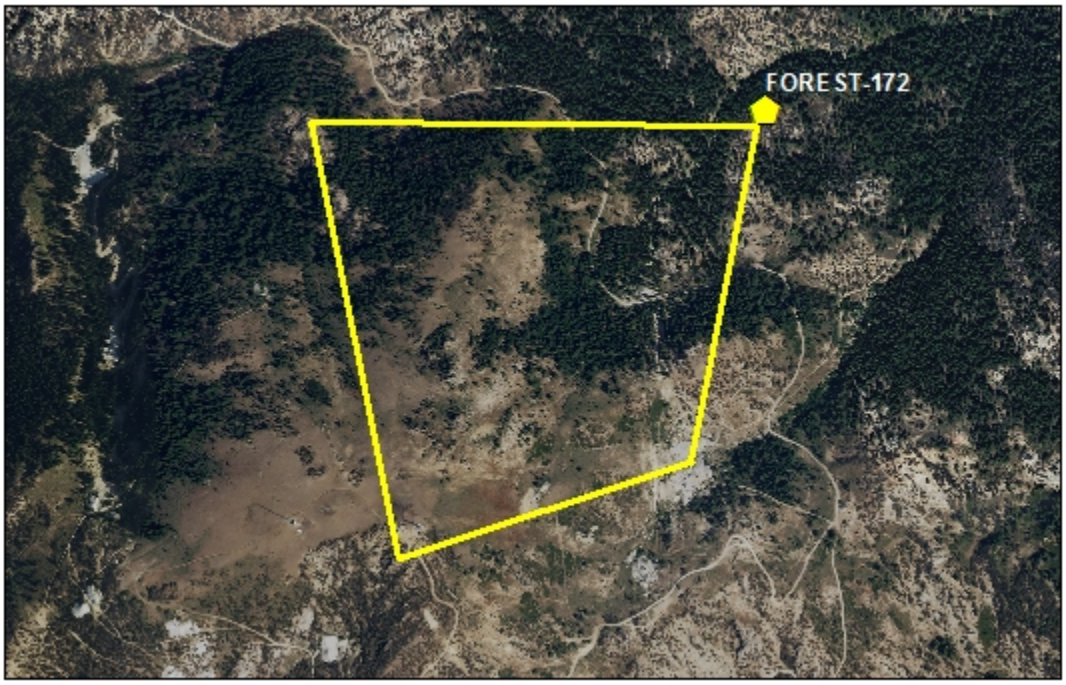

Figure WATERSH 32. AIM site Forest-172 analysis, NAIP 2017 imagery, scale 1:15,000

HAF Site S is a big sagebrush community (R025XY011ID, Loamy 13-16") (Figure WATERSH 33). Monitoring at the HAF/AIM sites indicate variability but remain closer to the reference community. For more detailed analysis please see Table WATERSH 23.

HAF site S in the 1963 imagery the ridgelines are sparsely lined with trees and few spots appear to have trees moving down off the ridgelines (Figure WATERSH 34 and Figure WATERSH 36). The immediate area surrounding the site shows limited trees. The 2017 NAIP imagery shows a widening stand of trees lining the ridgeline (Figure WATERSH 35 and Figure WATERSH 37). From the ridgeline trees radiate out down the hillside into the drainages. The area surrounding HAF Site S is now scattered with trees.

Figure WATERSH 33. HAF site S, 2014 monitoring, direction 180 degrees, pasture 6

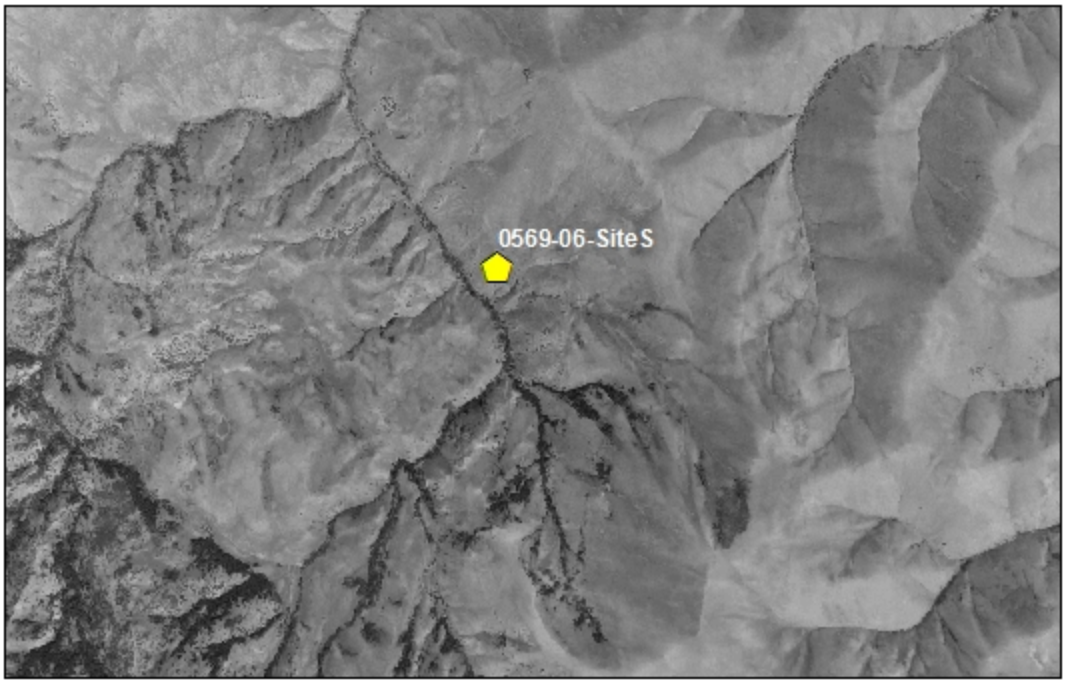

Figure WATERSH 34. HAF site S, 1963 imagery, scale 1:35,000, pasture 6

Figure WATERSH 35. HAF site S, NAIP 2017 imagery, scale 1:35,000, pasture 6

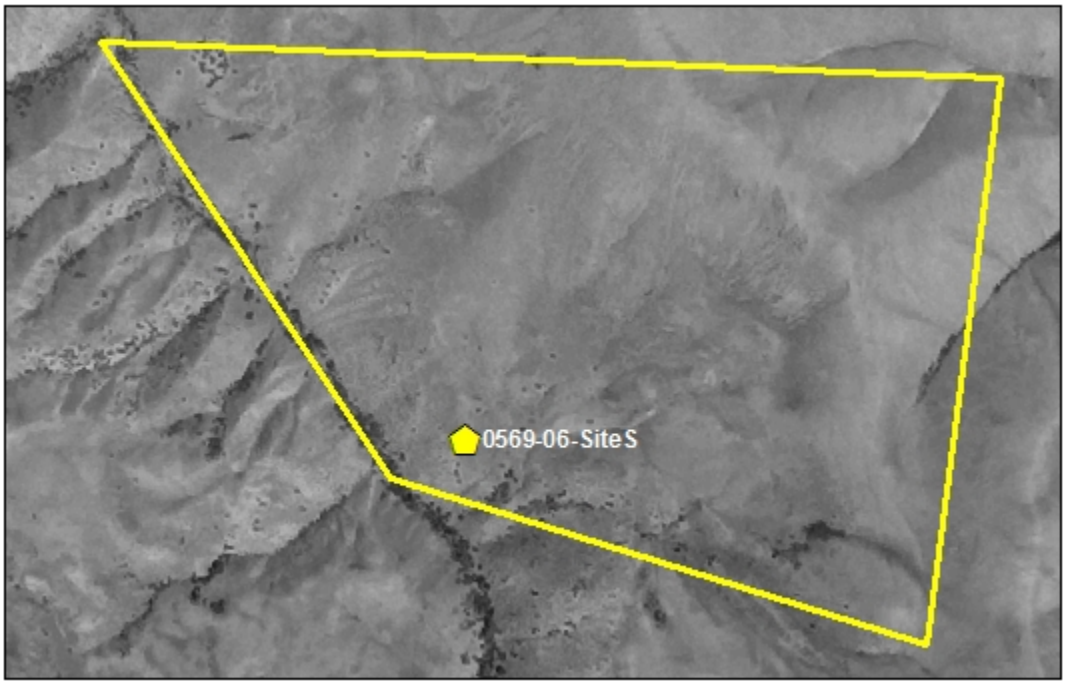

Figure WATERSH 36. HAF site S analysis area, 1963 imagery, scale 1:15,000

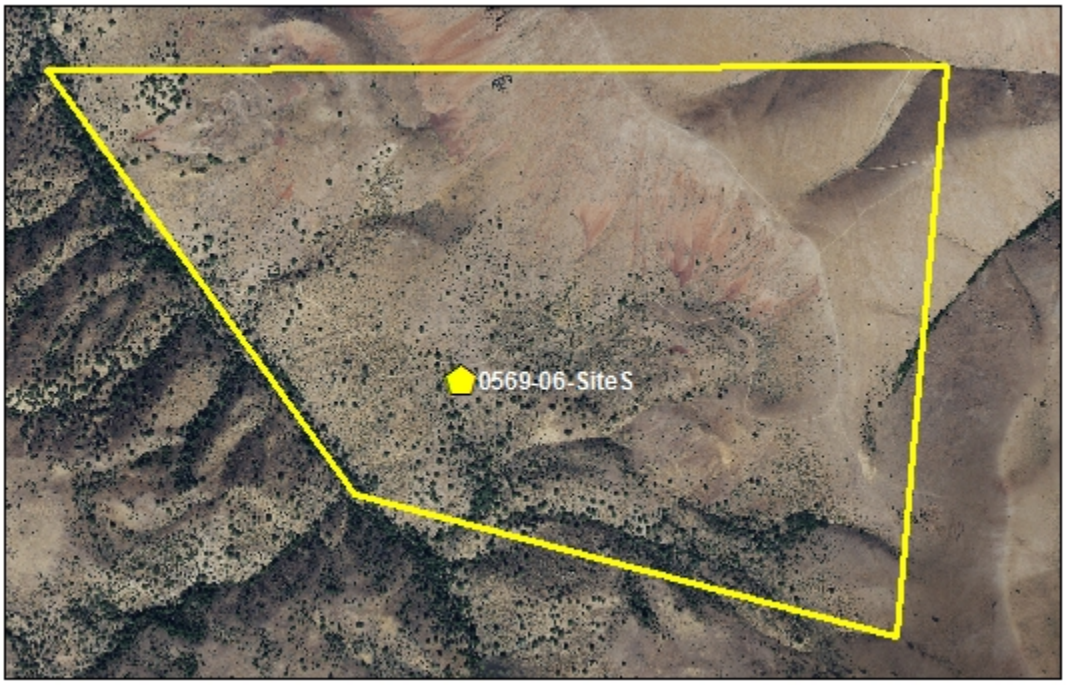

Figure WATERSH 37. HAF site S analysis area, NAIP 2017 imagery, scale 1:15,000

2.1.2 2.1.2 Evaluation of Standard 1- Watersheds

Evaluation Finding- Allotment/watershed is:

___Meeting Standard
___ Not meeting the Standard, but making significant progress toward meeting
_X_ Not meeting the Standard

OWYHEE RESOURCE MANAGEMENT PLAN (1999)

Objectives and Management Actions & Allocations:

Soil Resources

SOIL 1: Improve unsatisfactory and maintain satisfactory watershed health/condition on all areas.

- Presently, watershed health within the Silver City allotment is deficient. Soil stability and hydrologic function are compromised resulting in unsatisfactory conditions. Therefore, the objective is not being met.

SOIL 2: Achieve stabilization of current, and prevent the potential for future, localized accelerated soil erosion problems (particularly on streambanks, roads, and trails). Localized accelerated soil erosion is where humans, by their actions, are responsible for the site specific erosive process.

- There are extensive widespread erosion issues, as well as soil loss and movement through the allotment. These features were observed in both upland and riparian habitats (for riparian habitat see Standard 2). The objective is not being met.

Vegetation Resources

VEGE 1: Improve unsatisfactory and maintain satisfactory vegetation health/condition on all areas.

- Vegetation/health within the allotment is compromised, with a community shift to predominately shallow rooted grass species, which do not stabilize soil as effectively as deep rooted species. This has percolated into erosional issues throughout the uplands resulting in impaired site stability. Therefore, the objective is not being met.

2.1.2.1 2.1.3 Evaluation and Rationale for Evaluation Finding

Pastures 1-7 and 10-11 have moderate to high cover of cheatgrass, which is prohibitive for the establishment of native species, and produces excess amounts of plant litter. Although plant litter can be a stabilizing feature, the increase in invasive annual grasses outcompetes weakened perennial species and often creates a thatch layer (observed). This can create erosional features such as unimpeded water movement across the soil surface. In pastures 1-4 and 7-9, cheatgrass is a dominant component of the plant community. This is evidenced from all the monitoring methods, which consistently report high amounts of cheatgrass and subsequent litter. In pastures

5, 6, 10, and 11 encroachment of cheatgrass is limited and deep rootedperennial bunchgrasses are dominant or codominant with Sandberg bluegrass.

The shallow-rooted, Sandberg bluegrass has replaced the deep rootedbunchgrasses as the major grass component in all pastures except 5 and 6, and does not provide the sufficient ecological benefits. Additionally, it is often codominant in pastures 5 and 6, with the potential to become the dominant perennial species. Despite providing overall ground cover, Sandberg bluegrass does not capture water to the same degree as deep rootedgrasses to provide percolation of water deep into the soil profile. It can also perpetuate waterflow patterns/rilling and pedestalling, as was observed in the IIRH assessments. Although it does provide some site stability and competition with annual invasive grasses. Although plant density is variable across the allotment declines were noted at almost all sites. When analyzed with other methods, there is an overall lack of plant community structure across the landscape, with low cover of deep rooted perennial bunchgrasses, which compromises the ability to capture water, and cycle nutrients and energy appropriate to soil type and landform.

Tree cover and density in the higher elevations of pastures 5 and 6, is creating an environment prohibitive to herbaceous species establishment and proliferation. Generally, trees are extremely dense, outcompeting the understory for resources. These areas are lacking in overall structure, and creates a thick litter layer conducive to sloughing, without sufficient shrub or bunchgrass cover to slow overland flow events.

2.1.3 2.1.4 Information Sources

USDI Bureau of Land Management (BLM). 2005. Interpreting Indicators of Rangeland Health-Version 4. Technical Reference 1734-6. Denver CO. 118 p.

2.2 Standard 2: Riparian Areas and Wetlands

___ Standard Does Not Apply

Riparian-wetland areas are in proper functioning condition appropriate to soil type, climate, geology, and landform to provide for proper nutrient cycling, hydrologic cycling and energy flow.

Indicators may include but are not limited to:

1. The riparian/wetland vegetation is controlling erosion, stabilizing streambanks, shading water areas to reduce water temperature, stabilizing shorelines, filtering sediment, aiding in floodplain development, dissipating energy, delaying floodwater, and increasing recharge of groundwater appropriate to site potential.
2. Riparian/wetland vegetation with deep strong binding roots is sufficient to stabilize streambanks and shorelines. Invader and shallow rooted species are a minor component of the floodplain.
3. Age class and structural diversity of riparian/wetland vegetation is appropriate for the site.
4. Noxious weeds are not increasing.

This assessment of riparian areas and wetlands considers the following indicators and associated information sources (Table RIPN 1).

Table RIPN 1. Riparian area and wetland indicators and associated information sources

INFORMATION SOURCE	INDICATOR	ASSUMPTION
Lentic and Lotic Proper Functioning Condition Assessments	Functional condition rating	Riparian plant community composition and condition indicate recovery and maintenance of existing riparian area.
		Riparian plant community distribution indicates recovery and maintenance of riparian area, in regards to achieving potential extent.
Multiple Indicator Monitoring (MIM) Data	Herbaceous stubble height	Stubble height of vegetation within riparian areas of less than 6 inches reduces functional condition of riparian area, especially when occurring in consecutive years.
	Woody browse use	Indicates recovery and maintenance of woody plant species. More than light use of woody species under 3 feet tall inhibits recovery and maintenance of woody riparian vegetation.
	Streambank alteration	Indicates reduction in plant cover within the riparian area. Streambank alteration percentages more than 10% indicates disturbance that can result in loss of herbaceous riparian vegetation.

2.2.1 Rangeland Health Assessment

The hydrologic setting of the landscape within the Silver City allotment is comprised of headwater streams originating from specific point discharge springs or gaining reaches of streams in the upper portions of the watersheds. These headwater streams originate in steep confined draws with steep stream channel gradients. The streams transport water and sediment into higher order (Strahler 1957) stream reaches at lower elevations where stream channel gradients lower and aggradation is able to occur. The higher order stream channels naturally discharge into either the Snake River to the north or the East Fork Owyhee River to the south. The nature of this system lends the streams to have a combination of perennial, intermittent, or ephemeral qualities that are dependent upon the specific hydrologic and geologic characteristics that allow for water presence and transport through the stream channels.

Riparian hydric vegetation is dependent upon the geomorphic setting of the springs and stream channels within the landscape. Steeper stream channels have the potential for woody and herbaceous species to exist, but there is a lack of occupiable space due to the confined narrow landform setting in which these streams are found. Less steep stream types have a greater ability to sustain denser, more extensive riparian plant communities due to more occupiable space along the streambanks and floodplains. This space has a greater connectivity to the localized water table, enabling riparian hydric vegetation to exist. This is observed in the plant communities

found within the Silver City allotment with smaller, steeper stream channels not supporting dense riparian plant communities. Lower gradient, larger order stream channels support robust woody riparian plant communities in accordance with water availability and stream channel potential. Geomorphic disturbances that effect plant communities are also discussed within Standard 3.

Perennial and intermittent streams and springs were assessed utilizing the BLM lotic and lentic proper functioning condition (PFC) protocols (USDI BLM 1998) (USDI BLM 1999a). Locations that fit the criteria outlined in the protocols were selected for assessment by the interdisciplinary team.

Perennial and intermittent stream reaches were also monitored with the multiple indicator monitoring (MIM) protocol (USDI BLM 2011). MIM monitoring locations within grazing pastures were selected to document livestock utilization levels within the Silver City allotment.

2.2.1.1 Streams

The National Hydrologic Database (NHD) lists 54 miles of perennial streams and 173 miles of intermittent and ephemeral streams within the Silver City allotment. Using the BLM lotic proper functioning condition (PFC) protocol, 28.6 miles of stream were assessed: 5 miles (18 percent) being in PFC, 23.2 miles (81 percent) in functioning-at-risk (FAR), and 0.3 miles (1 percent) being in nonfunctioning condition (NF) (Figure RIPN 1; Figure APP 4.1 MAP 8). Sections of Bates Creek, Diamond Creek, Horse Ranch Creek, Jordan Creek, Presby Creek, and Sinker Creek were rated as PFC (Table RIPN 2). These stream reaches had consistent vegetation cover with diverse plant communities that are capable of resisting erosional forces and maintaining functional riparian and wetland attributes. Several streams were rated in FAR condition due to differing amounts of un-vegetated, bare streambanks including portions of Bates Creek, Diamond Creek, Jordan Creek, Mahogany Gulch, Pedricini Creek, Presby Creek, Sawpit Gulch, Scotch Bob Creek, Sinker Creek, Slaughterhouse Gulch, and Stobie Gulch. A section of the South Fork of Sinker Creek and a section of the North Fork of Sinker Creek were rated as NF due to the complete lack of stabilizing vegetation within the stream channel with no ability to stabilize a natural stream channel. These NF sections of streams represent 1 percent of the assessed stream reaches.

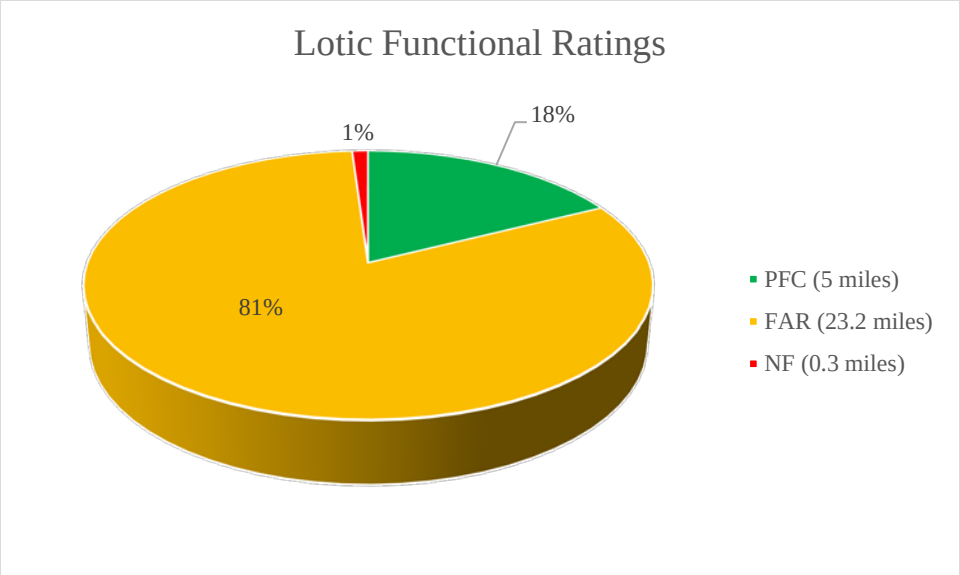

Figure RIPN 1. Lotic PFC assessment rating stream mile percentages

Table RIPN 2. Lotic PFC assessment ratings

Reach	Pasture	Date	Rating[1]	Length (Miles)
Diamond Creek	3	10/2/2014	PFC	0.7
Gray Eagle Creek	5	7/17/2012	FAR	1.3
Horse Ranch Creek	5	7/17/2012	PFC	1.0
Jordan Cr. Confluence Trib F&G	5	7/19/2012	PFC	0.2
Jordan Cr. Trib E	5	7/19/2012	PFC	0.1
Jordan Creek 38.8	5	9/15/2015	FAR	1.6
Jordan Creek 39.0	5	9/14/2015	FAR	0.8
Jordan Creek 40.1	5	9/14/2015	FAR	0.5
Jordan Headwaters Trib B	5	10/7/2015	FAR	0.3
NF Sinker 0.1	5	7/21/2015	FAR	1.4
NF Sinker 1.9	5	7/20/2015	FAR	2.9
Presby Creek	5	9/16/2015	FAR	0.7
Presby Creek	5	7/17/2012	PFC	1.1
Sawpit Gulch	5	8/10/2015	FAR	1.9
Slaughterhouse Gulch	5	9/16/2015	FAR	0.3
Stobie Gulch	5	7/20/2015	FAR	1.4
Bates Creek	6	7/28/2015	FAR	0.5
Bates Creek	6	7/25/2012	PFC	1.1
Mahogany Gulch	6	7/29/2015	FAR	0.8
OroFino Creek 0.2	6	8/4/2015	FAR	0.6

Reach	Pasture	Date	Rating[1]	Length (Miles)
OroFino Creek 1.9	6	7/30/2015	FAR	0.2
Pedracini Fork	6	9/29/2015	FAR	0.2
Pedracini Fork	6	9/29/2015	FAR	1.0
Scotch Bob	6	8/5/2015	FAR	2.2
Scotch Bob Trib 1	6	7/30/2015	FAR	0.2
Scotch Bob Trib 2	6	7/30/2015	FAR	0.3
SF Sinker 0.0	6	7/21/2015	FAR	0.9
SF Sinker 3.9	6	9/29/2015	FAR	1.0
SF Sinker 6.1	6	8/5/2015	FAR	1.0
SF Sinker 8.2	6	7/29/2015	NF	0.0 (~170 ft)
SF Sinker 8.2 A_B	6	7/29/2015	FAR	0.7
SF Sinker Creek T-19 Cumberland Gulch	6	7/31/2012	PFC	0.8
Diamond Creek	10	7/22/2015	FAR	0.4
Diamond Creek	10	7/9/2012	FAR	0.1
NF Sinker 7.9	11	9/21/2015	NF	0.3

[1] Ratings are: PFC = Proper functioning condition; FAR = Functioning at risk; and NF = Not functioning.

2.2.1.2 Multiple Indicator Monitoring (MIM)

MIM monitoring was routinely conducted on multiple stream segments residing in high elevation watersheds to lower elevation canyons (Figure APP 4.1 MAP 10). Annual indicators relating specifically to utilization of herbaceous and woody riparian vegetation were recorded, along with streambank alteration. Alteration of hydric soils along streambanks does influence hydric vegetation cover and composition, which results in MIM data from Standard 3 being applicable to this standard and is discussed within the evaluation of Standard 2. Results from MIM monitoring are discussed by monitoring location below.

Herbaceous Stubble Height

Stubble height is a measure of the residual height of key herbaceous vegetation species (USDI BLM 2011). Herbaceous stubble height gives an indication of riparian herbaceous potential and vigor, along with a measure of utilization. Site visits were conducted throughout the growing season and the grazing season in an attempt to capture both site potential and utilization. The Owyhee Resource Management Plan (RMP) aims to improve or maintain streambank and channel stability by maintaining a minimum 6-inch (15cm) stubble on riparian vegetation (USDI BLM 1999b). The stubble height measurement within the MIM protocol quantifies this measurement (USDI BLM 2011).

Streambank Alteration

Streambank alteration is an annual or short-term indicator of the effect of grazing impacts on long-term streambank stability (USDI BLM 2011). These measurements quantify the level of mechanical disturbance from large herbivores. The Owyhee RMP objectives are to improve or maintain streambank and channel stability by limiting annual trampling impacts to 10 percent or

less of the linear bank length (USDI BLM 1999b). The streambank alteration measurement within the MIM protocol measures this disturbance (USDI BLM 2011).

Woody Species Use

Woody Species use is a short-term indicator of grazing utilization on woody plants, shrubs, and trees along streambanks (USDI BLM 2011). These measurements can help quantify the level of browsing occurring within the stream reach, along with long-term condition and recruitment of woody plants. The Owyhee RMP aims to improve or maintain streambank and channel stability by limiting annual woody species use to under 25 percent on woody plant species less than 3 feet in height (USDI BLM 1999b). The woody species use measurement within the MIM protocol measures woody species use with categories and on woody vegetation up to 5 feet in height (USDI BLM 2011). A benchmark of 50% (moderate) is used to determine if woody species use has exceeded the guidelines of the RMP.

2.2.1.3 MIM Results by Pasture

Pasture 5

Jordan Creek

The monitoring location on Jordan Creek is located downstream from the town of Silver City and adjacent to a maintained dirt road leading to Jordan Valley. This stream channel resides in a confined canyon and has a channel substrate consisting of cobbles to boulders (Figure RIPN 2; Table RIPN 3). The riparian hydric vegetation consists of multiple woody riparian plant species in multiple age classes with herbaceous hydric vegetation existing on the stream banks and flood plain. This stream reach experiences disturbance from human recreational activity and livestock. Two different locations on the stream reach have been monitored in the past. These locations are several hundred meters from each other and are similar in plant composition and channel geometries.

Figure RIPN 2. Jordan Creek monitoring site

Table RIPN 3. Jordan Creek MIM results

Monitoring Date	Average Stubble Height (cm)	Streambank Alteration (%)	Woody Species Use (%)
8/14/2007	7.6*	24*	16.4
7/24/2012	21.3	4	12.2
11/15/2013	4.4*	-	-
11/6/2014	7.6*	18*	32.6
6/15/2015	17.7	1	10.9
8/31/2015	4.8*	4	17.7
9/28/2015	8.4*	6	17.0
6/9/2016	16.2	0	10.1
8/2/2016	10.7*	2	12.1
10/4/2016	9.3*	0	11.7
7/31/2017	10.3*	11*	10.7
10/10/2017	5.5*	14*	36.2
7/17/2018	18.6	6	13.6
9/19/2018	12.2*	3	26.8

* Indicates a measurement either below 15 cm stubbleheight, more than 10% alteration, or more than 50% woody species use.

Presby Creek

The monitoring location on Presby Creek resides in a confined drainage with a channel substrate of sand, cobbles, and boulders (Figure RIPN 3; Table RIPN 4). The riparian hydric vegetation consists of multiple woody riparian plant species in multiple age classes with herbaceous hydric vegetation existing on the stream banks and flood plain. Younger juniper trees are growing adjacent to hydric woody plant species within this reach. This stream experiences disturbances from wildlife, livestock, and sediment inputs from the two track road adjacent to the stream channel.

Figure RIPN 3. Presby Creek monitoring site

Table RIPN 4. Presby Creek MIM results

Monitoring Date	Average Stubble height (cm)	Streambank Alteration (%)	Woody Species Use (%)
11/6/2014	6.3*	28*	84.7*
6/15/2015	22.8	1	22.4
8/31/2015	14.3*	13*	17.3
9/28/2015	14.0*	13*	33.9
6/20/2016	21.4	2	10.7
8/2/2016	5.7*	14*	40.5
10/5/2016	5.9*	5	25.2
8/1/2017	16.6	12*	15.2
10/5/2017	9.1*	17*	42.9
7/16/2018	13.6*	8	18.2
9/17/2018	8.9*	18*	50.8*

* Indicates a measurement either below 15 cm stubbleheight, more than 10% alteration, or more than 50% woody species use

North Fork Sinker Creek Above Silver City Road

The monitoring location on North Fork Sinker Creek is located in a confined canyon that has a diverse hydric woody species community with a diverse age class (Figure RIPN 4; Table RIPN 5). The channel substrate consists of sand, cobble, and boulders. The riparian hydric vegetation consists of multiple hydric woody vegetation species, including cottonwood, and herbaceous hydric vegetation on the stream banks and flood plains. This stream reach experiences disturbances from wildlife, livestock, and past disturbances from historic mining activities and the Rough Diamond fire (2001) that burned into the riparian area and the adjacent uplands in the recent past.

Figure RIPN 4. North Fork Sinker above Silver City Road monitoring site

Table RIPN 5. North Fork Sinker above Silver City Road MIM results

Monitoring Date	Average Stubble height (cm)	Streambank Alteration (%)	Woody Species Use (%)
11/21/2013	14.2*	6	10.4
11/3/2014	28.2	3	19.0
6/9/2015	34.8	2	10.0
9/2/2015	37.4	3	14.4
9/30/2015	55.5	5	14.2
6/8/2016	31.9	0	10.0
8/4/2016	20.2	0	10.0
10/5/2016	17.1	0	10.0
7/25/2017	18.6	1	10.0
10/11/2017	12.5*	5	11.4
7/9/2018	37.8	0	14.6
9/26/2018	10.0*	1	18.2

* Indicates a measurement either below 15 cm stubbleheight, more than 10% alteration, or more than 50% woody species use

North Fork Sinker Creek Below Silver City Road

The monitoring location on North Fork Sinker Creek downstream from the Silver City Road is located in a confined canyon that has a diverse hydric woody species community with a diverse age class (Figure RIPN 5; Table RIPN 6). The channel substrate consists of sand, cobble, and boulders. The riparian hydric vegetation consists of multiple hydric woody vegetation species, to include multiple species of willows, and herbaceous hydric vegetation existing on the streambanks and flood plains. This stream reach experiences disturbances from wildlife, livestock, and effects from historic mining activities.

Figure RIPN 5. North Fork Sinker Creek below Silver City Road monitoring site

Table RIPN 6. North Fork Sinker Creek below Silver City Road MIM results

Monitoring Date	Average Stubble height (cm)	Streambank Alteration (%)	Woody Species Use (%)
6/3/2015	23.1	0	18.5
9/2/2015	20.4	3	13.1
9/29/2015	42.6	1	12.4
6/15/2016	26.6	0	10
8/2/2016	20.9	0	10.2
10/5/2016	8.0*	0	11.1
7/9/2018	26.8	0	10
9/24/2018	19.0	0	13.9

* Indicates a measurement either below 15 cm stubbleheight, more than 10% alteration, or more than 50% woody species use

Stobie Creek

The monitoring location on Stobie Creek is located in a confined canyon that has a diverse hydric woody species community with a diverse age class (Figure RIPN 6; Table RIPN 7). The channel substrate consists of sand, cobble, and boulders. The riparian hydric vegetation consists of multiple hydric woody vegetation species, to include cottonwood, and herbaceous hydric vegetation existing on the streambanks and flood plains. This stream reach experiences disturbances from wildlife, livestock, and historic mining activities.


Figure RIPN 6. Stobie Creek monitoring site

Table RIPN 7. Stobie Creek MIM results

Monitoring Date	Average Stubble height (cm)	Streambank Alteration (%)	Woody Species Use (%)
11/21/2013	15.0	7	10.0
11/3/2014	11.5*	5	30.4
6/10/2015	26.3	0	10.3
9/2/2015	21.7	4	19.8
9/30/2015	20.3	1	13.2
7/26/2017	19.0	3	10.0
10/11/2017	13.7*	12*	31.0
7/11/2018	53.8	0	15.2
9/25/2018	14.4*	3	28.1

* Indicates a measurement either below 15 cm stubbleheight, more than 10% alteration, or more than 50% woody species use

Pasture 6

Bates Creek

The monitoring location on Bates Creek is located just downstream from a perennial point discharge spring. The stream channel resides in a confined draw and is a high gradient, rock dominated channel (Figure RIPN 7; Table RIPN 8). The adjacent upland environment is dominated by thick Douglas-fir and other tree species. The riparian hydric vegetation consists

solely of shade tolerant forbs with very sparse grasses or other herbaceous vegetation. Multiple game/livestock trails cross the monitored stream reach.

Figure RIPN 7. Bates Creek monitoring site

Table RIPN 8. Bates Creek MIM results

Monitoring Date	Average Stubble height (cm)	Streambank Alteration (%)	Woody Species Use (%)
10/30/2014	7.1*	15*	-
6/24/2015	-	7	-
9/1/2015	-	12*	-
9/23/2015	-	27*	-
6/21/2016	-	0	10
8/1/2016	-	0	10
10/3/2016	-	0	10
7/26/2017	-	10	10
10/2/2017	-	13*	10
7/18/2018	-	12*	-
9/20/2018	-	2	-

* Indicates a measurement either below 15 cm stubbleheight, more than 10% alteration, or more than 50% woody species use.

Mahogany Creek

The monitoring location on Mahogany Creek is located in a confined basin downstream from active mines. The channel substrate consists of sand and small rocks (Figure RIPN 8; Table RIPN 9). The riparian hydric vegetation consists of multiple woody riparian plant species in multiple age classes with herbaceous hydric vegetation existing on the streambanks and flood plain. This stream reach experiences disturbance from wildlife, livestock, and both historic and current mining activities.

Figure RIPN 8. Mahogany Creek monitoring site

Table RIPN 9. Mahogany Creek MIM results

Monitoring Date	Average Stubble height (cm)	Streambank Alteration (%)	Woody Species Use (%)
11/7/2014	5.1*	56*	84.1*
6/30/2015	17.4	11*	14.7
9/1/2015	14.5*	7	42.3
9/30/2015	-	35*	76.3*
6/22/2016	11.3*	1	10.0
8/3/2016	10.9*	1	15.7
10/4/2016	-	1	38.6
7/28/2017	8.8*	7	12.5
10/3/2017	8.6*	15*	28.4
7/19/2018	10.7*	8	16.7
9/18/2018	-	26*	37.5

* Indicates a measurement either below 15 cm stubbleheight, more than 10% alteration, or more than 50% woody species use.

Scotch Bob Creek

The monitoring location on Scotch Bob Creek is located just downstream from a mining shaft that is a source of water for the stream channel. The stream channel resides in a confined draw and is a high gradient, rock dominated channel (Figure RIPN 9; Table RIPN 10). The adjacent upland environment is dominated by thick Douglas-fir and other tree species. The riparian hydric vegetation consists of shade tolerant forbs with sparse grasses or other herbaceous vegetation. Different stream reaches on this creek have been monitored due to the proximity of the mine to the monitoring location. This stream reach experiences disturbance from wildlife, livestock, a road, and both historic and current mining activities.

Figure RIPN 9. Scotch Bob Creek monitoring site

Table RIPN 10. Scotch Bob Creek MIM results

Monitoring Date	Average Stubble height (cm)	Streambank Alteration (%)	Woody Species Use (%)
7/11/2012	30.0	1	11.4
11/21/13	14.2*	9	8.6
7/1/2015	9.8*	16*	13.8
9/1/2015	5.3*	6	25.0
9/30/2015	-	25*	72.3*
6/27/2016	17.4	2	10.0
8/3/2016	14.1*	5	11.7
10/3/2016	19.3	4	13.1

* Indicates a measurement either below 15 cm stubbleheight, more than 10% alteration, or more than 50% woody species use.

South Fork Sinker Creek

The monitoring location on South Fork Sinker Creek is located in a confined draw with a high gradient, rock dominated stream channel (Figure RIPN 10; Table RIPN 11). The riparian hydric vegetation consists of multiple woody riparian plant species in multiple age classes with herbaceous hydric vegetation existing on portions of the streambanks and flood plain.


Figure RIPN 10. South Fork Sinker Creek monitoring site

Table RIPN 11. South Fork Sinker Creek MIM results

Monitoring Date	Average Stubble height (cm)	Streambank Alteration (%)	Woody Species Use (%)
6/30/2015	17.8	7	10.0
9/1/2015	17.6	3	36.1

2.2.1.4 Springs

The National Hydrologic Database (NHD) lists 31 springs within the Silver City allotment; however, more springs exist within the allotment than are inventoried within the NHD database. Using the BLM lentic PFC protocol (USDI BLM 1999a), 34 springs were assessed for functional condition: 30 rated in FAR condition (88 percent) and 4 rated in NF condition (12 percent) (Figure APP 4.1 MAP 9). Springs would have been rated as PFC if they had consistent vegetation cover with diverse plant communities that are capable of resisting erosional forces and maintaining functional riparian and wetland attributes. However, no assessed springs contained all the attributes to be rated in PFC. The majority of the springs were rated in FAR condition due to a decrease in vegetation cover and/or erosional features within the riparian and wetland area (Figure RIPN 11). Examples of springs with these observed attributes include Avondale Basin Spring, Bull Meadow Spring, and Bull Frame Meadow Spring (Table RIPN 12). Non-functioning springs exhibited a complete lack of herbaceous hydric vegetation cover within

the riparian and wetland area. The NF springs included Burnham Flats Spring, Diamond Creek Spring 2, NF Sinker Unnamed Spring, and Point of Rocks Spring.

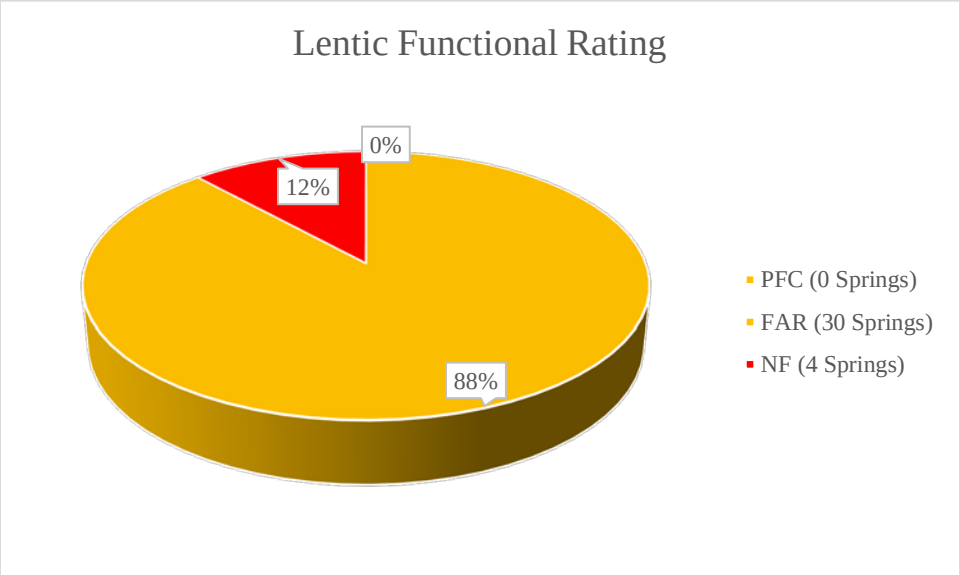

Figure RIPN 11. Lentic PFC assessment site percentages

Table RIPN 12. Lentic PFC assessment results

Name	Pasture	Date	Rating
Briar Springs	1	7/23/2015	FAR
Diamond Creek Spring 2	3	7/22/2015	NF
Diamond Creek Spring 3	3	7/22/2015	FAR
Avondale Basin	5	9/22/2015	FAR
Bull Frame Meadow	5	9/22/2015	FAR
Bull Meadow	5	9/23/2015	FAR
Duncan Spring (Jordan Creek Headwaters)	5	10/7/2015	FAR
Jordan Creek Trib C Spring	5	7/17/2012	FAR
Jordan Creek Trib D Spring	5	7/18/2012	FAR
Jordan Creek Watershed 520860 4759152	5	10/7/2015	FAR
Jordan Creek Watershed 520940 4759107	5	10/7/2015	FAR
Jordan Creek Watershed 521181 4759020	5	10/7/2015	FAR
Jordan Creek Watershed 521183 4759018	5	10/7/2015	FAR
Jordan Creek Watershed 522054 4758111	5	10/7/2015	FAR
Linehan Flats	5	7/29/2015	FAR
New York Summit Springs	5	9/16/2015	FAR
Sawpit Gulch Headwaters 520242 4759377	5	8/10/2015	FAR
Sawpit Gulch Headwaters 520403 4759452	5	7/19/2012	FAR
Sawpit Gulch Unnamed Spring	5	8/10/2015	FAR

Name	Pasture	Date	Rating
Sheep Herder Spring	5	7/30/2015	FAR
Burnham Flats	6	7/28/2015	NF
Burnham Flats Seep 1	6	7/28/2015	FAR
Burnham Flats Seep 2	6	7/28/2015	FAR
Drollinger Spring	6	8/4/2015	FAR
SF Sinker Headwaters 524851 4760412	6	7/29/2015	FAR
SF Sinker Headwaters 524927 4760443	6	7/29/2015	FAR
Thomas Lakes	6	9/28/2015	FAR
War Eagle Spring	5/6	7/29/2015	FAR
Point of Rocks Spring	10	7/23/2015	NF
Success Springs	10	7/23/2015	FAR
Milk Springs	11	10/20/2015	FAR
NF Sinker Unnamed Spring	11	8/2/2012	NF
Sinker Flats	11	9/21/2015	FAR
Tiddie Springs	11	9/21/2015	FAR

Bare ground and alteration of hydric soils was observed during interdisciplinary team visits and assessments of riparian and wetland sites (Figure RIPN 12, Figure RIPN 13, and Figure RIPN 14). Soil surface disturbance and compaction of hydric soils has reduced cover of hydric plant species cover. The loss of hydric vegetation has caused an alteration in the natural discharge of some wet meadow springs, resulting in channelized flow through bare ground when diffuse flow over a wet meadow environment is natural and attainable.

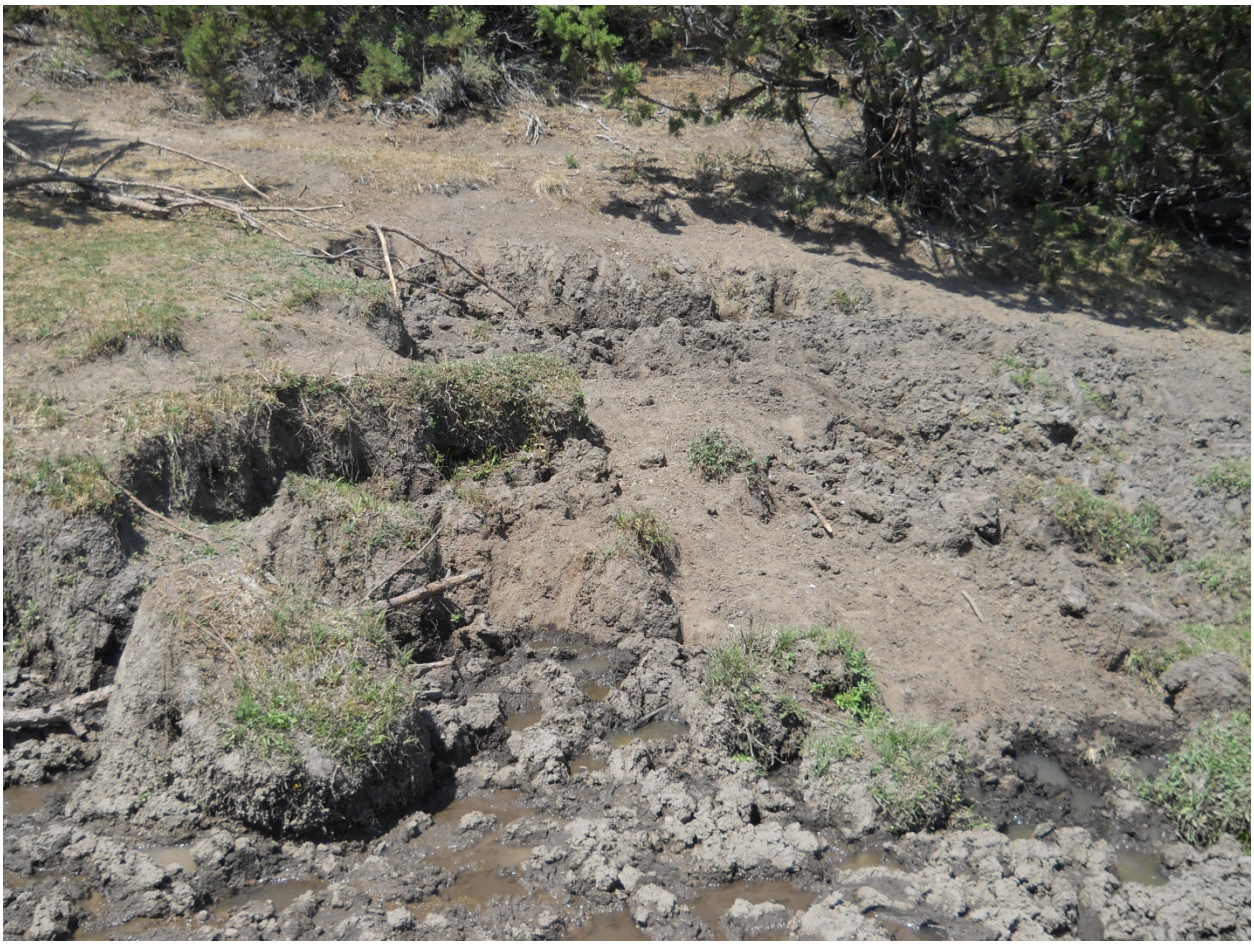

Figure RIPN 12. Erosional features within NF Sinker Creek Unnamed Spring (Rated NF)

Figure RIPN 13. Livestock alteration of spring at Sawpit Gulch Unnamed Spring (Rated FAR)


Figure RIPN 14. Gulley formation in spring at Sawpit Gulch Headwaters (Rated FAR)

2.2.2 Evaluation of Standard 2- Riparian Areas and Wetlands

Evaluation Finding- Allotment/watershed is:
___ Meeting Standard
___ Not meeting the Standard, but making significant progress toward meeting
_X_ Not meeting the Standard

OWYHEE RESOURCE MANAGEMENT PLAN (1999)

Objectives and Management Actions & Allocations:

Soil Resources

SOIL 2: Achieve stabilization of current, and prevent the potential for future, localized accelerated soil erosion problems (particularly on streambanks, roads, and trails). Localized accelerated soil erosion is where humans, by their actions, are responsible for the site specific erosive process.

- The Silver City allotment currently contains 82% of assessed streams and 100% of assessed springs not in PFC. Reduced hydric vegetation cover and vigor was a primary cause for riparian and wetland areas in reduced functional condition. Hydric vegetation is necessary for stabilizing hydric soils and reducing soil erosion. The Silver City allotment is not meeting this objective.

Vegetation
VEGE 1: Improve unsatisfactory and maintain satisfactory vegetation health/condition on all areas.

- The Silver City allotment currently contains 82% of assessed streams and 100% of assessed springs not in PFC. Reduced hydric vegetation cover and vigor was a primary cause for riparian and wetland areas in reduced functional condition. The Silver City allotment is not meeting this objective.

Riparian-Wetland Areas
RIPN 1: Maintain or improve riparian-wetland areas to attain proper functioning and satisfactory conditions. Riparian-wetland areas include streams, springs, seeps, and wetlands.

- The Silver City allotment currently contains 82% of assessed streams and 100% of assessed springs not in PFC. Reduced hydric vegetation cover and vigor was a primary cause for riparian and wetland areas in reduced functional condition. The Silver City allotment is not meeting this objective.

2.2.2.1 Evaluation and Rationale for Evaluation Finding
Standard 2 within pastures 1, 3, 5, 6, 10, and 11 is not being met due to reduced functional condition at riparian and wetland areas within the Silver City allotment. Sections of Bates Creek, Diamond Creek, Horse Ranch Creek, Jordan Creek, Presby Creek, and Sinker Creek are the only riparian and wetland area rated as being in PFC, which is the result of the riparian plant condition and species composition within the assessed stream reach. Streams that were rated in PFC had the characteristics of adequate vegetation, landform, or large woody debris to dissipate stream energy, filter and retain sediment aiding in floodplain development, improve flood-water retention and groundwater recharge, develop root masses that stabilize streambanks against cutting action, develop diverse ponding and channel characteristics to provide habitat for fish, waterfowl, and other species, and support greater biodiversity. These stream reaches of Bates Creek, Diamond Creek, Horse Ranch Creek, Jordan Creek, Presby Creek, and Sinker Creek may not be in desired condition (later seral), but possess the characteristics that fit the definition of PFC.

Riparian areas and wetlands lacking some of the characteristics required to fit the definition of PFC include most of the assessed stream reaches and all of the assessed springs. The assessments cite either a lack of stabilizing vegetation or a reduction in stabilizing vegetation cover needed for protection from erosional forces. The reduction or complete lack of vegetation cover is the result of multiple processes ranging from historic mining and development, the current road network, maturation and expansion of high elevation forest and lower elevation juniper stands, and current livestock grazing.

Increased sedimentation within the hydrologic network from past mining development, the existing road network, and current erosional features has reduced the ability of hydric herbaceous and woody riparian and wetland vegetation to exist in some areas of the Silver City allotment. Historic and current mining activity has created tailings piles and other geomorphic disturbances that has removed the natural soil surface and left an altered area for riparian and wetland plants

to occupy. The road network present in some drainages have channelized streams and is a source of excess sediment, altering the potential for hydric vegetation to exist. Tree stands have matured and grown dense within the Silver City allotment, shading out herbaceous and woody riparian and wetland vegetation which results in a decrease in the ability of hydric vegetation to exist.

Levels of livestock utilization of riparian plants and disturbance to riparian areas was monitored with three indicators from the MIM protocol. Stubble height, streambank alteration, and woody browse use was quantified at multiple monitoring locations ranging from high gradient, rock dominated 1st order (Strahler 1957) streams, to lower gradient, woody dominated 3rd order streams. Stubble heights recorded at less than 15 cm were documented at Bates Creek (2014), Jordan Creek (2007, 2013, 2014, 2015, 2016, 2017, 2018), Mahogany Creek (2014, 2015, 2016, 2017, 2018), North Fork Sinker Creek (2013, 2016, 2017), Presby Creek (2014, 2015, 2016, 2017, 2018), and Scotch Bob Creek (2013, 2015, 2016). Streambank alteration, which influences riparian herbaceous vegetation cover, was recorded over 10% at Bates Creek (2014, 2015, 2017, 2018), Jordan Creek (2007, 2014, 2017), Mahogany Creek (2014, 2015, 2017, 2018), Presby Creek (2014, 2015, 2016, 2017, 2018), Scotch Bob Creek (2015), and Stobie Creek (2017). Woody browse was recorded over 50% at Mahogany Creek (2014, 2015), Presby Creek (2014, 2018), and Scotch Bob Creek (2015).

The majority of the MIM monitoring locations that experienced an exceedance of an annual indicator are located in the upper elevations of the allotment. These exceedances are the result of riparian areas either being selectively over utilized by livestock or residing in travel corridors where streambank alteration disturbance impacts riparian vegetative condition. Disturbance from livestock is also observed at headwater springs and wet meadows in pastures 5, 6, and 11 that provide the source for many of these high elevation streams. Reduced vegetation cover caused from utilization and physical disturbance from hoof shearing and compaction of hydric soils exists at springs rated in FAR condition in the upper elevation pastures (5, 6, and 11) of the allotment. These springs include the low and high gradient Sawpit Gulch springs, wet meadow springs within the headwaters of Jordan Creek, and wet meadow springs near Presby Creek.

2.2.3 Information Sources

Strahler, A. 1957. Quantitative analysis of watershed geomorphology. American Geophysical Union Transactions, 38(6), 913-920.

USDI Bureau of Land Management (BLM). 1998. A user guide to assessing proper functioning condition and the supporting science for lotic areas. Technical Reference 1737-15.

_____. 1999a. A user guide to assessing proper functioning condition and the supporting science for lentic areas. Technical Reference 1737-16.

_____. 1999b. Owyhee resource management plan.

_____. 2011.TR 1737-23 Mulitple indicator monitoring (MIM) of stream channels and streamside vegetation.

2.3 Standard 3: Stream Channel and Floodplains

___ Standard Does Not Apply

Stream channels and flood plains are properly functioning relative to the geomorphology (eg., gradient, size, shape, roughness, confinement, and sinuosity) and climate to provide for proper nutrient cycling, hydrologic cycling, and energy flow.

Indicators may include but are not limited to:

1. Stream channels and floodplains dissipate energy of high water flows and transport sediment. Soils support appropriate riparian-wetland species, allowing water movement, sediment filtration, and water storage. Stream channels are not entrenching.
2. Stream width/depth ratio, gradient, sinuosity, and pool, riffle and run frequency are appropriate for the valley bottom type, geology, hydrology, and soils.
3. Streams have access to their floodplains and sediment deposition is evident.
4. There is little evidence of excessive soil compaction on the floodplain due to human activities.
5. Streambanks are within an appropriate range of stability according to site potential.
6. Noxious weeds are not increasing.

This assessment of stream channel and floodplain conditions considers the following indicators and associated information sources (Table STRM 1).

Table STRM 1. Stream channel indicators and associated information sources

INFORMATION SOURCE	INDICATOR	ASSUMPTION
Lentic and Lotic Proper Functioning Condition Assessments	Functional condition rating	Indicates if stream channel characteristics are stable and functioning in a sustainable manner.
		Indicates if floodplain and channel characteristics are adequate to dissipate energy.
Multiple Indicator Monitoring (MIM) Data	Herbaceous stubble height	Stubble height of vegetation within riparian areas of less than 6 inches reduces ability of stream channel to control erosion resulting in functional condition of riparian area.
	Woody browse use	Indicates recovery and maintenance of woody plant species. More than light use of woody species under 3 feet tall inhibits recovery and maintenance of woody riparian vegetation which stabilizes stream channels.
	Streambank alteration	Indicates level of alteration of streambank which may lead to reduction in functional condition of stream. More than 10% alteration will decrease ability for stream channel to be stable and control erosion.

2.3.1 Rangeland Health Assessment

Geomorphic characteristics of stream channels and floodplains are assessed within Standard 3. Spring geomorphology is also assessed within this standard due to the unique geomorphic environments in which they exist (Springer and Stevens 2009). These geomorphic environments for both streams and springs have the potential to be altered by natural and anthropogenic activities. Functional condition ratings of streams and springs and MIM monitoring data within the Silver City allotment are listed under Standard 2 – Riparian Areas and Wetlands. The indicators for those ratings and measurements in relation to geomorphology are discussed below.

2.3.1.1 Streams

Using the BLM lotic PFC protocol (USDI BLM 1998), 28.6 miles of stream were assessed : 5 miles rated in PFC, 23.2 miles rated in functioning-at-risk (FAR), and 0.3 miles rated in nonfunctioning (NF) condition (Figure APP 4.1 MAP 8). Sections of Bates Creek, Diamond Creek, Horse Ranch Creek, Jordan Creek, Presby Creek, and Sinker Creek were rated as PFC. These stream reaches had a stable stream channel able to resist erosional forces from high flows and little evidence of soil compaction on the streambanks and floodplains. The majority of the streams were rated in FAR condition due to unstable streambanks that do not have the ability to resist erosional forces. These stream sections include portions of Bates Creek, Diamond Creek, Jordan Creek, Mahogany Gulch, Pedricini Creek, Presby Creek, Sawpit Gulch, Scotch Bob Creek, Sinker Creek, Slaughterhouse Gulch, and Stobie Gulch. Sections of the North Fork of Sinker Creek and the South Fork of Sinker Creek were rated as NF due to the complete lack of stable channel with no ability to resist erosion. These NF sections of stream represent 1 percent of the assessed stream reaches.

2.3.1.2 MIM Monitoring

MIM monitoring was routinely conducted on multiple stream segments residing in high elevation watersheds to lower elevation canyons (Figure APP 4.1 MAP 10). Annual indicators relating specifically to utilization of herbaceous and woody riparian vegetation were recorded, along with streambank alteration. Herbaceous and woody riparian vegetation is integral in streambank stability, so MIM data from Standard 2 is applicable to this standard and is discussed within the evaluation of Standard 3.

2.3.1.3 Springs

Using the BLM lentic PFC protocol (USDI BLM 1999), 34 springs were assessed for functional condition: 30 rated in FAR condition (88 percent) and 4 rated in NF condition (12 percent) (Figure APP 4.1 MAP 9). For springs to be rated as PFC they would possess geomorphic soil surfaces that were not compacted and discharge spring water in a naturally occurring manner. No assessed springs within the Silver City allotment had those characteristics. Springs were rated in FAR condition due to un-vegetated, bare/altered hydric soil and unnaturally channelized spring water flow. Examples of springs with these attributes include Avondale Basin Spring, Bull Frame Meadow Spring, Bull Meadows Spring, Jordan Creek headwaters springs, and Sawpit Gulch headwaters springs (see Table RIPN 12 for complete list). Springs were rated as NF due to a completely disturbed and compacted riparian/wetland area that has no ability to filter and retain sediment. The NF springs included Burnham Flats Spring, Diamond Creek Spring 2, North Fork Sinker Unnamed Spring, and Point of Rocks Spring.

Bare ground is commonly observed during interdisciplinary team visits and assessments of riparian and wetland sites. Disturbance and compaction of hydric soils, along with a reduction in hydric plant species cover, has caused an alteration in the natural discharge of some wet meadow springs, resulting in channelized flow through bare ground when diffuse flow over a wet meadow environment is natural and attainable. Incised channels have developed within some of the wet meadows resulting in channelized flow, lowering of the local water table within the wet meadow, and drying of the upper soil layers resulting in lowering the potential for hydric vegetation to exist (Figure STRM 1).

Figure STRM 1. Headcuts and channelization of Bull Frame Meadow (Rated FAR)

2.3.2 Evaluation of Standard 3- Stream Channel and Floodplains

Evaluation Finding- Allotment/watershed is:
___ Meeting Standard
___ Not meeting the Standard, but making significant progress toward meeting
_X_Not meeting the Standard

OWYHEE RESOURCE MANAGEMENT PLAN (1999)
Objectives and Management Actions & Allocations:
Soil Resources

SOIL 2: Achieve stabilization of current, and prevent the potential for future, localized accelerated soil erosion problems (particularly on streambanks, roads, and trails). Localized accelerated soil erosion is where humans, by their actions, are responsible for the site specific erosive process.

- The Silver City allotment currently contains 82% of assessed streams and 100% of assessed springs not in PFC. Reduced hydric vegetation cover and vigor was a primary cause for riparian and wetland areas in reduced functional condition. Hydric vegetation is necessary for stabilizing hydric soils and reducing soil erosion. The Silver City allotment is not meeting this objective.

Riparian-Wetland Areas

RIPN 1: Maintain or improve riparian-wetland areas to attain proper functioning and satisfactory conditions. Riparian-wetland areas include streams, springs, seeps, and wetlands.

- The Silver City allotment currently contains 82% of assessed streams and 100% of assessed springs not in PFC. Reduced hydric vegetation cover and vigor, along with excessive erosion and deposition were primary causes for riparian and wetland areas in reduced functional condition. The Silver City allotment is not meeting this objective.

2.3.2.1 Evaluation and Rationale for Evaluation Finding

Standard 3 within pastures 1, 3, 5, 6, 10, and 11 is not being met due to reduced functional condition at riparian and wetland areas within the Silver City allotment. Geomorphic alterations of streams and springs resulting in excessive erosion and deposition of sediment has reduced the functional condition of these areas in most parts of the Silver City allotment. Sections of Bates Creek, Diamond Creek, Horse Ranch Creek, Jordan Creek, Presby Creek, and Sinker Creek are the only riparian and wetland area rated as being in PFC, due to the stream channels ability to resist erosional forces. Streams that were rated in PFC had the characteristics of adequate vegetation, landform, or large woody debris to dissipate stream energy, filter and retain sediment aiding in floodplain development, improve flood-water retention and groundwater recharge, develop root masses that stabilize streambanks against cutting action, develop diverse ponding and channel characteristics to provide habitat for fish, waterfowl, and other species, and support greater biodiversity. These stream reaches of Bates Creek, Diamond Creek, Horse Ranch Creek, Jordan Creek, Presby Creek, and Sinker Creek may not be in desired condition (later seral), but possesses the characteristics that fit the definition of PFC.

Riparian areas and wetlands lacking some of the characteristics required to fit the definition of PFC include most of the assessed stream reaches and all of the assessed springs. The assessments cite erosional features such as headcuts, channel incision, and other geomorphic features as the cause of degradation to stream channels and wet meadows. Aggradational geomorphic features resulting from upstream erosional processes were also observed in many of the streams assessed. This accelerated transport of sediment is resulting in unstable stream channels and degrading functional condition of wet meadows.

Erosional and aggradational processes influencing stream and wet meadow geomorphology is the result of historic mining and development, the current road network, maturation and

expansion of high elevation forest and lower elevation juniper stands, and current livestock grazing. Stream channels have been geomorphically altered by disturbances related to mining and development, along with the road network. These past and current disturbances have removed hydric soil and vegetation allowing for increased erosion and aggradation within the stream networks. These activities have also straightened stream channels and reduced access to floodplains disabling the stream channels abilities to reduce energy during high flow events. Maturation and expansion of densely populated trees has reduced the ability for riparian areas to exist, diminishing the ability for sediment retention on stream banks and allowing for erosional features to propagate within the watershed.

MIM annual indicator monitoring is presented and discussed within Standard 2. The same discussion applies to Standard 3 as riparian plant condition and utilization, along with stream bank stability affect stream channel stability, floodplain development, and erosional processes. The majority of the monitoring locations that experienced an exceedance of an annual indicator were typically located in the upper elevations of the allotment. These exceedances are the result of riparian areas either being selectively over utilized by livestock or residing in travel corridors where streambank alteration disturbance impacts riparian vegetation condition. Disturbance from livestock is also observed at headwater springs and wet meadows that provide the source for many of these high elevation streams. Reduced vegetation cover caused from utilization and physical disturbance from hoof shearing and compaction of hydric soils exists at springs rated in FAR condition in the upper elevation pastures of the allotment. These springs include Avondale Basin Spring, Bull Frame Meadow Spring, Bull Meadows Spring, Jordan Creek headwaters springs, and Sawpit Gulch headwaters springs. This disturbance can channelize flow, leading to excessive erosion and the formation of rills and gulleys. The result of gulley formation within wet meadows is a lowering of the water table, reducing the ability of the surrounding riparian hydric vegetation to exist.

2.3.3 Information Sources

Springer, A.E., Stevens, LE. 2009. Spheres of discharge of springs. Hydrogeology Journal, 17:83. DOI 10.1007/s10040-008-0341-y

USDI Bureau of Land Management (BLM). 1998. A user guide to assess proper functioning condition and support science for lotic areas. Technical Reference 1737-15.

_____. 1999. A user guide to assessing proper functioning condition and the supporting science for lentic areas. Technical Reference 1737-16.

2.4 Standard 4: Native Plant Communities

___ Standard Does Not Apply

Healthy, productive, and diverse native animal habitat and populations of native plants are maintained or promoted as appropriate to soil type, climate and landform to provide for proper nutrient cycling, hydrologic cycling, and energy flow.

Pastures 8 and 9 were seeded in the 1960s and are not discussed below in Standard 4 - Native Plant Communities, but are instead discussed in Stadard 5 - Seedings. On these two pastures sagebrush was mechanically removed and crested wheatgrass was seeded. As created wheatgrass

is still predominate, and diversity is low for other perennial species, these pastures are managed as seedings and therefore will be discussed in Standard 5 Seedings.

Indicators may include but are not limited to:

1. Native plant communities (flora and microbiotic crusts) are maintained or improved to ensure proper functioning of ecological processes and continued productivity and diversity of native plant species.
2. The diversity of native species is maintained.
3. Plant vigor (total plant production, seed and seedstalk product, cover, etc.) is adequate to enable reproduction and recruitment of plants when favorable climatic events occur.
4. Noxious weeds are not increasing.
5. Adequate litter and standing dead plant material are present for site protection and for decomposition to replenish soil nutrients relative to site potential.

This assessment of native plant community conditions considers the following indicators and associated information sources (Table VEG 1).

Table VEG 1. Native plant community indicators and associated information sources.

INFORMATION SOURCE	INDICATOR	ASSUMPTION
Interpreting Indicators of Rangeland Health (IIRH)	Perennial plant reproductive Capability	Indicates plant vigor since healthy plants are better able to produce adequate quantities of viable seed than stressed or decadent plants.
	Plant mortality/ decadence	Indicates population dynamics.
	Annual production	Indicates the energy captured by plants and its availability for secondary consumers given current weather conditions.
	Relative dominance of functional/ structural plant groups	Indicates ecosystem processes including plant productivity, plant percent nitrogen, plant total nitrogen, and light penetration.
Interpreting Indicators of Rangeland Health (IIRH) Assessment, Inventory and Monitoring (AIM) Habitat Assessment Framework (HAF) District Noxious Weeds Database	Comprehensive plant species lists	Indicates plant species diversity.
Interpreting Indicators of Rangeland Health (IIRH)	Amount and distribution of plant litter	Stabilizes soil surface, promotes nutrient cycling, and retains soil moisture.
Assessment, Inventory and Monitoring (AIM) Habitat Assessment Framework (HAF)	Amount and distribution of biologic soil crust cover	Stabilizes soil surface and promotes nutrient cycling, particularly in warm dry regions.

INFORMATION SOURCE	INDICATOR	ASSUMPTION
Upland Vegetation Monitoring (Trend)		
Interpreting Indicators of Rangeland Health (IIRH) Assessment, Inventory and Monitoring (AIM) Habitat Assessment Framework (HAF) Upland Vegetation Monitoring (Trend)	Short- and mid-stature perennial grass cover and frequency	Stabilizes soil surface, promotes nutrient, water, and energy cycling.
	Invasive plants including noxious, non-native, and native.	May impact an ecosystem's type and abundance of species, their interrelationships, energy, and nutrient cycles.
	Shrub foliar cover and frequency	Stabilizes soil surface; retains snow and moisture.

2.4.1 Rangeland Health Assessment

The ecological sites describe the potential natural vegetation under reference conditions. Reference conditions for the major ecological sites in the Silver City allotment are plant communities dominated by deep rootedperennial bunchgrasses, subdominated by shrubs (sagebrush/saltbush), and a diversity of forbs. Different sagebrush types (i.e. basin big vs. mountain) are contingent on elevation and soil type. There are also upper elevation communities dominated by mountain mahogany and Douglas-fir with a diverse understory of shrubs, grasses and forbs. Current plant community conditions in the Silver City allotment have been altered from reference conditions by a combination of vegetation treatments (spray, plow, seeding), wildfires, livestock grazing, invasive annual grass invasion, mining and recreation.

2.4.1.1 Indicators of Rangeland Health

Nine of the seventeen indicators utilized in the rangeland health field assessment relate to Standard 4 – Native Plant Community (USDI BLM 2005). The final ratings for biotic integrity are presented by pasture below and presented in Figure APP 4.1 MAP 14.

Pasture 1

Table VEG 2. Final rating for biotic integrity in pasture 1

Pasture	Site ID	Ecological Sites	Biotic Integrity
1-Briar	A	Sandy Loam 8-12" Wyoming big sagebrush/ Indian ricegrass	Moderate to Extreme
	B	Loamy 8-12" Wyoming Big Sagebrush/Indian Ricegrass/Thurber's Needlegrass	Moderate to Extreme
	C	Calcareous Loam 7-10" Shadscale Saltbush-Bud Sagebrush/Indian Ricegrass-Thurber's Needlegrass	Moderate to Extreme

The three sites in Pasture 1– Briar are Site A, representing Sandy Loam 8-12 ecological site, Site B representing Loamy 8-12 Basin Big Sagebrush- Bluebunch Wheatgrass ecological site, and Site C representing Calcareous Loam 7-10 ecological site (Table VEG 2). Site A was rated in the

moderate to extreme range of departure for Biotic Integrity for the ecological site. A decrease in large bunchgrasses and an increase in cheatgrass to widespread and common throughout the site has occurred. Cheatgrass is prohibitive to establishment/recruitment of perennial species reducing site recruitment. Site B was rated in the moderate to extreme range of departure for Biological Integrity for the ecological site. Dead sagebrush reduces the reproductive capability of the site. An increase in invasive grasses coupled with dead sagebrush alters the functional structural groups and hinders the sites ability to capture and dissipate water movement across the site. Site C was rated in the moderate to extreme range of departure for Biological Integrity for the ecological site. Dead sagebrush reduces the sites ability to reproduce and maintain functional structural groups. Dead sagebrush reduces the reproductive capability of the site. An increase in invasive grasses coupled with dead sagebrush alters the functional structural groups and hinders the sites ability to capture and dissipate water movement across the site. While invasive plants are common but not wide spread on the site, an increase in Sandberg bluegrass and reduction in forbs, bunchgrasses, and sagebrush increase the risk for spreading of invasive plants on the site.

Pasture 2

Table VEG 3. Final rating for biotic integrity in pasture 2

Pasture	Site ID	Ecological Sites	Biotic Integrity
2-Striker	D	Calcareous Loam 7-10” Shadscale Saltbush-Bud Sagebrush/Indian Ricegrass-Thurber’s Needlegrass	Extreme
	F	Sandy Loam 8-12” Wyoming Big Sagebrush/Indian Ricegrass	Moderate to Extreme
	G	Loamy 8-12” Wyoming Big Sagebrush/Bluebunch Wheatgrass-Thurber’s Needlegrass	Moderate to Extreme

The three sites in Pasture 2- Striker are Site D representing a Calcareous Loam 7-10 ecological site, Site F representing a Sandy Loam 8-12 Wyoming Big Sagebrush- Indian Rice Grass ecological site, and Site G representing a Loamy 8-12 Wyoming Big Sagebrush-Bluebunch Wheatgrass-Thurber’s Needlegrass ecological site (Table VEG 3). Site D was rated in the moderate to extreme range of departure for Biological Integrity for the ecological site. Conversion of deep rooted bunchgrasses and forbs to small bunchgrasses and cheatgrass has altered the functional structural groups from the reference condition. While the shrub component of the site is still present it is reduced from the reference condition. Loss of large perennial bunchgrasses has changed infiltration. Site F was rated in the moderate to extreme range of departure for Biological Integrity for the ecological site. A reduction in deep rooted bunchgrasses increase bare ground in interspaces. Continuous bare ground in interspaces provides opportunity for spreading and proliferation of invasive annual grasses. Invasive annual grasses reduce the quality of habitat for wildlife. Site G was rated in the moderate to extreme range of departure for Biological Integrity from the expected condition for the ecological site. A reduction in deep rooted bunchgrasses increase bare ground in interspaces. Continuous bare ground in interspaces provides opportunity for spreading and proliferation of invasive annual grasses. Invasive annual grasses reduce the quality of habitat for wildlife.

Pasture 3

Table VEG 4. Final rating for biotic integrity in pasture 3

Pasture	Site ID	Ecological Sites	Biotic Integrity
3-Diamond	E	Calcareous Loam 7-10” Shadscale Saltbush –Bud Sagebrush	Moderate to Extreme
	I	Loamy 8-12” Wyoming Big Sagebrush/Bluebunch Wheatgrass-Thurber’s Needlegrass	Moderate to Extreme
	J	Sandy Loam 8-12” Wyoming Big Sagebrush-Indian Ricegrass	Moderate

The three sites in Pasture 3 – Diamond are Site E representing Calcareous Loam 7-10 Shadscale Saltbush –Bud Sagebrush ecological site, Site I representing Loamy 8-12 Wyoming Big Sagebrush/Bluebunch Wheatgrass-Thurber’s Needlegrass ecological site, and J representing Sandy Loam 8-12 Wyoming Big Sagebrush-Indian Ricegrass ecological site (Table VEG 4). Site E was rated in the moderate to extreme range of departure for Biological Integrity for the ecological site. Loss of large bunchgrasses and soil crusts reduces infiltration. Replacement of deep rooted bunchgrasses to shallow rooted bunchgrasses reduces the diversity of the site. Site I was rated in the moderate to extreme range of departure for Biological Integrity for the ecological site. Shrub mortality reduces the reproductive potential of the site and therefore reduces recruitment and diversity of the site. While dead shrubs can capture snow and facilitate infiltration of water, greatly reduced deep rooted bunchgrasses coupled with reduced diversity of forbs hinders the infiltration potential of the site. Site J was rated in the moderate range of departure for Biological Integrity for the ecological site. Conversion of Indian Rice Grass to Sandberg and Squirretail has reduced the diversity of perennial grasses. Reduced diversity of bunchgrasses coupled with an increase in cheatgrass reduces the sites ability to recruit new deep rooted bunchgrasses.

Pasture 4

Table VEG 5. Final rating for biotic integrity in pasture 4

Pasture	Site ID	Ecological Sites	Biotic Integrity
4-Gerdie	U	Loamy 10-13” Wyoming Big Sagebrush/Bluebunch Wheatgrass	Moderate
	V	Sandy loam 8-12” Wyoming Big Sagebrush/Indian Ricegrass	Moderate

The two sites in Pasture 4- Gerdie are Sites U representing Loamy 10-13 Wyoming Big Sagebrush/Bluebunch Wheatgrass ecological site and V representing Sandy loam 8-12 Wyoming Big Sagebrush/Indian Ricegrass ecological site (Table VEG 5). Site U was rated in the moderate range of departure for Biological Integrity for the ecological site. An increase in cheatgrass reduces diversity by competing with native plants for scarce nutrients. Site V was rated in the

moderate range of departure for Biological Integrity for the ecological site. A decrease in native plants decreases the quality of habitat for wildlife.

Pasture 5

Table VEG 6. Final rating for biotic integrity in pasture 5

Pasture	Site ID	Ecological Sites	Biotic Integrity
5-Jordan	GG	Mountain Ridge 14-18" Low Sagebrush/Bluebunch Wheatgrass	Slight to Moderate
	O	Mahogany Savanna 16-22" Curl-leaf Mountain Mahogany-Moutain Snowberry/Idaho Fescue- Needlegrass	Slight to Moderate
	P	Loamy 16+ Mountain Big Sagebrush /Idaho Fescue	Moderate
	T	Mahogany Savana 16-22" Curl-leaf Mountain Mahogany- Moutain Snowberry/Idaho Fescue- Needlegrass	Moderate
	Y	Loamy 16+ Mountain Big Sagebrush/Idaho Fescue	Moderate to Extreme
	Z	Mahogany Savanna 16-22" Curl-leaf Mountain Mahogany- Moutain Snowberry/Idaho Fescue- Needlegrass	Moderate to Extreme

The six sites in Pasture 5- Jordan are Site P representing Loamy 16+ Mountain Big Sagebrush /Idaho Fescue ecological site, Site O representing Mahogany Savanna 16-22 Curl-leaf Mountain Mahogany-Moutain Snowberry/Idaho Fescue- Needlegrass ecological site, Site T representing Mahogany Savana 16-22 Curl-leaf Mountain Mahogany- Moutain Snowberry/Idaho Fescue-Needlegrass ecological site, Site Y representing Loamy 16+ Mountain Big Sagebrush Idaho Fescue ecological site, Site Z representing Mahogany Savanna 16-22 Curl-leaf Mountain Mahogany- Moutain Snowberry/Idaho Fescue- Needlegrass ecological site, and Site GG representing Mountain Ridge 14-18 Little Sagebrush/Bluebunch Wheatgrass ecological site (Table VEG 6). Site P was rated in the moderate range of departure for Biological Integrity for the ecological site. While shrubs provided habitat for wildlife and site stability through snow capture, a reduction in deep rooted bunchgrasses increase bare ground in interspaces. Invasive annual grasses reduce the quality of habitat for wildlife. Site O was rated in the slight to moderate range of departure for Biological Integrity for the ecological site. The presence of weeds and reduction in Idaho Fescue is departed from expected condition for Biotic Integrity. Site T was rated in the moderate range of departure for Biological Integrity for the ecological site. Reduction in deep rooted bunchgrasses increases bare ground in interspaces providing opportunity for the spread and proliferation of invasive annual grasses. Site Y was rated in the moderate to extreme range of departure for Biological Integrity for the ecological site. While shrubs provided habitat for wildlife and site stability through snow capture, a reduction in deep rooted bunchgrasses increase bare ground in interspaces. Continuous bare ground in interspaces provides opportunity for spreading and proliferation of invasive annual grasses. Invasive annual grasses reduce the quality of habitat for wildlife. Site Z was rated in the moderate range of departure for Biological Integrity for the ecological site. A reduction in deep rooted bunchgrasses reduces production. A decrease in litter reduces the amount of nutrient cycling from

decomposition hindering the establishment/recruitment of native plants. Site GG was rated in the slight to moderate range of departure for Biological Integrity for the ecological site. While there is good Idaho Fescue, a reduction in Bluebunch Wheatgrass, and an increase in Sandberg is a departure from expected condition for Biotic Integrity.

Pasture 6

Table VEG 7. Final rating for biotic integrity in pasture 6

Pasture	Site ID	Ecological Sites	Biotic Integrity
6-South Sinker	FF	Douglas-fir/mountain snowberry 22-32"	Slight to Moderate
	R	Loamy 13-16" Mountain Big Sagebrush/Bluebunch Wheatgrass- Idaho Fescue	Moderate to Extreme
	S	Loamy 13-16" Mountain Big Sagebrush/Bluebunch Wheatgrass-Idaho Fescue	Moderate

The three sites in Pasture 6- South Sinker are Site R representing Loamy 13-16 Wyoming Big Sagebrush/Bluebunch Wheatgrass- Idaho Fescue ecological site, S representing Loamy 13-16 Wyoming Big Sagebrush/Bluebunch Wheatgrass-Idaho Fescue ecological site, and FF Douglas-fir/mountain snowberry 22-32 ecological site (Table VEG 7). Site FF was rated in the slight to moderate range of departure for Biological Integrity for the ecological site. Diversity is departed for a mid-seral conifer stand from expected for Biotic Integrity. Site R was rated in the moderate to extreme range of departure for Biological Integrity for the ecological site. A reduction in deep rooted bunchgrasses and forbs provides opportunity for proliferation of invasive plant species. A reduction in diversity increases the risk of invasive species proliferation which reduces vegetative diversity subsequently reducing wildlife habitat. Site S was rated in the moderate range of departure for Biological Integrity for the ecological site. A reduction in deep rooted bunchgrasses increases bare ground in interspaces. Increased bare ground in interspaces provides opportunity for spreading and proliferation of invasive annual grasses. Invasive annual grasses reduce the quality of habitat for wildlife by reducing diversity in plant structure.

Pasture 7

Table VEG 8. Final rating for biotic integrity in pasture 7

Pasture	Site ID	Ecological Sites	Biotic Integrity
7-Rabbit Creek	L	Loamy 8-12" Wyoming Big Sagebrush/Bluebunch Wheatgrass-Thurber's Needlegrass	Moderate to Extreme
	M	Sandy Loam 8-12" Wyoming Big Sagebrush/Indian Ricegrass	Moderate to Extreme

The two sites in Pasture 7-Rabbit Creek, are Sites L representing Loamy 8-12 Wyoming Big Sagebrush/Bluebunch Wheatgrass-Thurber's Needlegrass ecological site and Site M representing Sandy Loam 8-12 Wyoming Big Sagebrush/Bluebunch Wheatgrass-Thurber's Needlegrass

ecological site (Table VEG 8). Site L was rated in the moderate to extreme range of departure for Biological Integrity for the ecological site. The scarcity of large bunchgrasses increases bare ground providing an increased risk of establishment of invasive plant species. Invasive plants reduce plant diversity impacting wildlife habitat. Site M was rated in the moderate to extreme range of departure for Biological Integrity for the ecological site. Reductions in large bunchgrasses increases bare ground providing an increased risk of establishment of invasive plant species. Invasive plants reduce plant diversity impacting wildlife habitat.

Pasture 10

Table VEG 9. Final rating for biotic integrity in pasture 10

Pasture	Site ID	Ecological Sites	Biotic Integrity
10-Point of Rocks	AA	Sandy Loam 8-12” Wyoming Big Sagebrush/Indian Ricegrass	Moderate
	BB	Loamy 11-13” Basin Big Sagebrush/Bluebunch Wheatgrass	Moderate to Extreme

The two site in Pasture 10- Point of Rocks are Site AA representing Sandy Loam 8-12 ecological site and BB representing Loamy 11-13 Basin Big Sagebrush/Bluebunch Wheatgrass ecological site (Table VEG 9). Site AA was rated in the moderate range of departure for Biological Integrity for the ecological site. The presence of shallow rooted bunchgrasses like Sanderg bluegrass and invasive annual grasses like cheatgrass is increasing. While Sandberg bluegrass is present it produces less vegetative biomass. A reduction in vegetative biomass reduces nutrient cycling due to the decrease in decomposition, hindering establishment/recruitment of native plants. Site BB was rated in the moderate to extreme range of departure for Biological Integrity for the ecological site. Cheatgrass and redstem storeksbill are scattered throughout the site. The soil surface resistance to erosion is significantly reduced due to the reduction in organic matter inputs. Organic matter increases infiltration and nutrients available for deep rooted bunchgrasses.

Pasture 11

Table VEG 10. Final rating for biotic integrity in pasture 11

Pasture	Site ID	Ecological Sites	Biotic Integrity
11-Little Sugarloaf	CC	Loamy 13-16” Mountain Big Sagebrush /Bluebunch Wheatgrass-Idaho Fescue	Moderate
	DD	Loamy 13-16” Mountain Big Sagebrush/Bluebunch Wheatgrass-Idaho Fescue	Moderate to Extreme
	EE	Shallow Claypan 12-16” Low Sagebrush/Idaho Fescue	Moderate
	X	Sandy Loam 8-12” Wyoming Big Sagebrush/Indian Ricegrass	Moderate to Extreme

The four sites in Pasture 11- Little Sugarloaf are Site CC representing Loamy 13-16 Mountain Big Sagebrush /Bluebunch Wheatgrass-Idaho Fescue ecological site, Site DD representing

Loamy 13-16 Mountain Big Sagebrush/Bluebunch Wheatgrass-Idaho Fescue ecological site, Site EE representing Shallow Claypan 12-16 ecological site, and Site X representing Sandy Loam 8-12 Wyoming Big Sagebrush/Indian Ricegrass ecological site (Table VEG 10). Site CC was rated in the moderate range of departure for Biological Integrity for the ecological site. Cheatgrass and bulbous bluegrass are common throughout the site. A reduction in deep rooted bunchgrasses increases bare ground in interspaces. Increased bare ground in interspaces provides opportunity for spreading and proliferation of invasive annual grasses. Invasive annual grasses reduce the quality of habitat for wildlife by reducing diversity in plant structure crucial for habitat. Site DD was rated in the moderate to extreme range of departure for Biological Integrity for the ecological site. The reference dominate grass species Idaho fescue and bluebunch are absent and reproduction at the site is highly reduced. While shrubs provide habitat for wildlife, an increase in shrubs reduces diversity of the plant community. Reduced diversity in plant community subsequently reduces diversity of wildlife habitat. Site EE was rated in the moderate range of departure for Biological Integrity for the ecological site. A reduction in deep rooted bunchgrasses increases bare ground in interspaces. Increased bare ground in interspaces provides opportunity for spreading and proliferation of invasive annual grasses. Invasive annual grasses reduce the quality of habitat for wildlife by reducing diversity in plant structure crucial for habitat. Site X was rated in the moderate to extreme range of departure for Biological Integrity for the ecological site. A reduction in deep rooted bunchgrasses increases bare ground in interspaces. Increased bare ground in interspaces provides opportunity for spreading and proliferation of invasive annual grasses. Invasive annual grasses reduce the quality of habitat for wildlife by reducing diversity in plant structure crucial for habitat.

2.4.1.2 Noxious Weeds and Invasive Species

Noxious weed species, as listed by the state of Idaho, are managed on BLM administered public lands under the Plant Protection Act (2000). Infestations of thirteen species of noxious weeds have been recorded in the Silver City allotment to date. Most infestations are relatively small (< 0.1 – 0.5 acres) and have been treated, sometimes repeatedly, for control. A small portion of infestations (16%) are between (0.5 – 5 acres) in size and include whitetop (*Cardaria draba*), perennial pepperweed (*Lepidium latifolium*), and diffuse knapweed (*Centaurea diffusa*). The majority of infestations are commonly found along roads, watering sites, fences, and other disturbed areas. Data on non-native species are derived from trend monitoring sites, sage-grouse Habitat Assessment Framework (HAF) sites, and the BLM Boise District noxious weeds database.

Pasture 1 has a total of 31 occurrences and all have been treated chemically. The majority of infestations have been recorded in the northwest portion of the pasture with Whitetop occupying the most acreage. Russian knapweed (*Acroptilon repens*), Russian olive (*Elaeagnus angustifolia*), and tamarisk (*Tamarix* spp) also occur in pasture 1, but in smaller numbers, covering less acreage.

Pasture 2 has a total of 41 occurrences and all but four have been treated chemically. The majority of infestations have been recorded near the Silver City Road with whitetop and diffuse knapweed occupying the most acreage. Russian knapweed, yellow star-thistle (*Centaurea solstitialis*), and tamarisk also occur in pasture 2, but in smaller numbers, covering less acreage.

Pasture 3 has a total of 30 occurrences and all but four have been chemically treated. The majority of infestations occur along the Silver City Road and in the northwest portion of the pasture with whitetop occupying the most acreage. Russian knapweed, spotted knapweed (*Centaurea stoebe*), Canada thistle (*Cirsium arvense*), poison hemlock (*Conium maculatum*), and Scotch thistle (*Onopordum acanthium*) also occur in pasture 3, but in smaller numbers, covering less acreage.

Pasture 4 has a total of five occurrences and all but one have been chemically treated. All infestations are located along a main access road. Whitetop and Scotch thistle occur in pasture 4, but in small numbers, occupying less than 0.1 acres in most cases.

Pasture 5 has a total of 27 occurrences and all but seven have been chemically treated. The majority of infestations occur along the Silver City Road and in the northeast corner of the pasture, where three pasture fences meet. Whitetop had the highest number of occurences, with spotted knapweed, rush skeletonweed (*Chondrilla juncea*), Scotch thistle, and puncturevine (*Tribulus terrestris*) occurring in smaller numbers, covering less acreage.

Pasture 6 has a total of six occurrences and all but one have been chemically treated. The majority of infestations occur along the Silver City Road. All infestations are small (< 0.1 acre) and include whitetop, diffuse knapweed, and spotted knapweed.

Pasture 7 has the smallest number of occurrences with a total of four and all have been chemically treated. All four infestations are small (< 0.1 – 0.5 acres) and include a single species (whitetop).

Pasture 8 has a total of 32 occurrences (whitetop) and all but one have been chemically treated. The majority of infestations occur within a 25 acre corridor in the northwest corner of the pasture.

Pasture 9 has a total of seven occurrences and all have been chemically treated. The majority of infestations occur along the Old Stage Road. All infestations are small (< 0.1 – 0.5 acres) and include whitetop and Russian knapweed.

Pasture 10 has a total of 44 occurrences and all but five have been chemically treated. The majority of infestations occur along a main access road and in the southwest portion of the pasture. All of the infestations are small (< 0.1 – 0.5 acres) with the exception of a single occurrence of perennial pepperweed that is (0.5 – 5 acres) in size.

Pasture 11 has the largest number of occurrences with a total of 136 and all but 12 have been chemically treated. The majority of infestations occur within a 65 acre corridor in the southeast corner of the pasture that extends into the southwest corner of pasture 10. Whitetop and Scotch thistle are the two most common noxious weeds in the pasture with a few occurrences of Perennial pepperweed and Canada thistle.

2.4.1.3 Native and Non-native Species

Frequency is an indicator of overall probability of encountering a species, and its overall distribution across the landscape. Perennial species are less sensitive to seasonal changes in this method, and is therefore appropriate for change detection over time (University of Idaho 2009). For analysis purposes, species have been lumped into functional groups. Frequencies derived from trend data are presented below by pasture. Trend site locations are shown in Figure APP 4.1 MAP 11. Pastures 8 and 9 are presented in Standard 5 – Seedings.

Due to the variability in collection of forb data, analyzing trends in them is largely inappropriate. Furthermore, the timing of data collection at particularly trend locations is highly variable, which can lead to misleading trends, such as an abundance of forbs in one read, and a complete lack in another if the plots were read at different times of year. Flora which have been observed are largely perennial, but were not generally identified to the species level. Such genera include lupine, phlox, penstemon, biscuitroot (*Lomatium*) and astragalus. On earlier reads (generally occurring in May), *Eriastrum* and *Draba verna* are noted, and occasionally storksbill (*Eriodium cicutarium*). Similar issues arise in the forb data collected for HAF. Genus level identifications are the standard, which are not an indicator of overall diversity, as there can be multiple species in the same genus within a site. However, with the limited available data, only a handful of genera are detected, which speaks to larger lack of floral diversity, which is additionally substantiated by the homogenous shrub and graminoid data.

Pasture 1

Table VEG 11. Frequency from trend monitoring site 02S02W35 in pasture 1

Cover Type	Frequency (%)			Difference between 2002 and 2013	p-value
	2002	2008	2013		
Native Perennial Grass	25.0	21.0	18.0	-7.0	0.25
Annual Invasive Grass	100.0	95.0	100.0	0.0	1.00
Sagebrush	0.0	0.0	2.0	2.0	0.37
Rabbitbrush	18.0	13.0	12.0	-6.0	0.32

Changes in frequency at the Pasture 1 trend site are not statistically significant (Table VEG 11). Annual invasive grass are prevalent throughout the site at 100 percent, while native perennial grasses declined steadily (25 to 18 percent) (Figure VEG 1). Although this change is not statistically significant, it is likely biologically significant, and especially relevant because there is incremental decline across monitoring years. Sagebrush increases on the site slightly (0 to 2 percent), while rabbitbrush declined steadily (18 to 12 percent).

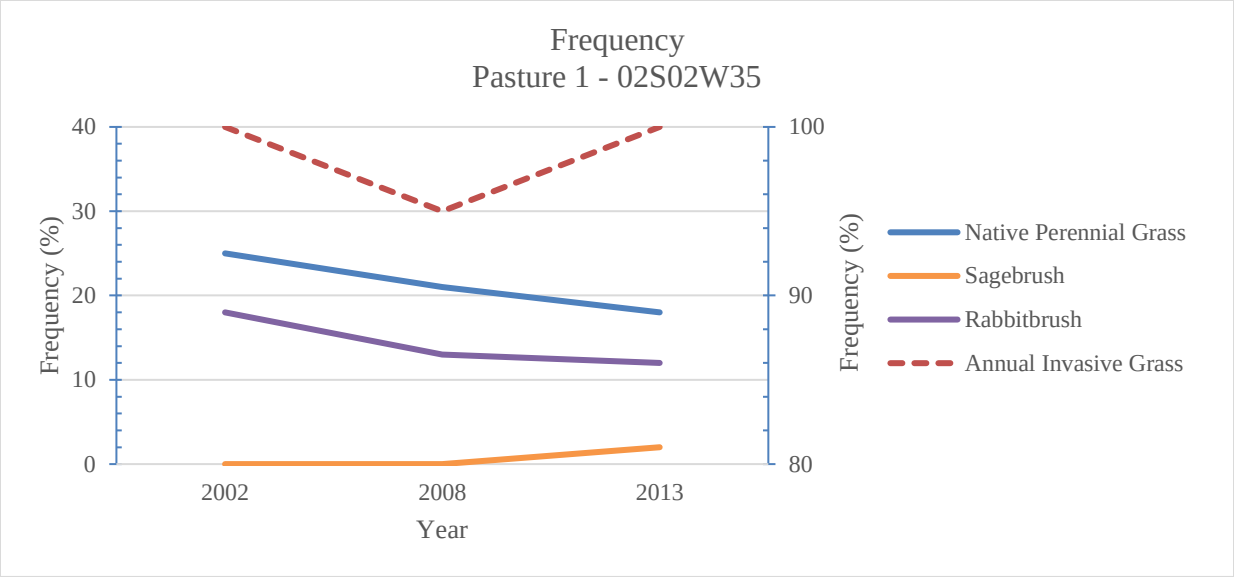

Figure VEG 1. Frequency trends derived from monitoring site 02S02W35 in Pasture 1. Native perennial grass, sagebrush and rabbitbrush are presented on the left axis, while annual invasive grass are presented on the right axis.

Pasture 2

Table VEG 12. Frequency from trend monitoring site 03S02W24 in pasture 2

Cover Type	Frequency (%)			Difference between 2002 and 2014	p-value
	2002	2008	2014		
Native Perennial Grass	16.0	2.0	18.0	2.0	0.83
Annual Invasive Grass	90.0	94.0	95.0	5.0	0.30
Sandberg's Bluegrass	25.0	24.0	40.0	15.0	0.01
Sagebrush	17.0	6.0	6.0	-11.0	0.18
Other Shrubs	67.0	68.0	48.0	-19.0	0.00

In Pasture 2, native perennial grasses increase slightly, after a steep decrease from 2002 to 2008 (Table VEG 12; Figure VEG 2). Overall, they increase slightly from 16 to 18 percent. The sharp decline is likely an anomaly in the data. Annual invasive grass increase from 90 to 95 percent, although this increase is not statistically significant. Sanderg bluegrass increases from 25 to 40 percent, which is both a biologically and statistically significant increase. Sagebrush and other shrubs both decrease (17 to 6 percent, 67 to 48 percent, respectively). Although both experienced decline, only the decrease in other shrubs was statistically significant. However, both are biologically significant.

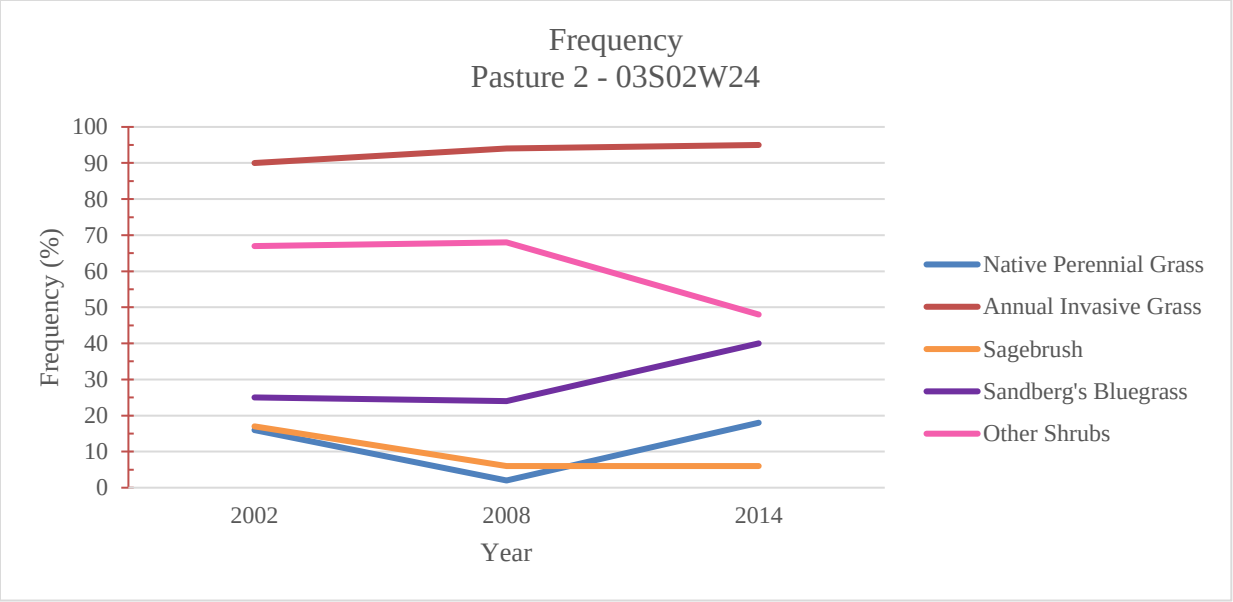

Figure VEG 2. Frequency trends derived from monitoring site 03S02W24 in Pasture 2.

Pasture 3

Table VEG 13. Frequency from trend monitoring site 04S02W24 in pasture 3

Cover Type	Frequency (%)				Difference between 2002 and 2014	p-value
	2002	2008	2010	2014		
Native Perennial Grass	52.0	20.0	40.0	34.0	-18.0	0.01
Annual Invasive Grass	10.0	16.0	10.0	6.0	-4.0	0.48
Sandberg's Bluegrass	85.0	92.0	96.0	90.0	5.0	0.45
Sagebrush	37.0	6.0	28.0	22.0	-15.0	0.06
Other Shrubs	64.0	59.0	52.0	34.0	-30.0	0.03

Native perennial grass in Pasture 3 declines substantially from 2002 to 2014 (Table VEG 13; Figure VEG 3). Although there is an initial decline from 2002 to 2008, with recovery in 2010, the grasses decline from 52 to 24 percent over the evaluation period, which is also a statistically significant change. Annual invasive grass frequency also declines from 10 to 6 percent. Sandberg bluegrass frequency is also high at this site, and increases slightly (85 to 90 percent). This illustrates a Sandberg bluegrass dominant community, especially with the decline of deep rooted species. Sagebrush and other shrubs also decline. There is a substantial decline in sagebrush in 2008, which is likely a data anomaly, as there is similar cover in 2002 (37 percent) as 2010 (28 percent). Overall, sagebrush decreases over the evaluation period (37 to 22 percent). Other shrubs also decline by roughly 50 percent from 2002 to 2014 (64 to 34 percent).

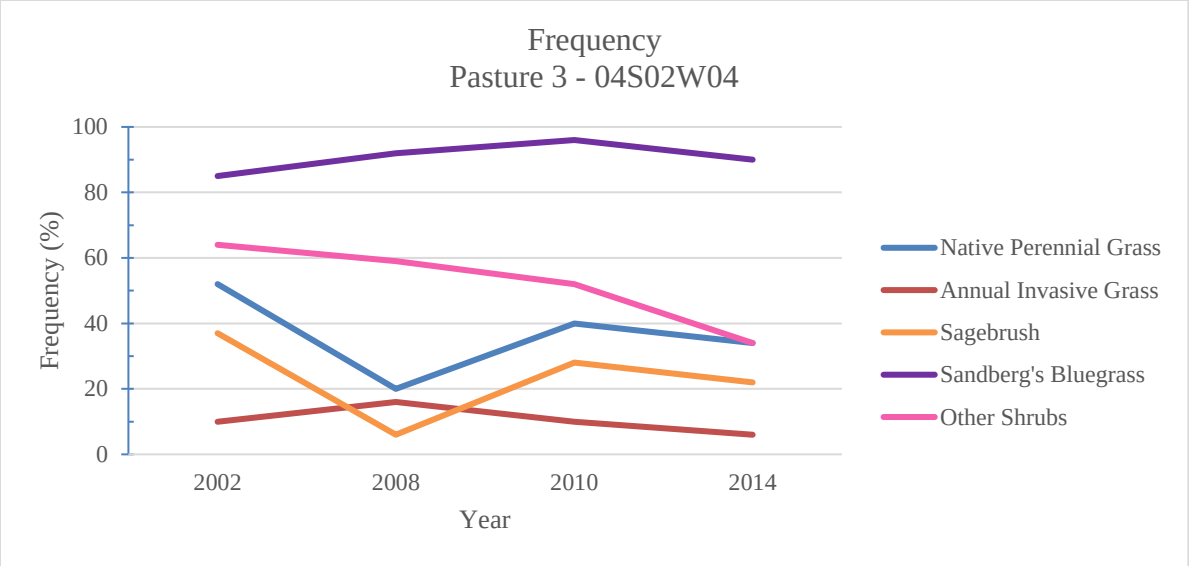

Figure VEG 3. Frequency trends derived from monitoring site 04S02W04 in Pasture 3.

Pasture 4

Table VEG 14. Frequency from trend monitoring site 04S02W27 in pasture 4

Cover Type	Frequency (%)			Difference between 2002 and 2014	p-value
	2002	2008	2014		
Native Perennial Grass	34.0	42.0	66.0	32.0	0.00
Annual Invasive Grass	0.0	1.0	8.0	8.0	0.08
Sandberg's Bluegrass	98.0	99.0	100.0	2.0	0.18
Sagebrush	35.0	34.0	19.0	-16.0	0.02

At the trend site in Pasture 4, native perennial grasses increase steadily from 34 to 66 percent, which is statistically significant (Table VEG 14; Figure VEG 4). Annual invasive grasses were observed initially in trace amounts, but increase to 8 percent in 2014. Sandberg bluegrass is the dominant perennial grass species, observed at high frequencies (98 to 100 percent). Sagebrush declines from 35 to 19 percent. This may in part be due to an aroga moth defoliation event that occurred in parts of the allotment.

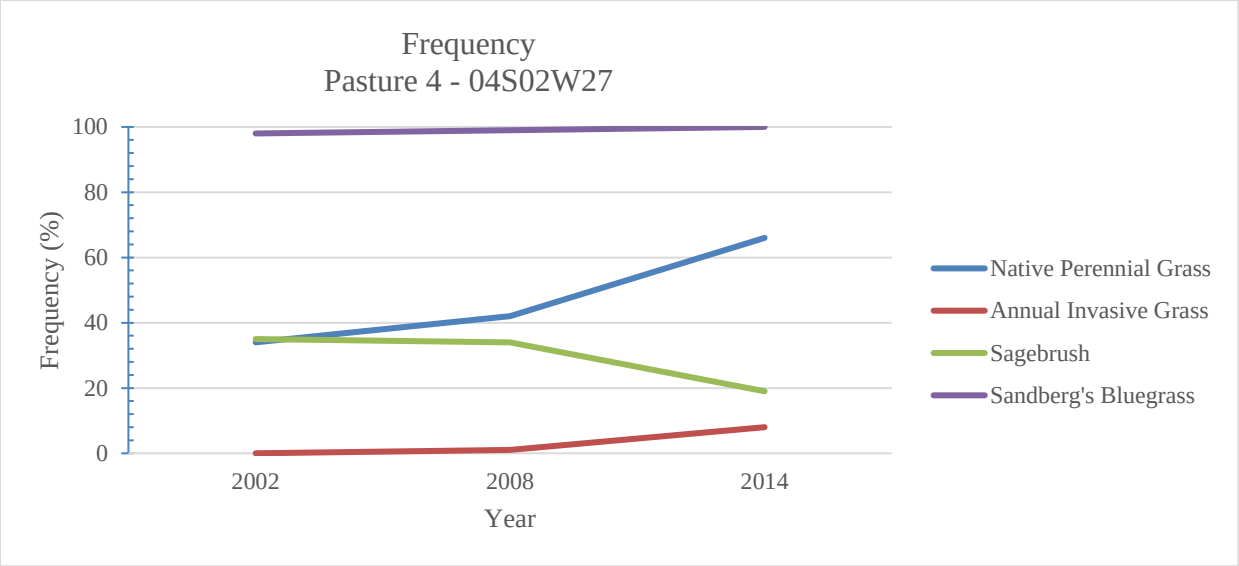

Figure VEG 4. Frequency trends derived from monitoring site 04S02W27 in Pasture 4.

Pasture 5

Table VEG 15. Frequency from trend monitoring site 04S03W19 in pasture 5

Cover Type	Frequency (%)			Difference between 2002 and 2014	p-value
	2002	2008	2014		
Native Perennial Grass	92.0	49.0	90.0	-2.0	0.88
Annual Invasive Grass	23.0	9.0	38.0	15.0	0.19
Sandberg's Bluegrass	4.0	6.0	33.0	29.0	0.00
Sagebrush	50.0	38.0	38.0	-12.0	0.05
Other Shrubs	14.0	22.0	33.0	19.0	0.01

There are inconsistencies with data collected in 2008, so less emphasis is given to those trends observed. Focus is given to those from 2002 to 2014. Overall in Pasture 5, native perennial grasses decline slightly in frequency (92 to 90 percent), while annual invasive grasses increase from 23 to 38 percent (Table VEG 15; Figure VEG 5). Although this increase is not statistically significant, it is biologically significant. If trends continue to increase for annual invasive grasses, the increases will be statistically significant. Sanderg bluegrass increases from 4 to 33 percent from 2002 to 2014, this change is statistically significant. Sagebrush decreases from 50 to 38 percent, this change is marginally not significant. Other shrubs increase on the site from 14 to 33 percent.

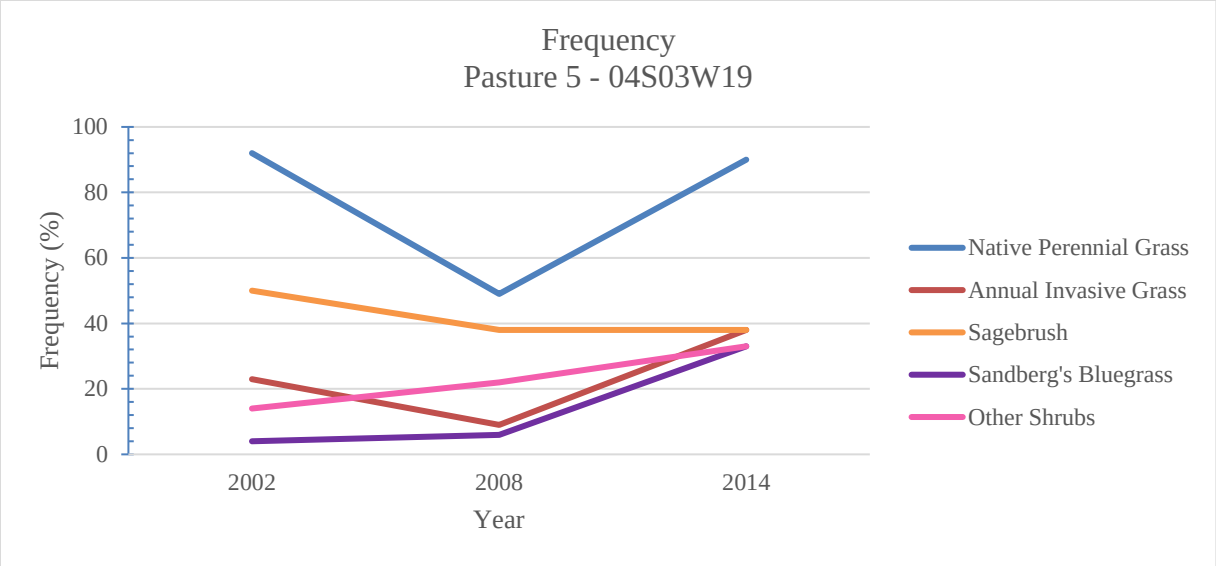

Figure VEG 5. Frequency trends derived from monitoring site 04S02W27 in Pasture 5.

Pasture 6

Table VEG 16. Frequency from trend monitoring site 05S03W09 in pasture 6

Cover Type	Frequency (%)			Difference between 2002 and 2014	p-value
	2002	2008	2014		
Native Perennial Grass	99.0	66.0	100.0	1.0	0.37
Annual Invasive Grass	0.0	19.0	13.0	13.0	0.19
Sandberg's Bluegrass	80.0	60.0	82.0	2.0	0.77
Sagebrush	81.0	80.0	75.0	-6.0	0.28
Rabbitbrush	1.0	1.0	1.0	0.0	1.00
Other Shrubs	0.0	0.0	1.0	1.0	0.37

There are some inconsistencies in grass frequency in 2008, so less emphasis is given to those data. Overall, native perennial grass frequency is static in Pasture 6, as is Sandberg bluegrass, although the frequency of Sandberg bluegrass is higher than expected (82 percent) (Table VEG 16; Figure VEG 6). Annual invasive grass cover increases from 0 to 13 percent, although there is a spike in 2008 to 19 percent. Sagebrush decreases from 81 to 75 percent, which is still higher than expected. Rabbitbrush and other shrubs largely remain the same. Frequency from this trend location indicates a densely vegetated community.

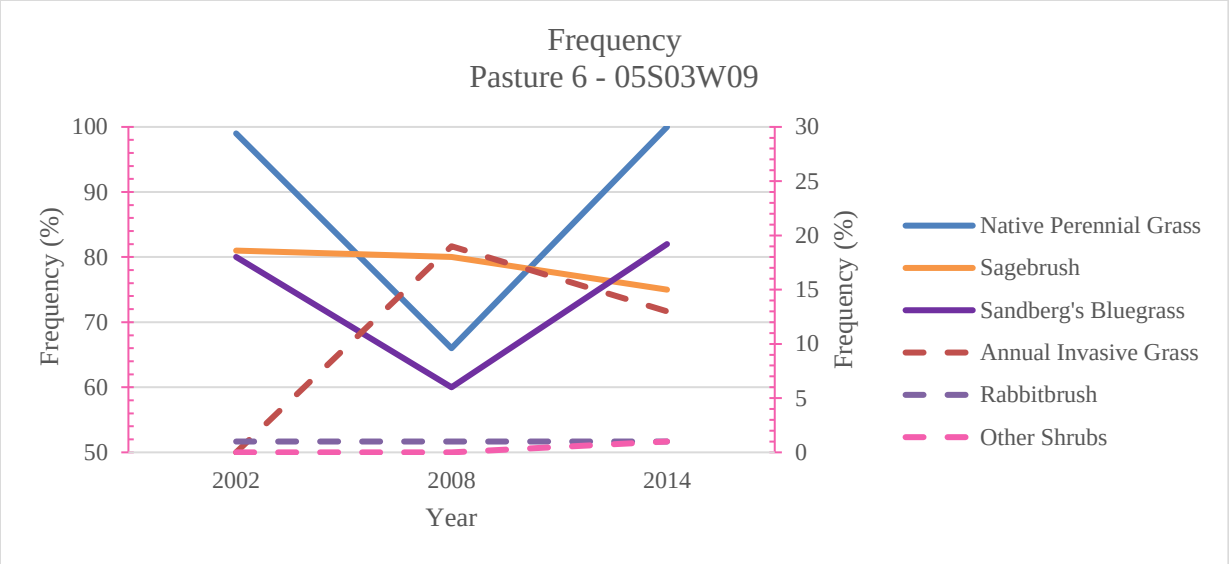

Figure VEG 6. Frequency trends derived from monitoring site 05S03W09 in Pasture 6. Native perennial grass, sagebrush and Sandberg bluegrass are presented on the left axis, while annual invasive grass, rabbitbrush and other shrubs are presented on the right axis.

Pasture 7

Table VEG 17. Frequency from trend monitoring site 03S02W15 in pasture 7

Cover Type	Frequency (%)		Difference between 2008 and 2013	p-value
	2008	2013		
Native Perennial Grass	8.0	6.0	-2.0	0.48
Annual Invasive Grass	92.0	98.0	6.0	0.08
Sandberg's Bluegrass	0.0	1.0	1.0	0.37
Sagebrush	11.0	14.0	3.0	0.53
Rabbitbrush	1.0	1.0	0.0	1.00
Other Shrubs	7.0	7.0	0.0	1.00

Most frequency trends in Pasture 7 have increased since 2002, with the exception of native perennial grasses, which have decreased slightly (8 to 6 percent) (Table VEG 17; Figure VEG 7). Annual invasive grass dominates the site at nearly 98 percent frequency, while Sandberg bluegrass represents a trace component at 1 percent. Sagebrush increases from 11 to 14 percent, while rabbitbrush and other shrubs remain the same. Sagebrush and native perennial grasses are generally lower than expected for the site.

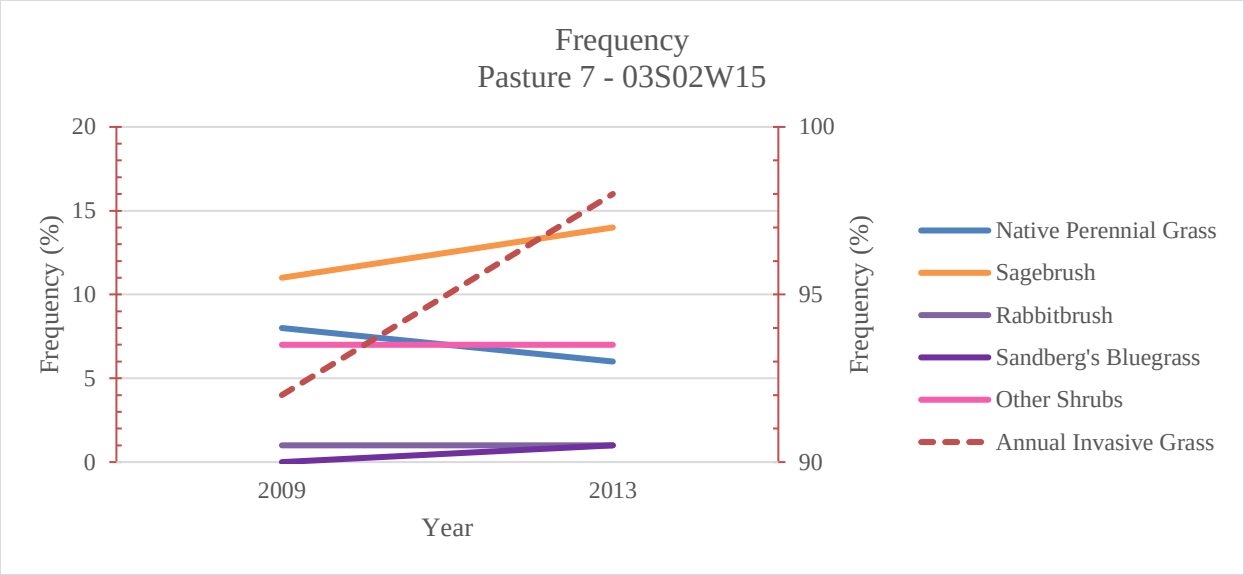

Figure VEG 7. Frequency trends derived from monitoring site 03S02W15 in Pasture 7. Native perennial grass, sagebrush, rabbitbrush, other shrubs and Sandberg bluegrass are presented on the left axis, while annual invasive grass is presented on the right axis.

Pasture 10

Table VEG 18. Frequency from trend monitoring site 03S02W30 in pasture 10

Cover Type	Frequency (%)		Difference between 2008 and 2014	p-value
	2008	2014		
Native Perennial Grass	46.0	38.0	-8.0	0.26
Annual Invasive Grass	0.0	82.0	82.0	0.00
Sandberg's Bluegrass	98.0	99.0	1.0	1.00
Sagebrush	30.0	9.0	-21.0	0.01
Rabbitbrush	13.0	7.0	-6.0	0.18
Other Shrubs	2.0	2.0	0.0	0.37

In Pasture 10, native perennial grass frequency decreases from 46 to 38 percent, while annual invasive grass increases substantially (0 to 82 percent) (Table VEG 18; Figure VEG 8). Sandberg bluegrass increases slightly (98 to 99 percent). Sagebrush decreases from 30 to 9 percent, which is statistically significant. Rabbitbrush also declines (13 to 7 percent), while other shrubs remain the same.

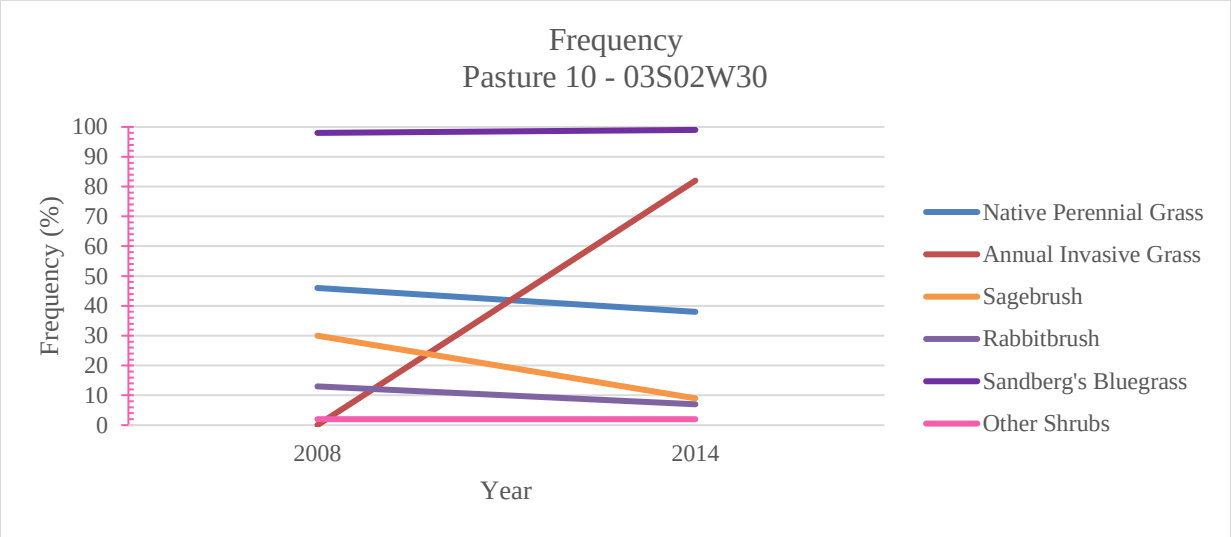

Figure VEG 8. Frequency trends derived from monitoring site 03S02W30 in Pasture 10.

Pasture 11

Table VEG 19. Frequency from trend monitoring site 04S03W02A in pasture 11

Cover Type	Frequency (%)		Difference between 2008 and 2014	p-value
	2009	2014		
Native Perennial Grass	71.0	72.0	1.0	0.91
Annual Invasive Grass	83.0	97.0	14.0	0.00
Sandberg's Bluegrass	82.0	91.0	9.0	0.18
Sagebrush	6.0	13.0	7.0	1.00
Other Shrubs	0.0	1.0	1.0	1.00

In Pasture 11, native perennial grass frequency increases slightly, while annual invasive grasses increase from 83 to 97 percent, which is a statistically significant change (Table VEG 19; Figure VEG 9). Sandberg bluegrass frequency also increases from 82 to 91 percent. Sagebrush increases from 6 to 13 percent, which is lower than expected, while other shrubs are detected for the first time in 2014.

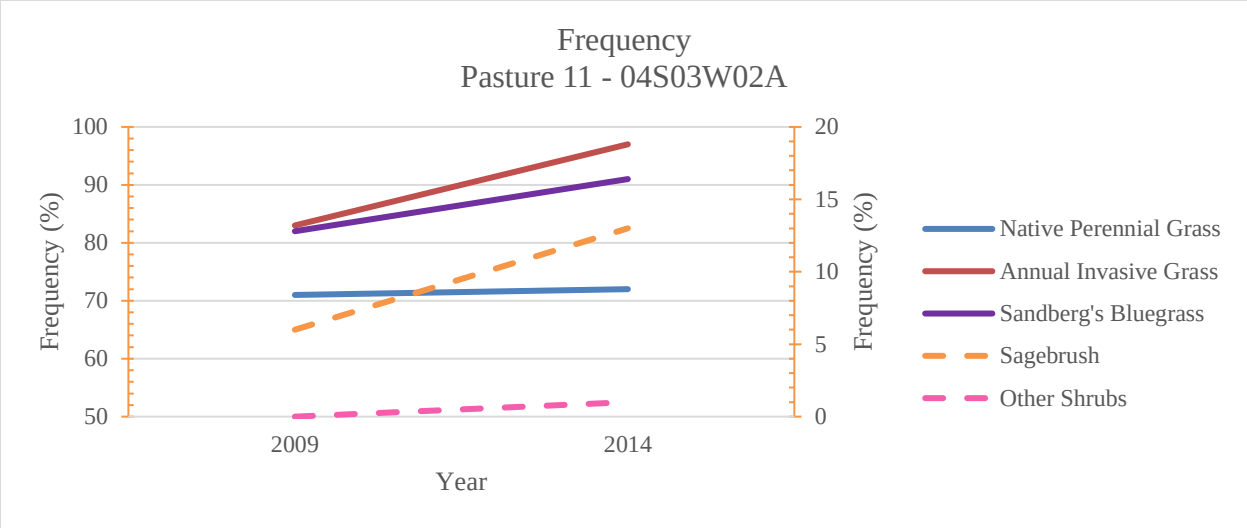

Figure VEG 9. Frequency trends derived from monitoring site 04S03W02A in Pasture 11.

2.4.1.4 Photo Plots

Photos are taken at every trend monitoring location, although there are four dedicated photo only sites in the Silver City allotment in Pastures 8 and 11. Three plots are presented in this section, all in Pasture 11, while the plot in Pasture 8 is analyzed under Standard 5 – Seedings. Two plots have been monitored twice during the evaluation period, once 2008/2009 and again in 2014. (Table ALLOT 9).

Trend site 04S03W02B is in Pasture 11. The comparison of photos demonstrates the increase in cheatgrass cover over the last several years (Figure VEG 10). Although the photos are taken at different times of year (May and August) and utilization levels, they both show a continuity of cheatgrass through the interspaces with limited perennial species observed. The increase in cheatgrass is also demonstrated by the nested frequency plot in the same pasture. The 2014 photo shows lupine, which is not shown in the 2008 photo.

Figure VEG 10. Comparison of photos from 2008 (left) and 2014 (right) for trend site 04S03W02B.

The last photo plot trend site (04S03W35) in Pasture 11 has been monitored once in 2014 (Figure VEG 11). It shows a robust perennial grass component with a low sagebrush overstory. Multiple forbs are observed, such as lupine and indian paintbrush. Cheatgrass does occupy the interspaces, with some continuity. Junipers are also observed of mostly young age classes.

Figure VEG 11. Photo at trend site 04S03W35 in May 2014.

2.4.2 Evaluation of Standard 4 - Native Plant Communities

Evaluation Finding- Allotment/watershed is:
___ Meeting Standard
___ Not meeting the Standard, but making significant progress toward meeting
_X_ Not meeting the Standard

OWYHEE RESOURCE MANAGEMENT PLAN (1999)

Objectives and Management Actions & Allocations:

Vegetation

VEGE 1: Improve unsatisfactory and maintain satisfactory vegetation health/condition on all areas.

- Vegetation conditions within the allotment are largely unsatisfactory. Shallow rooted grass species are the dominant herbaceous component in many areas, in addition to

invasive annual grasses. An overall lack of species diversity is also leading to unsatisfactory conditions. Therefore, the objective is not being met.

2.4.2.1 Evaluation and Rationale for Evaluation Finding

In all monitoring sites, regardless of pasture or ecological site, the plant community has been altered from reference conditions. Sandberg bluegrass has replaced bluebunch wheatgrass or Idaho fescue as the dominant grass species in most pastures, which is indicative of degradation and a change in seral phase. This is significant in terms of water capture and infiltration and overall vegetative structure of the landscape, as well as wildlife habitat. The composition and cover of species found across the allotment is insufficient to maintain ecological processes and is experiencing continued loss of abundance and diversity.

Frequency trends do not suggest that the plant communities are moving closer to reference conditions, nor to a greater degree of functional or structural diversity. Sandberg bluegrass continues to be static or increasing, which is indicative of degraded conditions. Furthermore, bluebunch wheatgrass, is static to decreasing, and is representative of a lack of cool season bunch grasses in this environment in general. Although the higher elevation pastures (5, 6, 11) have a much higher frequency of native, deep-rooted species, the frequency of both Sandberg bluegrass and cheatgrass (annual invasive grass) exists at largely inappropriate levels, which influences the overall hydrologic function and biotic integrity, as demonstrated in the indicators assessments. See Standard 1 – Watersheds for additional discussion.

Sagebrush frequency trends are mixed. Other pastures are variable in their trends, which is likely due to a defoliation event by aroga moth in 2013/2014. Long term consequences are expected from this event, which appears to have effected predominately the lower pastures (1-4, 7-10). Perennial forb data derived from trend sites are variable, so determining inclination is largely inappropriate. However, recent data collected from HAF/AIM indicates an overall lack of native forbs in the Silver City allotment. This is discussed repeatedly in the indicators assessments, and the minimal forbs noted at HAF sites substantiate this observation. Higher elevation pastures (5, 6, 11) harbor greater forb diversity than the lower elevations, but the frequency of cheatgrass, and the lack of perennial bunchgrasses across the allotment jeopardize the proliferation of native forbs. Furthermore, there is little shrub diversity; although sub-dominant shrubs only constitute a small proportion of shrub cover, they are often absent entirely across the allotment, representing an additional lack of diversity.

In summary, lack of cool season bunchgrasses, and subsequent replacement by Sandberg bluegrass resulting in compromised ecological processes, as well as low species diversity, indicate the standard is not being met.

2.4.3 Information Sources

University of Idaho. 2009. What is Frequency? retrieved on 28 May 2019. https://www.webpages.uidaho.edu/veg_measure/Modules/Lessons/Module%206(Frequency)/What%20is%20Frequency.htm

USDI Bureau of Land Management. 2005. Interpreting Indicators of Rangeland Health-Version 4. Technical Reference 1734-6. Denver CO. 118 p.

2.5 Standard 5: Seedings

_ Standard Does Not Apply

Rangelands seeded with mixtures, including predominately non-native plants, are functioning to maintain life form diversity production, native animal habitat, nutrient cycling, energy flow and hydrologic cycle.

Indicators may include but are not limited to:

1. In established seedings, the diversity of perennial species is not diminishing over time.
2. Plant production, seed production, and cover are adequate to enable recruitment when favorable climatic events occur.
3. Noxious weeds are not increasing.
4. Adequate litter and standing dead plant material are present for site protection and for decomposition to replenish soil nutrients relative to site potential.

This assessment of seeding conditions considers the following indicators and associated information sources (Table SEED 1).

Table SEED 1. Seeding indicators and associated information sources

INFORMATION SOURCE	INDICATOR	ASSUMPTION
Interpreting Indicators of Rangeland Health (IIRH)	Perennial plant reproductive Capability	Indicates plant vigor since healthy plants are better able to produce adequate quantities of viable seed than stressed or decadent plants.
	Plant mortality/ decadence	Indicates population dynamics.
	Annual production	Indicates the energy captured by plants and its availability for secondary consumers given current weather conditions.
	Relative dominance of functional/ structural plant groups	Indicates ecosystem processes including plant productivity, plant percent nitrogen, plant total nitrogen, and light penetration.
Interpreting Indicators of Rangeland Health (IIRH)	Comprehensive plant species lists	Indicates plant species diversity.
Interpreting Indicators of Rangeland Health (IIRH)	Amount and distribution of plant litter	Stabilizes soil surface, promotes nutrient cycling, and retains soil moisture.
Upland Vegetation Monitoring (Trend)	Amount and distribution of biologic soil crust cover	Stabilizes soil surface and promotes nutrient cycling, particularly in warm dry regions.
Interpreting Indicators of Rangeland Health (IIRH)	Short- and mid-stature perennial grass cover and frequency	Stabilizes soil surface, promotes nutrient, water, and energy cycling.

INFORMATION SOURCE	INDICATOR	ASSUMPTION
	Invasive plants including noxious, non-native, and native.	May impact an ecosystem's type and abundance of species, their interrelationships, energy, and nutrient cycles.

2.5.1 Rangeland Health Assessment

In 1963 the vast majority of both pastures 8 and 9 (3,600 acres seeded of 3,833 total pasture acres) were plowed to remove sagebrush and seeded with crested wheatgrass to improve rangeland conditions (Figure APP 4.1 MAP 16). Nearly a third of the original seeding was reseeded in 1964 with crested wheatgrass. Crested wheatgrass is still the dominant perennial grass component, with minimal species diversity of grass or shrubs, therefore, it is appropriate to categorize these pastures as seedings. This was determined using historic records, the Silver City 2003 Assessment (USDI BLM 2003), and recent monitoring.

2.5.1.1 Indicators of Rangeland Health

Nine of the seventeen indicators utilized in the rangeland health field assessment relate to Standard 5 – Seedings, for pastures 8 and 9 (USDI BLM 2005). Final ratings for biotic integrity are presented below and in Figure APP 4.1 MAP 14.

Pasture 8

Table SEED 2. Final rating for biotic integrity in pasture 8

Pasture	Site ID	Ecological Sites	Biotic Integrity
8-Moore	N	Loamy 8-12" Wyoming Big Sagebrush/Bluebunch Wheatgrass-Thurber's Needlegrass	Moderate
	Q	Calcareous loam 7-10" Shadscale Saltbush-Bud Sagebrush/Indian Ricegrass-Thurber's Needlegrass	Moderate to Extreme

The two sites in Pasture 8-Moore are Sites N representing Loamy 8-12 Wyoming Big Sagebrush/Bluebunch Wheatgrass-Thurber's Needlegrass ecological site and Site Q representing Calcareous loam 7-10 Shadscale Saltbush-Bud Sagebrush/Indian Ricegrass-Thurber's Needlegrass ecological site (Table SEED 2). Both sites were rated in the moderate to extreme range of departure for Biotic Integrity for the ecological sites. While native deep rooted bunchgrasses have been replaced with non-native deep rooted bunchgrasses they provide the same ecosystem function. Non-native deep rooted bunchgrasses provide site litter and standing dead material for nutrient cycling. The shallow rooted bunchgrass Sandberg is increasing at the site. The increase hinders nutrient cycling by reducing the amount of litter and root structure available for decomposition thus providing organic matter. While cheatgrass is common throughout the site it is not increasing see Foliar Cover.

Pasture 9

Table SEED 3. Final rating for biotic integrity for pasture 9

Pasture	Site ID	Ecological Sites	Biotic Integrity
9-Diamond Well	H	Loamy 8-12" Wyoming Big Sagebrush/Bluebunch Wheatgrass	Moderate to Extreme
	K	Sandy Loam 8-12" Wyoming Big Sagebrush/Indian Ricegrass	Moderate to Extreme

The two sites in Pasture 9-Diamond Well are Sites H representing Loamy 8-12 Sagebrush-Bluebunch Wheatgrass ecological site and Site K representing Sandy Loam 8-12 Wyoming Big Sagebrush/Indian Ricegrass (Table SEED 3). Both sites were rated in the moderate to extreme range of departure for Biotic Integrity for the ecological sites. While cheatgrass is not prevalent the scarcity of deep rooted bunchgrasses provides a void that could be occupied by cheatgrass. Dead sagebrush and reduced vigor of Sandberg bluegrass have contributed to the reduced production of this site. Sandberg is increasing, and while this increases diversity, Sandberg bluegrass does not fill the same ecological role as deep rooted bunchgrasses.

2.5.1.2 Trend

Pasture 8

Trend site 03S02W21 shares it's location with Rangeland Health Assessment site N (Figure APP 4.1 MAP 11). Trend data were collected in 2012 and 2014.

Table SEED 4. Frequency from trend monitoring site 03S02W29 in pasture 8

Cover Type	Frequency (%)			Difference between 2002 and 2014	p-value
	2002	2008	2014		
Crested Wheatgrass	74.0	40.0	69.0	-5.0	0.46
Native Perennial Grass	2.0	0.0	1.0	-1.0	0.37
Annual Invasive Grass	3.0	0.0	6.0	3.0	0.30
Sandberg's Bluegrass	97.0	98.0	100.0	3.0	0.07
Sagebrush	33.0	36.0	32.0	-1.0	0.85
Other Shrubs	33.0	25.0	18.0	-15.0	0.01

The trend site in Pasture 8 shows an overall high frequency (69 percent) of crested wheatgrass (Table SEED 4; Figure SEED 1). This is a decrease since 2002 (74 percent), although not statistically significant. Native perennial grass frequency is low (1 percent) and decreasing since 2002. Invasive annual grasses occur in low frequency, but increased from 3 to 6 percent. Sandberg bluegrass increased from 97 percent to 100 percent. Sagebrush decreased marginally (33 to 32 percent), while other shrubs decreased from 33 to 18 percent, which is a statistically significant decline.

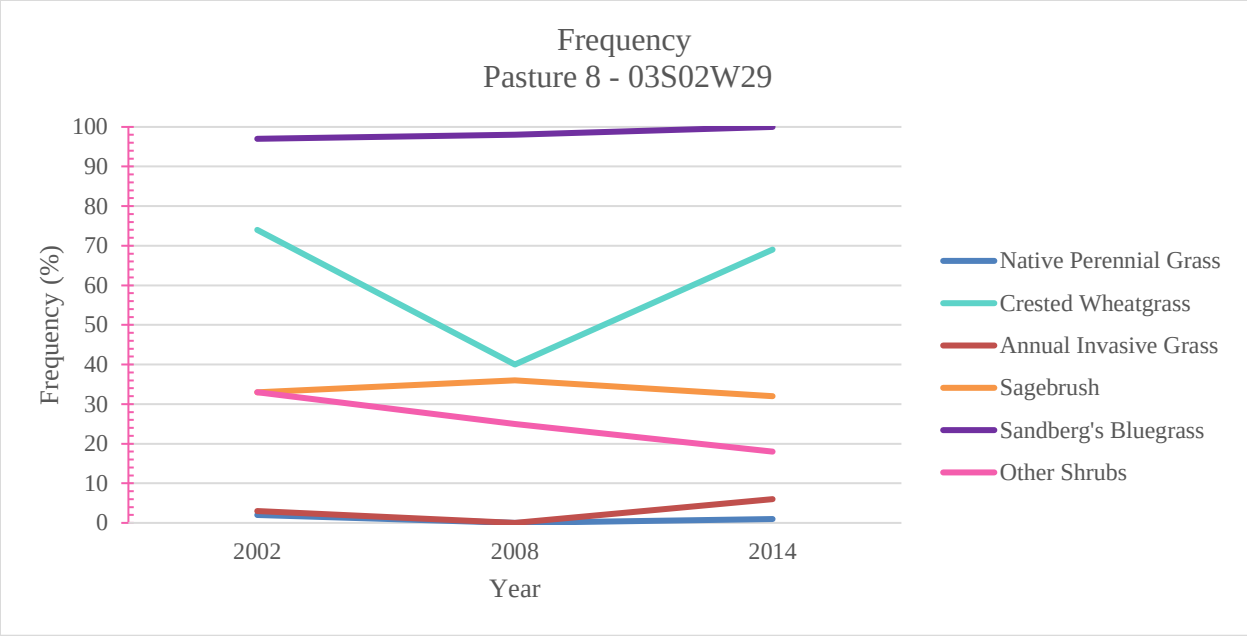

Figure SEED 1. Frequency trends derived from monitoring site 03S02W29 in Pasture 8.

The photo plot in Pasture 8 was established in 2014, and has only been visited once. Therefore, the photo is representative of the condition at that time and not trend. From the photo, crested wheatgrass is the dominant perennial grass species, with a moderate component of Wyoming sagebrush (Figure SEED 2). There are trace amounts of cheatgrass throughout the site, but it is not continuous.

Figure SEED 2. Photo from trend site 03S02W21 in 2014.

Pasture 9

The trend site in Pasture 9 is also in an old crested wheatgrass seeding, which increased steadily from 68 to 80 percent (Table SEED 5; Figure SEED 3). Frequency of plants at trend site 03S02W28 remain static since 2002 with minimal changes (see Table VEG- 11). Crested wheatgrass remains the dominate vegetation and invasive annual grasses remain a trace component. While shrub frequency is increasing, it remains a minor component of the trend site.

Table SEED 5. Frequency from trend monitoring site 03S02W28 in pasture 9

Cover Type	Frequency (%)			Difference between 2002 and 2014	p-value
	2002	2008	2014		
Crested Wheatgrass	68.0	75.0	80.0	12.0	0.28
Annual Invasive Grass	0.0	0.0	2.0	2.0	0.37
Sandberg's Bluegrass	84.0	83.0	91.0	7.0	0.51
Sagebrush	8.0	1.0	5.0	-3.0	0.18
Other Shrubs	30.0	36.0	27.0	-3.0	0.74

Figure SEED 3. Frequency trends derived from monitoring site 03S02W28 in Pasture 9.

2.5.1.3 Ground and Foliar Cover

Please see Standard 1 – Watersheds for discussion on collection methods for ground and foliar cover.

Pasture 8

Foliar cover for sagebrush and perennial grasses across ecological sites and years is highly variable. However, Sandberg bluegrass is consistently a large component of the site. Invasive annual grass is present at one of two sites (Table WATERSH 42). Frequency of other shrubs is consistent. Bare soil is consistent across sites and years. Litter and rock cover were variable across both site and years. For a detailed analysis please see Section 2.1.1.3 Foliar Cover.

Pasture 9

Foliar cover for perennial grasses and sagebrush is variable across ecological sites and time, with the expection of Sandberg bluegrass which is consistent. Invasive annual grasses along with other shrubs are a minimal component of the site reducing the diversity of the site (Table WATERSH 43). For a detailed analysis please see Section 2.1.1.3 Foliar Cover.

2.5.2 Evaluation of Standard 5- Seedings

Evaluation Finding- Allotment/watershed is:
_X Meeting Standard
___Not meeting the Standard, but making significant progress toward meeting
__Not meeting the Standard

OWYHEE RESOURCE MANAGEMENT PLAN (1999)

Objectives and Management Actions & Allocations:
Vegetation

VEGE 1: Improve unsatisfactory and maintain satisfactory vegetation health/condition on all areas.

- As seedings, Pastures 8 and 9 have robust crested wheatgrass components, which fufill the niche of deep rooted perennial grass species. These seedings are healthy and robust vegetatively, therefore, the objective is being met.

IDAHO APPROVED RESOURCE MANAGEMENT PLAN AMENDMENT (2015/2019)

Objectives and Management Actions & Allocations:

Vegetation

MD VEG 7: During land health assessments, evaluate the relative value of existing nonnative seeding within GRSG habitat as: 1) a component of a grazing system allowing improvement of adjacent native vegetation, 2) development of a forage reserve, 3) incorporation into a fuel break system (Davies et al. 2011) or 4) restoration/diversification for GRSG habitat improvement. Where appropriate and feasible, diversify seedings, or restore to native vegetation when potential benefits to GRSG habitat outweigh the other potential uses of the non-native seeding, with emphasis on PHMA and IHMA. Allow recolonization of seedings by sagebrush and other native vegetation.

- Seeding areas in pasture 8 and 9 that are mapped as sage-grouse habitat are assessed to the quality of sage-grouse habitat they provide in Standard 8 – Threatened and Endangered Species. The monitoring locations and habitat ratings are shown in Figures APP 4.1 MAP 19 and 20.

2.5.2.1 Evaluation and Rationale for Evaluation Finding

The Silver City allotment is meeting Standard 5 in pastures 8 and 9. Disturbance factors that have affected this pasture include livestock grazing, plowing and seeding (broadcast seeding). Under current conditions, while Sandberg bluegrass is prevalent within the seeding area, diversity remains low across both pastures despite a slight increase in sagebrush. While Sandberg bluegrass is a shallow-rooted, native perennial grass it does not replace the function of native deep rooted perennial grasses. Crested wheatgrass in pasture 9 increased in frequency from 2002-2014 while crested wheatgrass in pasture 8 is variable, decreasing in year 2008, and increasing in year 2014. Deep-rooted perennial grasses provide an underground biomass, which in turn increases the capture and percolation of water through the soil profile. While crested wheatgrass is not a native perennial bunchgrass it does provide the same ecological role. Across all sites within the seeding, frequency of other shrubs remain a minor component. Invasive annual grasses have remained a minor component of the seeding with negligible change (Table SEED 4 and Table SEED 5). Bare soil varies between sites however, there is a significant difference between pastures, pasture 9 at 40 percent and Pasture 8 at 25 percent. Foliar cover for pasture 8 indicates perennial grasses are the dominant functional structural group at the site. While perennial grasses are the dominant group, Sandberg is the dominant grass species. In pasture 9 foliar cover is variable across sites and time for crested wheatgrass.

Although diversity remains low in the seeding, despite an increase in the shallow rooted bunchgrass Sandberg bluegrass, perennial grass species are not diminishing over time. While crested wheatgrass is a non-native species, it provides a crucial ecological task that shallow

rooted bunchgrasses do not provide. Despite variability across the pastures for crested wheatgrass, the pastures remain dominated by perennial grasses, with low site diversity and minimal annual grasses.

2.5.3 Information Sources

USDI Bureau of Land Management (BLM). 2003. Assessments for Silver City (0569), Diamond Basin (0579), Con Shea (0571), Joyce FFR (0487), and Murphy FFR (0486) Allotments. Owyhee Filed Office. June 2003.

_____. 2005. Interpreting Indicators of Rangeland Health-Version 4. Technical Reference 1734-6. Denver CO. 118 p.

2.6 Standard 6: Exotic Plant Communities

X_ **Standard Does Not Apply**

Although exotic plant species occur throughout the allotment, they do not dominate any given pasture. Exotic species are addressed under Standard 4 – Native Plant Communities, and Standard 5 – Seedings, as applicable.

2.7 Standard 7: Water Quality

___ **Standard Does Not Apply**

Surface and groundwater on public lands comply with the Idaho Water Quality Standards.

Indicators may include but are not limited to:

- Physical, chemical, and biologic parameters described in the Idaho Water Quality Standards.

This assessment of water quality conditions considers the following indicators and associated information sources (Table WATERQ 1).

Table WATERQ 1. Water quality indicators and associated information sources

INFORMATION SOURCE	INDICATOR	ASSUMPTION
IDEQ 2014 Integrated Report (IDEQ 2017)	Category 4A	Waters of the State impaired for one or more beneficial uses with an approved Total Maximum Daily Load (TMDL).
	Category 4C	Waters of the State impaired for one or more beneficial uses not needing a TMDL, since the impairment is not caused by a pollutant, but by pollution, such as flow or habitat alteration
	Category 5	Waters of the State impaired for one or more beneficial uses for which a TMDL is needed.

2.7.1 Rangeland Health Assessment

The state regulatory agency for water quality, the Idaho Department of Environmental Quality (IDEQ), has evaluated and designated streams within the Silver City allotment for beneficial uses (Table WATERQ 2; Figure APP 4.1 MAP 17). The different uses have associated water quality

standards, and records water quality information on the waters of Idaho within an Integrated Report (IDEQ 2017) (IDAPA 58.01.02).

Table WATERQ 2. Designations of beneficial uses for water bodies in the Silver City allotment (IDAPA 58.01.02)

Assessment Unit	Water Body	Designated Use*	Non-designated Use*
17050103SW011	Rabbit Creek	-	COLD, PCR/SCR
17050103SW012	Sinker Creek	COLD, SS, PCR	-
17050103SW013	Fossil Creek	-	COLD, PCR/SCR
17050103SW017	Bates Creek	-	COLD, PCR/SCR
17050108SW004	Jordan Creek	COLD, SS, PCR	-

*COLD (cold water communities), SS (salmonid spawning), PCR (primary contact recreation), SCR (secondary contact recreation)

The IDEQ has listed multiple stream sections within the Silver City allotment on the Environmental Protection Agency's (EPA's) 303(d) list of impaired waters (IDEQ 2017). First and 2nd order sections of the Rabbit creek watersheds and 3rd order sections of the Sinker creek watershed are fully supporting the beneficial uses. First and 2nd order sections of the Sinker, Fossil, and Bates creek watersheds and 3rd and 4th order sections of the Rabbit creek watersheds have been unassessed for beneficial uses.

IDEQ has developed Total Maximum Daily Loads (TMDL) to address some of the specific impairments within the watersheds (IDEQ 2011 and 2013). A TMDL is a tool for implementing state water quality standards and is based on the relationship between pollution sources and in-stream water quality conditions (EPA 1991). Once the EPA approves the TMDL for the specific stream system, it is removed from Category 5 of the Integrated Report and placed in Category 4A. For category 4C streams, a TMDL is not required, since the impairment is not caused by a pollutant, but by pollution, such as flow or habitat alteration (IDEQ 2017). The specific impairments and state of listing is noted by pollutant below with any monitoring that has been completed to address water quality with the allotment. IDEQ listed 303(d) and TMDL impaired stream reaches on the Silver City allotment are shown in Table WATERQ 3.

Table WATERQ 3. Streams with 303(d) listings or EPA approved TMDL (IDEQ 2017).

Water Body Name	Assessment Unit	Pasture	Supporting Beneficial Uses	IDEQ Category	Impairment
Sinker Creek	17050103SW012_04	4 , 5	No	4a, 4c	Sedimentation/ Siltation, Temperature, Other Flow Regime Alterations

Water Body Name	Assessment Unit	Pasture	Supporting Beneficial Uses	IDEQ Category	Impairment
Jordan Creek and tributaries[1]	17050108SW004_02	5	No	4a, 5	Temperature, Mercury

[1]Tributaries of Jordan Creek include Presby Creek, Bull Frame Creek, Sawpit Gulch, Long Gulch, Silver Cord Gulch, Slaughterhouse Gulch, and Webfoot Gulch.

2.7.1.1 Temperature

IDEQ has developed two different TMDLs to address temperature pollution within some of the stream systems within the allotment. The temperature TMDLs include the Jordan Creek TMDL (IDEQ 2009) and the Mid Snake River/Succor Creek TMDL (IDEQ 2003). These temperature TMDLs address temperature exceedances as a function of decreased stream shading from potential natural vegetation (PNV). The TMDLs reference specific first and second order reaches of Jordan creek and fourth order reaches of Sinker creek that are temperature impaired.

2.7.1.2 Sedimentation/Siltation

IDEQ has developed the Mid Snake River/Succor Creek TMDL to address sediment within some of the stream systems within the allotment (IDEQ 2003). The sediment TMDL addresses sediment exceedances as a function of decreased bank stability. The TMDL references specific fourth order reaches of Sinker Creek that are sediment impaired.

2.7.1.3 Mercury

IDEQ has developed a TMDL to address the mercury within the Jordan Creek stream system, but the EPA did not approve the TMDL. Under the guidance of that finding, the Jordan Creek stream system will remain in category 5 until the EPA issues a mercury TMDL for those waters.

2.7.2 Evaluation of Standard 7- Water Quality

Evaluation Finding- Allotment/watershed is:
___Meeting Standard
___ Not meeting the Standard, but making significant progress toward meeting
_X_ Not meeting the Standard

1999 OWYHEE RESOURCE MANAGEMENT PLAN
Objectives and Management Actions & Allocations:
Water Resources
WATR 1: Meet or exceed State of Idaho water quality standards on all federally administered waters within the Owyhee Resource Area.

- Stream systems within the Silver City allotment are listed as impaired by IDEQ. The Silver City allotment is not meeting this objective.

2.7.2.1 Evaluation and Rationale for Evaluation Finding

The Silver City allotment is not meeting Standard 7 due to impairment from temperature, sediment, and mercury. Temperature impairments exist within 1st and 2nd order stream segments

of the Jordan creek watershed and 4th order segments of the Sinker creek watershed. Sediment impairments exist within 4th order segments of the Sinker creek watershed. Mercury impairments exist within 1st and 2nd order segments of the Jordan creek watershed. Temperature and sediment impairments to streams within the Silver City allotment, after development of implementation plans, indicates that water quality standards are still not being met. MIM monitoring indicated that utilization and disturbance levels on multiple streams exceeded amounts that would allow for recovery of hydric vegetation and hydric soils (Section 2.2). This decreased the ability of the streamside vegetation to shade and thermally regulate stream temperatures, along with filter and retain sediment.

Sources of mercury for the Jordan creek stream system are within or near the stream channel or nearby tributaries. These sources were likely imported into the area during the late 19th to early 20th century for mining operations and no new sources of mercury have been identified (IDEQ 2009).

2.7.3 Information Sources

Environmental Protection Agency (EPA). 1991. Guidance for water quality-based decisions: the TMDL process. U.S. Environmental Protection Agency.

IDAPA 58.01.02. Water Quality Standards Administrative Rules. Idaho Administrative Code. Idaho Department of Environmental Quality.

Idaho Department of Environmental Quality (IDEQ). 2003. Mid Snake River/Succor Creek subbasin assessment and total maximum daily load. Boise.

_____. 2009. Jordan Creek subbasin assessment and total maximum daily load. State of Idaho Department of Environmental Quality.

_____. 2011. Mid Snake River / Succor Creek Subbasin. Five-Year Review of 2003 and 2007 Total Maximum Daily Loads. State of Idaho Department of Environmental Quality.

_____. 2013. Mid Snake River/Succor Creek Tributaries Sediment Total Maximum Daily Load (HUC ID170580103), 2013 Addendum. State of Idaho Department of Environmental Quality.

_____. 2017. Idaho's 2014 Integrated Report. State of Idaho Department of Environmental Quality.

2.8 Standard 8: Threatened and Endangered Species

___ Standard Does Not Apply

Habitats are suitable to maintain viable populations of threatened and endangered, sensitive, and other special status species.

Indicators may include but are not limited to:

1. Parameters described in the Idaho Water Quality Standards.
2. Riparian/wetland vegetation with deep, strong, binding roots is sufficient to stabilize streambanks and shorelines. Invader and shallow rooted species are a minor component of the floodplain.
3. Age class structure diversity or riparian/wetland vegetation is appropriate for the site.

4. Native plant communities (flora and microbiotic crusts) are maintained or improved to ensure the proper functioning of ecological processes and continued productivity and diversity of native plant species.
5. The diversity of native species is maintained.
6. The amount and distribution of ground cover, including litter, for identified ecological site(s) or soil-plant associations are appropriate for site stability.
7. Noxious weeds are not increasing.

This assessment of special status species (including listed threatened and endangered species) considers the following indicators and associated information sources (Table SSSP 1).

Table SSSP 1. Threatened and endangered, and special status species indicators and associated information sources

INFORMATION SOURCE	INDICATOR	ASSUMPTION
Idaho Fish and Wildlife Information System Database	Incidental observations	Presence of a species, especially during the breeding season, indicates that the area is adequate to induce attempted reproduction during that particular year.
Idaho Department of Fish and Game (monitoring reports)	Individuals in population over time	Stable or increasing populations are expected given a maintenance or improvement of habitat conditions.
	Age class distribution	If habitat is suitable for a range of age classes, habitat conditions facilitate continuation of that particular species.
Standard 2, Riparian Areas and Wetlands	Proportion of sites in PFC	Characteristics of these measurements, which contribute to the evaluation outcome for Standard 2, functions as a surrogate for how riparian and wetland areas affect various wildlife species.
Standard 4, Native Plant Communities	Deviation of upland conditions from reference conditions	Characteristics of these measurements, which contribute to the evaluation outcome for Standard 4, functions as a surrogate for how upland areas affect various plant and wildlife species.
HAF[1] Sage-Grouse Nesting Assessments	Proportions of sites in 'Suitable' condition	Characterizes the contribution of the habitat toward favorable nesting conditions, leading to successful reproduction and maintenance or increases to the sage-grouse population using the area.
HAF Sage-Grouse Winter Habitat Assessments	Proportions of sites in 'Suitable' condition	Characterizes the contribution of the habitat toward favorable winter habitat conditions, contributing toward the survival of sage-grouse and the maintenance of the sage-grouse population using the area.

[1] HAF = Sage-Grouse Habitat Assessment Framework

2.8.1 Rangeland Health Assessment

Species evaluated are those listed under the Endangered Species Act (ESA; 16 U.S. Code Sections 1531-1544) and other Idaho BLM special status species (USDI BLM 2016). Discussions will be categorized under plant, wildlife, or fish and invertebrate species.

2.8.1.1 Special Status Plants – Standard 8

There are 10 unique BLM special status plant species occurring in the Silver City allotment (Table SSSP 2 and Table SSSP 3). Although slickspot peppergrass (Lepidium papilliferum) is known to occur in eastern Owyhee County, suitable habitat does not exist within the Owyhee Field Office. Therefore, there are no plant species listed or proposed for listing under the ESA known or suspected to occur in the Silver City allotment (USDI USFWS 2018). Special status species are found in all but pastures 9 and 10 and constitute 48 distinct populations (Table SSSP 4; IDFG 2016). Conditions of these populations are described below.

Table SSSP 2. BLM type definitions for special status plant species

BLM Special Status Type	Definition
1	These are species listed under the Endangered Species Act as threatened, endangered or candidate/proposed for listing.
2	These are species that have a high likelihood of being listed in the foreseeable future due to their global rarity and significant endangerment factors.
3	Range-wide or State-wide Imperiled – Moderate endangerment. These are species that are globally rare or very rare in Idaho, with moderate endangerment factors. Their global or state rarity and the inherent risks associated with rarity make them imperiled species.
4	Species of Concern – These are species generally rare in Idaho with small populations or localized distribution and currently have low threat levels. However, due to the small populations and habitat area, certain future land uses in close proximity could significantly jeopardize these species.

Table SSSP 3. Special status plant species found in the Silver City allotment

Species	BLM Status	Life Form	Habitat[1]
Stiff milkvetch *Astraglus conjunctus var conjunctus*	Type 4	perennial	Rocky hillsides, ridges, or benches with sagebrush and bunchgrasses
Snake River Milkvetch *Astragalus purshii var. ophiogenes*	Type 4	perennial	Sand or gravel on bluffs, dunes, or ash beds
Tufted foothill sedge *Carex tumulicola*	Type 4	perennial	Wooded slopes, meadows; middle and upper elevations
Desert Pincushion *Chaenactis stevioides*	Type 4	annual	Open, sandy areas, often more alkali textures

Species	BLM Status	Life Form	Habitat[1]
White Eatonella *Eatonella nivea*	Type 4	annual	Open, sandy areas, often with sagebrush.
War Eagle Mountain Buckwheat *Eriogonum crosbyae var mystrium*	Type 3	perennial	Restricted to granitic slopes in sagebrush communities and conifer woodlands
White-margined Wax Plant *Glyptopleura marginata*	Type 4	annual	Open, sandy areas, often with sagebrush; often mildly alkali as well.
Rigid Threadbush *Nemacladus rigidus*	Type 4	annual	Desert scrub, juniper woodlands, sandy and gravelly wash bottoms
Least Phacelia *Phacelia minutissima*	Type 2	annual	Wet meadows, moist, open places
Annual brittlebrush *Psathyrotes annua*	Type 3	annual or perennial	Dry, open, often alkali places

[1]Habitat descriptions are derived from Intermountain Flora (Cronquist 1972).

Table SSSP 4 Special status plant populations by pasture

Species	Pasture Element Occurrences (EOs)											Total EOs
	1	2	3	4	5	6	7	8	9	10	11	
Stiff milkvetch *Astraglus conjunctus var conjunctus*	1	-	-	-	2	5	-	1	-	-	1	**10**
Snake River Milkvetch *Astragalus purshii var. ophiogenes*	-	1	-	-	-	-	1	-	-	-	-	**2**
Tufted foothill sedge *Carex tumulicola*	-	-	-	-	-	1	-	-	-	-	-	**1**
Desert Pincushion *Chaenactis stevioides*	3	-	-	-	-	-	-	-	-	-	-	**3**
White Eatonella *Eatonella nivea*	2	1	1	1	-	-	1	-	-	-	-	**6**
War Eagle Mountain Buckwheat *Eriogonum crosbyae var mystrium*	-	-	-	-	2	-	-	-	-	-	-	**2**
White-margined Wax Plant *Glyptopleura marginata*	4	2	4	-	-	-	3	-	-	-	-	**13**
Rigid Threadbush *Nemacladus rigidus*	2	-	3	-	-	-	3	-	-	-	-	**8**
Least Phacelia *Phacelia minutissima*	-	-	-	-	1	-	-	-	-	-	-	**1**
Annual brittlebrush *Psathyrotes annua*	2	-	-	-	-	-	-	-	-	-	-	**2**
Total Populations by Pasture	**14**	**4**	**8**	**1**	**5**	**6**	**8**	**1**	**0**	**0**	**1**	**48**

General habitat is assessed in this standard to describe suitability for rare plant maintenance and sustainability. Habitat conditions both from the species asssessments, and vegetation data derived from trend/HAF/AIM are utilized. Information included in observation reports are incorporated to describe specific disturbances, and broad habitat conditions.

Rare plant populations within the lower elevation pastures (1- 4, 7- 10) are in similar poor condition, with overall loss of suitable habitat, and encroachment of invasive annual grasses. More extensive descriptions of such conditions are described in Standard 1 – Watersheds. Notes from site visits in pastures 1 through 4, indicate mild to moderate disturbance from wildfire, OHVs and livestock. Furthermore, white eatonella, annual brittlebrush, rigid threadbush, white margined wax plant and desert pincushion have specific edaphic soil requirements which limit their overall distribution. Disturbances within these sensitive areas are more impactful because of the limited distribution of these soil types. Also of note is the inability to relocate the population of Simpson's hedgehog cactus (*Pediocactus simpsonii*), which was described in the previous Silver City Assessment (USDI BLM 2003, pg. 72), and has not been observed since that assessment. In the prior assessment, it was deemed vulnerable to OHV disturbance.

The higher elevation pastures (5 and 6), contain populations of mostly stiff milkvetch (a sagebrush habitat obligate), War Eagle buckwheat, least phacelia and tufted foothill sedge. Notes on these populations cite active mining and livestock grazing as potential threats, but describe largely intact populations. The least phacelia and tufted foothill sedge populations, however, specifically cite extensive livestock use within the springs they are found. Although some disturbance is acceptable, heavy trampling is detrimental to these species. Conditions described are consistent with riparian monitoring occurring in pastures 5 and 6 which site heavy livestock use, and compromised hydrology. See Standard 2 and 3 for more information.

Using HAF/AIM and trend data analysis (see Standards 1 and 4), suitable conditions for the maintenance and recruitment of upland special status species is not being maintained, due to lack of habitat structural diversity, reduced water infiltration and increase in invasive annual grasses. Such conditions affect suitable microsite characteristics for special status plant species.

2.8.1.2 Special Status Wildlife – Standard 8

Special status wildlife species discussed in this assessment are those listed on the Idaho BLM Special Status Animal Species List (USDI BLM 2016), as well as those protected under the Bald and Golden Eagle Protection Act (16 U.S. Code 668-668d), and the Migratory Bird Treaty Act (16 U.S. Code 703-712). Special status wildlife species for the Owyhee Field Office and their potential to occur within the Silver City allotment are provided in Appendix 4.2. There are no ESA listed threatened or endangered species, or any designated critical habitat within or reasonably near the allotment.

Potential habitat occurs within the allotment for 46 of these special status wildlife species: 3 amphibians, 20 birds, 1 fish, 0 invertebrates, 18 mammals, and 3 reptiles. Fish and invertebrates will be discussed in Section 2.8.1.11, below. In addition to special status species, migratory birds and big game species (mule deer and antelope) are management species with objectives to provide habitat for healthy populations. The ecological sites within the allotment that provide key habitat for these special status wildlife species is listed in Table SSSP 5.

Table SSSP 5. Ecological sites within the Silver City allotment that provide key habitat for special status wildlife species.

Ecological Site	Special Status Wildlife Species[1]								
	AMPH	MIBI	GRSG	SMMA	BATS	BHSH	MUDE	PRAN	REPT
Saltbrush R011XY010ID		X		X		X		X	X
Wyoming big sagebrush R011XY014ID R011XY001ID		X	X	X		X		X	X
Low sagebrush R025XY010ID		X	X	X		X			X
Mountain and basin big sagebrush R025XY011ID R025XY043ID		X	X	X	X	X	X		X
Mountain mahogany R025XY018ID		X			X		X		
Douglas-fir R025XY045ID		X			X		X		
Wetland/riparian	X	X	X		X		X		
Rock outcrop/canyon		X			X	X			X

[1] Special Status Wildlife Species codes are: **AMPH** = Amphibians, **MIBI** = Migratory Birds, **GRSG** = Greater Sage-grouse, **SMMA** = Small Mammals, **BATS** = Bats, **BHSH** = Bighorn Sheep, **MUDE** = Mule Deer, **PRAN** = Pronghorn Anetelope, and **REPT** = Reptiles.

The strategy for assessing wildlife habitat conditions within the Silver City allotment will be to assess the condition of the ecological sites and their ability to provide quality habitat for the species of concern listed above with potential to inhabit the site. Additional species information, such as population data, will be included when available.

2.8.1.3 Amphibians

Amphibian species of concern with potential to occur within the Silver City allotment include the western boreal toad (*Anaxyrus boreas*), northern leopard frog (*Lithobates pipiens*), and Woodhouse's toad (*Anaxyrus woodhousii*). Although western boreal and Woodhouse's toads are largely terrestrial within a general proximity to water, their breeding habitat is wetland areas associated with springs, streams, and ponds. Habitat supporting these three amphibian species generally includes still water areas with emergent wetland vegetation.

As described in Section 2.2.1, the hydrologic features within the Silver City allotment include spring fed headwater streams and gaining reaches of streams in the upper portions of the watersheds. The streams together have a combination of perennial, intermittent, or ephemeral qualities. Evaluation of wetland conditions that may support amphibian species will include lentic and lotic PFC data and MIM data (discussed in Standards 2 and 3).

Of the 28.6 miles of stream assessed with the BLM lotic PFC protocol, 4.9 mi (18 percent) were rated in PFC, 23.4 mi (81 percent) in FAR, and 0.3 mi (1 percent) in NF. Only a section of Diamond Creek was rated as PFC, as it had consistent vegetation cover with diverse plant communities that maintain functional riparian and wetland attributes. Several streams were rated in FAR condition due to differing amounts of un-vegetated, bare streambanks. A section of the South Fork of Sinker Creek was rated as NF due to the complete lack of stabilizing vegetation within the stream channel. The lack of wetland vegetation along the FAR and NF stream reaches (82 percent of sampled areas) implicate their inability to support emergent vegetation in wetland areas and do not provide quality habitat for amphibians.

Thirty-two springs within the allotment were assessed with the BLM lentic PFC protocol. Of these sites, no springs were rated in PFC, 29 springs (91 percent) were rated in FAR, and 3 springs (9 percent) were rated in NF. The springs in the allotment rated in FAR have un-vegetated, bare/altered hydric soils; and springs rated in NF completely lack wetland herbaceous cover in the wetland area. All of the assessed springs (those in FAR and NF) do not support emergent vegetation in the wetland areas and therefore do not provide quality habitat for amphibians.

2.8.1.4 Avian Species –Special Status Species and Migratory Birds

There are 18 special status bird species and a variety of other migratory birds with potential to occur on the allotment. Some species occur in open shrub steppe and nests on the ground or cliffs, some occur and nest in shrub steppe and riparian shrub areas, and others occur and nest in forest dominated communities such as mountain mahogany, juniper, or mixed forest and aspen stands. Assessment of habitat for these species will be grouped and discussed below based on habitat requirements. The BLM has specific management goals and guidelines for the greater sage-grouse in the ARMPA (USDI BLM 2015 and 2019) and therefore sage-grouse habitat will be discussed individually, below.

Open Shrub Steppe and Grassland Habitat

Species with open shrub steppe and grassland habitats include the burrowing owl, ferruginous hawk, long-billed curlew, short-eared owl, and grasshopper sparrow. These species occur in lower elevation and sparsely vegetated shrub steppe, saltbush-greasewood shrublands, and grassland habitat and feed mainly on small mammals and insects.

The burrowing owl nests in badger or ground squirrel burrows in open areas of short, sparse vegetation and forage for small mammals and invertebrates. The ferruginous hawk nests on cliffs, on the ground on rock outcrops or hill crests, or on tall shrubs/small trees and has a main diet of small to medium sized mammals (mice, ground squirrels, jackrabbits). The long-billed curlew requires large, open, and contiguous grasslands for nesting, and feeds mainly on terrestrial and benthic invertebrates, and some small vertebrates. The short-eared owl occurs in open areas such as marshes, grasslands, and shrubsteppe, and nests on the ground in a grass-lined bowl amid grasses or short vegetation, with diet of small mammals. The grasshopper sparrow occurs mostly in areas of perennial bunchgrasses, to a lesser extent in sagebrush-bunchgrass areas, and are least abundant in degraded sagebrush with an understory dominated by cheatgrass (IDFG 2017b).

Within the allotment, potential habitat for these species occurs in the shadscale saltbush-bud sagebrush, Wyoming big sagebrush/ bluebunch wheatgrass, and Wyoming big sagebrush/ Indian ricegrass communities in pastures 1-4 and 7-10. Grassland ecological sites do not occur on the allotment and optimal grassland habitat for some of these species is not present. Vegetation cover and height measurements for the shadscale saltbush and Wyoming big sagebrush communities on the allotment are shown in Table SSSP 6. Also inculded in the table are cover measurements for intact, late-seral Wyoming big sagebrush communities in eastern Oregon (Davies and Bates 2010, Davies et al. 2006) representing potential vegetation characteristics under undisturbed conditions for comparison.

Table SSSP 6**.** Vegetation measurements in ecological sites providing shrub/grassland avian habitat on the Silver City allotment, and in similar intact communities in eastern Oregon

Ecological Sites	Vegatation Parameters Average Percent Cover and Height						
	Sagebrush	Other Shrub	Perennial Grass	Sandberg Bluegrass	Invasive Annual Grass	Shrub Height (cm)[1]	Grass and Forb Height (cm)[1]
Shadscale saltbush-Bud sagebrush/ Indian ricegrass, Thurber's needlegrass R011XY010ID	0	8	7	25	11	24	18
Wyoming big sagebrush/ bluebunch wheatgrass – Thurbers needlegrass R011XY001ID	12	1	5	31	11	54	15
Wyoming big sagebrush/ Indian ricegrass R011XY014ID	15	2	8	31	23	62	17
Intact Wyoming big sagebrush (Davies and Bates 2010)	9.7 (3.6-19.7)	1.9 (0-8.5)	10*	<5*	<1*	NA	NA
Intact Wyoming big sagebrush (Davies et al. 2006)	12.3 (3.2-25.5)	1.1 (0-8.4)	12.19 (4.5-28.3)	5.39 (0-13.21)	0.61 (0-11.9)	NA	NA

[1]Height measurements are collected in metric units. U.S unit conversion (rounded): 10 cm = 4 inches.
*Values are estimates from a bar graph (Davies and Bates 2010, pg. 463).

For sites on the allotment, total shrub cover (sagebrush plus other shrubs) is 8 percent for the shadscale saltbrush, 13 percent for the Wyoming big sagebrush/ bluebunch wheatgrass, and 17 percent for the Wyoming big sagebrush/ Indian ricegrass (Table SSSP 6). Total shrub cover in

the intact Wyoming big sagebrush communtities are 11.6 (2010) and 13.4 (2006) for comparison. Shrub heights for sites on the allotment range from 24 to 62 cm (9 to 24 inches).

Perennial grass cover on the allotment ranges from 5 to 8 percent, while it is 10 and 12 percent in the intact Wyoming big sagebrush sites. Grass and forb height on the allotment ranges from 15 to 18 cm (6 to 7 inches). Sandberg bluegrass and invasive annual grass cover together is 36 to 54 percent for sites on the allotment, compared to 6 percent or less in intact Wyoming big sagebrush. While these grasses are short in stature, the extensive cover they create degrades the habitat quality for species whose preferred habitat is sparsely vegetated areas. In addition, the increase in Sandberg bluegrass and invasive annual grasses, along with the decrease in perennial grass cover in these sites, is a departure and opposite from what is expected in healthy functioning communities, as shown in the intact Wyoming big sagebrush communities (Table SSSP 6).

Shrub Steppe and Riparian Shrub Habitat

Species with habitat of shrub steppe and shrubby riparian areas include the golden eagle, willow flycatcher, and sagebrush obligate species such as Brewer's sparrow, sage thrasher, and sage sparrow. These species occur in areas with taller and heavier shrub cover than those discussed above.

The golden eagle nests on cliffs in open country, and forages in sagebrush areas for a diet of small to medium sized mammals, mainly jackrabbits. The willow flycatcher is found in thickets, brushy areas, and riparian willow habitat, with a diet of insects. The Brewer's sparrow is associated with abundant, scattered shrubs and short grass, nesting in shrubs greater than 50 cm tall (20 in) (Paige and Ritter 1999), and feeds on insects and seeds. The sage thrasher is dependent on large patches of sagebrush steppe for nesting, preferring tall shrubs greater than 70 cm (28 in), and feeds on insects and seeds (IDFG 2017b). The sage sparrow prefers habitat with semi-open shrub areas, nesting in shrubs 50 to 70 cm tall, with a diet of insects and seeds (Paige and Ritter 1999).

Within the allotment, potential habitat for these species occurs mainly in the mountain big sagebrush (R025XY011ID) and basin big sagebrush communities (R025XY043ID) in pastures 5, 6, 10 and 11 and Wyoming big sagebrush communities (R011XY001ID and R011XY014ID) in pastures 1-4 and 7-10. Vegetation cover and height measurements for the mountain and basin big sagebrush communities on the allotment are shown in Table SSSP 7, and for the Wyoming big sagebrush communities in Table SSSP 6. Measurements for intact, late-seral mountain big sagebrush communities in eastern Oregon (Davies and Bates 2010) are also shown in Table SSSP 7 for comparison with this community on the allotment.

Table SSSP 7**.** Vegetation measurements in ecological sites providing shrub/riparian avian habitat on the Silver City allotment, and in similar intact communities in eastern Oregon

Ecological Sites	Vegatation Parameters Average Percent Cover and Height						
	Sagebrush	Other Shrub	Perennial Grass	Sandberg Bluegrass	Annual Invasive Grass	Shrub Height (cm)[1]	Grass and Forb Height (cm)[1]
Mountain big sagebrush/ bluebunch wheatgrass, Idaho fescue R025XY011ID	20	10	17	26	27	73	29
Basin big sagebrush/ bluebunch wheatgrass R025XY043ID	15	7	27	36	14	76	36
Intact mountain big sagebrush (Davies and Bates 2010)	23 (9.1-41.7)	3.2 (0-12.1)	15*	<5*	<1*	NA	NA

[1] Information is collected in metric units. U.S unit conversion (rounded): 10 cm = 4 inches.
*Values are estimates from a bar graph (Davies and Bates 2010, pg. 463).

Total shrub cover (sagebrush plus other shrub) for sites on the allotment is 30 percent for mountain big sagebrush, 22 percent for basin big sagebrush (Table SSSP 7), 13 percent for Wyoming big sagebrush/ bluebunch wheatgrass, and 17 percent for Wyoming big sagebrush/ Indian ricegrass (Table SSSP 6). Total shrub cover in the intact mountain big sagebrush community is 26.2 percent, compared to the 30 percent for the same community on the allotment (Table SSSP 7). Shrub heights for all big sagebrush communities on the allotment (Wyoming, mountain and basin big sagebrush) ranges from 54 cm to 76 cm (21 to 30 in), and are within the preferred shrub heights of 50 to 70 cm or greater for the bird species of concern.

Perennial grass cover and height for sites on the allotment ranges from 17 to 27 percent cover, and 29 to 36 cm (6 to 7 inches) high, respectively (Table SSSP 7). The mountain big sagebrush sites on the allotment are comparable to the intact mountain big sagebrush communities in terms of shrub and perennial grass cover. However, like the Wyoming big sagebrush sites discussed above, Sandberg bluegrass and annual invasive grass cover is much higher than that in the intact community (Table SSSP 7).

Forest and Aspen Habitat

Species with habitat of montane conifer forest include the Cassin's finch, Lewis' woodpecker, northern goshawk, and olive-sided flycatcher. These species have been observed within or near the allotment (observation records in IFWIS (IDFG n.d.) or eBird (eBird 2012)).

The Cassin's finch occurs in open coniferous forest at higher elevations, with a diet of insects and seeds. The Lewis's woodpecker is found in open forest and riparian woodlands, nesting in cavities and feeds on insects and seeds. The northern goshawk occurs in open mixed conifer forest and aspen stands and along forest edges, with a diet of birds and small mammals. The olive-sided flycatcher occurs in mixed conifer forest and along forest edges and openings, with a diet of flying insects. All these species prefer open forest (often logged or burned) and forest openings.

The mixed conifer forest on the allotment generally provide a lot of forest edge, as the forests break along elevation and aspect gradients in the high relief Owyhee mountains, often occurring in finger reaches and irregular borders. The forests themselves however, are generally even aged, densely stocked communities, lacking older trees with a diverse understory and forest openings. Habitat for these open forest species is not optimal on the allotment.

Sage-grouse

The sage-grouse is a BLM Sensitive species with management directed by the The Idaho Greater Sage-grouse Approved Resource Management Plan Amendment (ARMPA; USDI BLM 2015 and 2019). The ARMPA designated lands covered within the amended Management Plans (including the Owyhee Resource Management Plan) as habitat management areas for sage-grouse, with management implications for the different priority levels. The designations include: priority habitat management areas (PHMA; the highest value to maintaining sustainable sage-grouse populations), important habitat management areas (IHMA; management buffer for PHMA and connect patches of PHMA), and general habitat management areas (GHMA; some special management applies to sustain sage-grouse populations). Eighty percent (approx. 59,000 acres) of the allotment is within IHMA, and 11 percent (approx. 4,000 acres) is within GHMA (Figure APP 4.1 MAP 18). However, the IHMA areas are currently managed as PHMA under the adaptive management requirements in the ARMPA, due to the large scale loss of sage-grouse habitat from the 2015 Soda Fire and the resulting hard trip of the Habitat Adaptive Management trigger in the West Owyhee Conservation Area.

Sage-grouse utilize habitat differently throughout their annual life-cycle. During breeding, sage-grouse congregate on traditional communal strutting grounds, known as leks, to breed from March to early May. The nesting season occurs soon after, extending from May through June. Broods remain with females for several more months, and as seasonal changes occur, they move from early brood-rearing areas (i.e., forb- and insect-rich upland areas surrounding nest sites) to late brood-rearing and summer habitats (i.e., wet meadows and riparian areas) from June to August. In the late fall birds begin moving to winter use areas dominated by tall sagebrush which provides food and cover during winter snow conditions. The Idaho BLM has mapped lek locations and spring, summer, and winter seasonal use areas (SUA; Spring SUA = May 1–June 30; Summer SUA = July-October; and Winter SUA = November-March). No occupied leks (active at least one breeding season within the prior 5 years) occur within the Silver City allotment. One unoccupied lek, which has not been used by sage-grouse during the past eight years, occurs in pasture 11. Five percent (approx. 4,000 acres) of the allotment is mapped spring SUA and 25 percent (approx. 18,000 acres) is mapped winter SUA; no summer SUA occurs in the allotment (Figure APP 4.1 MAP 19 and 20).

Population trends for sage-grouse in Idaho are monitored by the Idaho Department of Fish and Game (IDFG) through annual lek surveys, counting the number of displaying males at leks. With these lek data it is important to note that there are uncertainties and variability with the data, as some leks, such as those along established lek routes, are counted several times each spring using a standardized protocol—and therefore reflect greater precision and accuracy--whereas other leks may be counted only once, if at all depending on accessibility, staff priorities, weather, etc. Although there are no occupied leks within the Silver City allotment, looking at trends for leks within a 10 km (6.2 miles) radius of the allotment can inform about the numbers of sage-grouse potentially using the allotment for nesting and early brood rearing habitat. Connelly et al. (2013) found that sage-grouse within the West Owyhee Conservation Area (contains the Silver City allotment), 80 percent nested within 10 km from capture leks.

There are 11 occupied leks (active at least once within the last five years) within approximately 10 km of the Silver City allotment, and 12 leks that are unoccupied or undetermined. Of the 11 occupied leks, five were active (a lek that has been attended by >1 displaying male sage-grouse during the breeding season) in 2018, with a total of 50 displaying male sage-grouse. The total number of male sage-grouse counted on established lek routes surveyed in the West Owyhee Conservation Area (south of the Snake River and west of the Bruneau River; USDI BLM 2015, Figure 2-14) since 2011 are shown in Table SSSP 8 (A. Moser, IDFG, email May 16, 2019).

Table SSSP 8. Number of male sage-grouse on lek routes in the Idaho West Owyhee Conservation Area since 2011

Number of Male Sage-Grouse on Lek Route Surveys								
Idaho West Owyhee Conservation Area	2011	2012	2013	2014	2015	2016	2017	2018
	693	600	527	566	837	1108	935	617

Assessment of the suitability of the sage-grouse habitat within the allotment follows protocols in the Sage-grouse Habitat Assessment Framework (HAF; Stiver et al. 2015). The HAF habitat indicators and respective suitability values for spring and winter SUA are shown in Table SSSP 9 and Table SSSP 10, and are used to assess the spring and winter habitat in the Silver City allotment. The individual habitat indicators are first given a suitability rating, and then combined to give the site an overall habitat suitability rating. In determining overall site suitability, all appropriate seasonal habitat indicators are reviewed collectively, and interpretation of the relationships between the indicators and other supplemental factors considered (e.g., non-sagebrush shrub cover and height; annual grass and forb cover and height; and bare ground cover) (Stiver et al. 2015). Describing overall site suitability requires professional expertise and judgement, and use of a preponderance of evidence approach (USDI BLM 2018). It is also important to recognize that the term “suitable” is not synonymous with “optimal.”

Table SSSP 9**.** Habitat suitability indicators for nesting/early brood-rearing habitat (i.e., spring seasonal use area) assessments from Stiver et al. (2015)

Habitat Indicator	Suitable Habitat	Marginal Habitat	Unsuitable Habitat
Sagebrush Canopy Cover	15% - 25%	5 to < 15% or > 25%	< 5%
Sagebrush Height Mesic	40 to 80 cm[1]	20 to < 40 cm or > 80[1]	< 20 cm[1]

Habitat Indicator	Suitable Habitat	Marginal Habitat	Unsuitable Habitat
Arid	30 to 80 cm[1]	20 to < 30 cm or > 80[1]	< 20 cm[1]
Predominant Sagebrush Shape	Spreading	Mix of spreading and columnar	Columnar
Perennial Grass and Forb Height	≥ 18 cm[1]	10 to < 18 cm[1]	< 10 cm[1]
Perennial Grass Canopy Cover[2] Mesic Arid	 ≥ 15% ≥ 10%	 5 to < 15% 5 to < 10%	 < 5% < 5%
Perennial Forb Canopy Cover Mesic Arid	 ≥ 10% ≥ 5%	 5 to < 10% 3 to < 5%	 < 5% < 3%
Preferred Forb Availability	Preferred forbs are common with several species present	Preferred forbs are common but only a few species are present	Preferred forbs are rare

[1] Information is collected in metric units. U.S unit conversion (rounded): 10cm = 4”; 18cm = 7”; 20cm = 8”; 30cm = 12”; 40cm = 16”; 80cm = 32”.
[2] Perennial grass canopy cover does not include Sandberg bluegrass.

Table SSSP 10. Habitat suitability indicators for winter habitat assessments from Stiver et al. (2015)

Habitat Indicator	Suitable Habitat	Marginal Habitat	Unsuitable Habitat
Sagebrush Canopy Cover	≥ 10%	5 to < 10%	< 5%
Sagebrush Height Above Snow	≥ 25 cm[1]	> 10 cm to < 25 cm	≤ 10 cm

[1] Information is collected in metric units. U.S unit conversion (rounded): 10cm = 4”; 25cm = 10”.

In the Silver City allotment, 10 sage-grouse HAF plots are located in the spring SUA to evaluate nesting/early brood rearing habitat and 34 HAF plots in the winter SUA (Figure APP 4.1 Map 19 and 20). Overall habitat suitability determinations for the spring and winter SUA in the allotment are provided in Figure SSSP 1. For spring habitat, three HAF plots (30 percent) provide suitable habitat, five plots (50 percent) provide marginal habitat, and two plots (20 percent) are unsuitable habitat. For winter habitat, 19 plots (56 percent) plots provide suitable habitat, two plots (6 percent) are marginal habitat, and 13 plots (38 percent) are unsuitable habitat. However, for both spring and winter SUA, all of the unsuitable plots and one marginal plot each, had conditions that limited their ability to meet suitability objectives for sage-grouse habitat (these plots are notated in Figure SSSP 1 as “with suitability limitations”). First, some plots are located in a shadscale saltbush/ bud sagebrush ecological site, which has a minimal sagebrush component, and limits the sites potential for meeting sagebrush habitat parameters. Second, some plots measured in 2014 exhibit widespread sagebrush defoliation, evidence of an infestation of the sagebrush defoliating moth *Aroga websteri*, which also limits a sites potential to meet sagebrush habitat parameters (defoliated plants are treated as dead material). Under either of these conditions however, there may also be other limiting habitat factors.

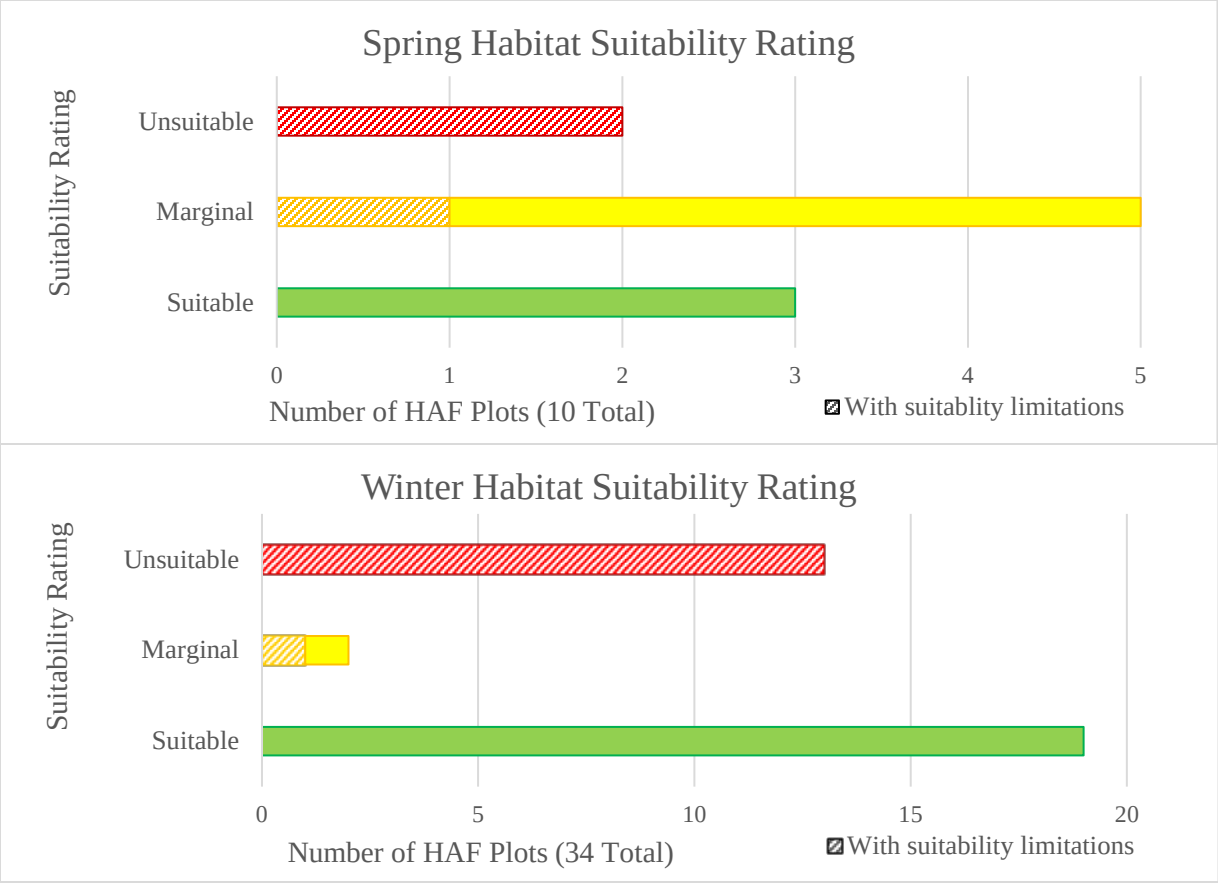

Figure SSSP 1**.** Overall sage-grouse habitat suitability ratings for spring and winter season use areas. Plots "with suitability limitations" are those with conditions that limited their ability to meet suitability objectives.

To help describe some of the driving factors limiting the quality of sage-grouse habitat, Figure SSSP 2 and Figure SSSP 3 show the suitable ratings for individual habitat indicators for spring and winter habitat. For spring habitat, the indicators often rated unsuitable include sagebrush cover, perennial grass and forb cover, and forb availability. All the unsuitable sagebrush cover values are due to defoliated sagebrush stands. The unsuitable perennial grass and forb indicators generally occurred in the same plots. In addition, supplemental factors of percent cover of *Poa* species and cheatgrass are considered. High percentages of *Poa* cover is often associated with decreases in deep rooted perennial bunchgrass and signify a deviation from expected grass compostion of the Ecological Sites. Cheatgrass cover greater than 25 percent is indicative of substantial disturbance and may limit forage vegetation species diversity. Nine of the 10 spring SUA HAF plots had *Poa* species cover greater than 25 percent, and three plots had cheatgrass cover greater than 25 percent.

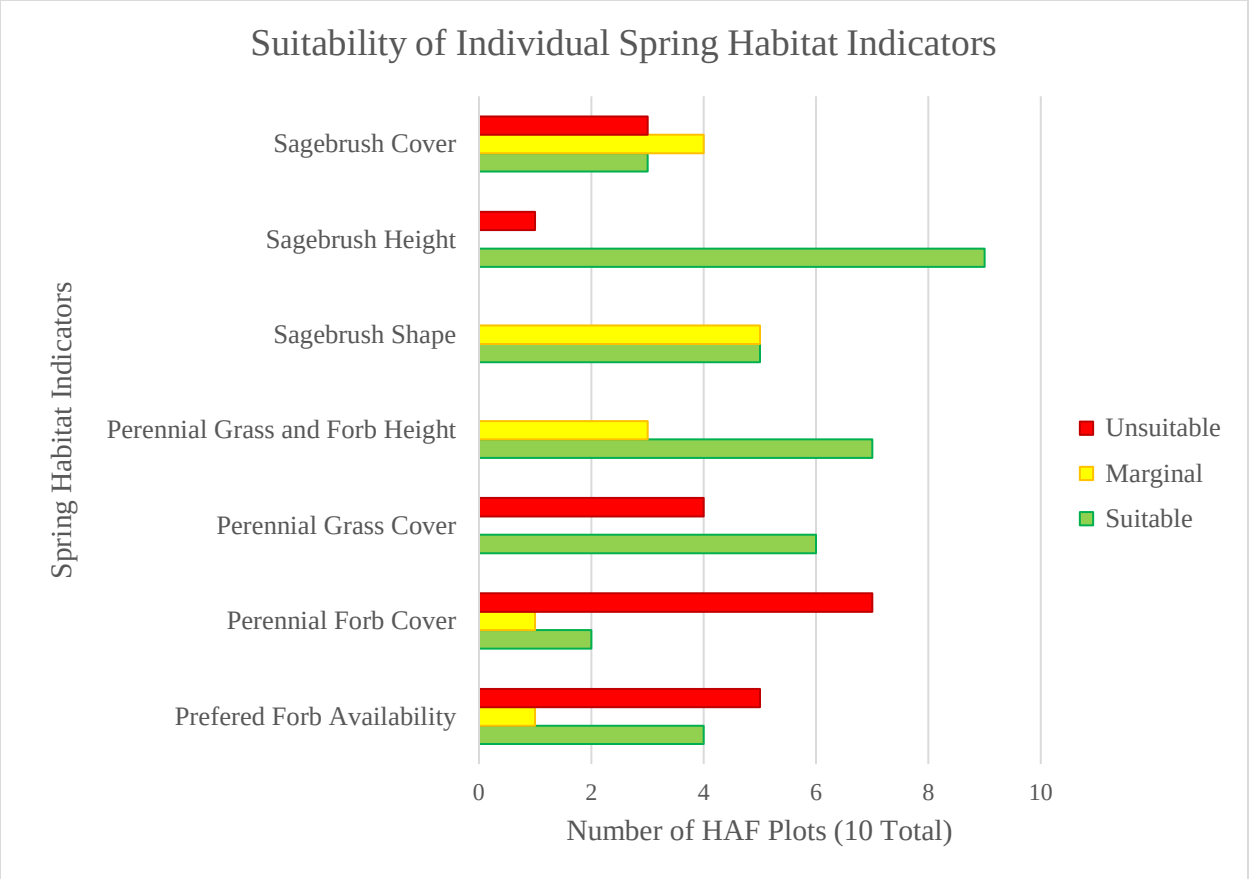

Figure SSSP 2. Sage-grouse habitat suitability ratings for individual spring habitat indicators

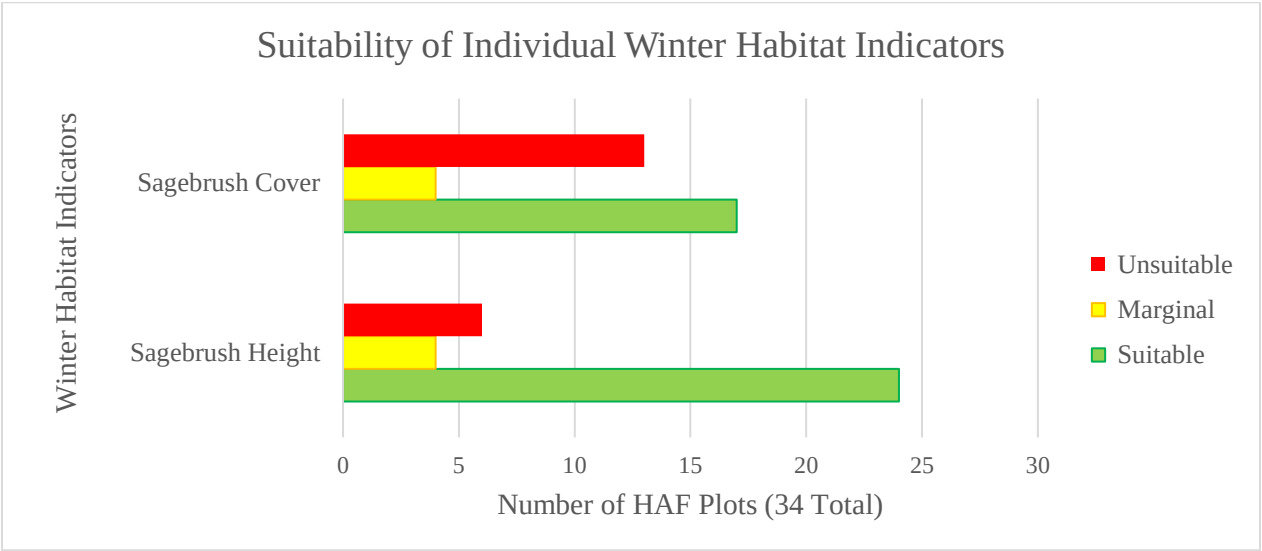

Figure SSSP 3. Sage-grouse habitat suitability ratings for individual winter habitat indicators

For clarification, Sandberg bluegrass is not included in generating average perennial grass canopy cover and height estimates, but is considered as a supplemental factor in determining

habitat suitablility. Sandberg bluegrass is a shallow rooted perennial bunchgrass that does not perform the same ecological functions as deep rooted perennial bunchgrasses. For example, deep rooted species capture water at deeper soil depths and are better able to hold soil to prevent soil erosion. Furthermore, Sandberg bluegrass does not provide the same structural height as deep rooted species, which is important for sage-grouse habitat. This approach is consistent with HAF protocols (Stiver et al. 2015, pg. 96) and provides more accurate information on large stature perennial bunchgrasses with greater effective growth form and vertical height.

For winter habitat, all of the 13 unsuitable sagebrush cover plots are due to either the shadscale saltbush/ bud sagebrush ecological site limiting sagebrush cover (six plots) or from defoliated sagebrush. And for all six of the unsuitable sagebrush height plots, they are shadscale saltbush/ bud sagebrush ecological sites which limit sagebrush presence.

Fences on the allotment may pose a collision risk to sage-grouse with potential for injury or death. Risk of fence collision for sage-grouse at the broad-scale level is positively correlated with density of fences (higher density leads to higher risk), and negatively correlated with distance to nearest active lek (greater distance leads to lower risk) and ruggedness of terrain (greater ruggedness leads to lower risk) (Stevens et al. 2012b). The increase in risk near active leks is likely a function of sage-grouse spring congregation near leks. To reduce collision risk, Stevens (2012a) recommends management should focus on fences within 3 km of active leks that have low terrain ruggedness, and created a GIS spatial model that rates collision risks within these areas in Idaho and other western states. Although there are no active leks on the Silver City allotment, two occupied leks are within 3 km of the allotment boundary. Using the GIS collision risk model (Stevens 2012a), only 2 miles of allotment fenceline occur within 3 km of an active lek and are in low risk areas. Six miles of fence on the allotment occur within sage-grouse spring SUA, and 30 miles of fence within winter SUA.

2.8.1.5 Small mammals

One special status small mammal species has potential to occur in the allotment, the Piute ground squirrel. In addition however, ground squirrel species in general and the black-tailed jackrabbit are important diet staples for many raptors species, including special status species like the burrowing owl, ferruginous hawk, golden eagle, and short-eared owl.

The Piute ground squirrel occurs mainly in high desert shrub steppe. Shrub habitats provide a more favorable and stable environment (temperature and moisture) for Piute ground squirrels than grass habitats (Steenhof et al. 2006, Sharpe and Van Horne 1999). In southwestern Idaho, highest densities of ground squirrels were in winterfat-Sandberg bluegrass communities, intermediate densities in big sagebrush-dominated communities, lowest densities in shadscale saltbrush communities, and densities were negatively correlated with cheatgrass and other exotic annuals in all communities (Yensen et al. 1992). The main diet of ground squirrels is grasses and forbs, including their seeds and roots, and sometimes insects as well.

The black-tailed jackrabbit in Idaho is found in lower-elevation shrub steppe communities. Its diet includes small trees, shrubs, grasses and forbs. Grasses and forbs are used primarily in the spring and early summer, and shrubs are consumed all year and comprise the bulk of the fall and winter diet. Primary forage shrub species includes big sagebrush, rabbitbrush (*Chrysothamnus/*

Ericameria spp.), spiny hopsage (*Grayia spinosa*), greasewood, and four-wing saltbrush (Howard 1995). Preferred grasses includes Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Pseudoroegneria spicata*), needle-and-thread grass (*Hesperostipa comata*), Indian ricegrass (*Achnatherum hymenoides*), and crested wheatgrass (*Agropyron cristatum* and *A. desertorum*) where available (Howard 1995). For cover, black-tailed jackrabbits need shrubs or small trees for hiding, nesting and thermal cover. A mixture of shrubs, grasses and forbs provides hiding cover and forage diversity. Jackrabbits in southwestern Idaho are found more frequent on sites dominated by big sagebrush or black greasewood than on sites dominated by smaller shrubs such as winterfat (*Krascheninnikovia lanata*) or shadscale saltbush (*Atriplex confertifolia*) (Howard 1995).

On the allotment, ground squirrel and jackrabbit habitat occurs on the shadscale saltbush-bud sagebrush, Wyoming big sagebrush/ bluebunch wheatgrass, and Wyoming big sagebrush/ Indian ricegrass communities at lower elevations mainly in pastures 1 – 4, and 7 – 10. Vegetation cover and height measurements for the shadscale saltbush and both Wyoming big sagebrush communities on the allotment are shown in Table SSSP 6 (in Section 2.8.1.4 Avian Species), along with cover measurements for intact, late-seral Wyoming big sagebrush communities in eastern Oregon for comparison (Davies and Bates 2010, Davies et al. 2006).

As discussed is Section 2.8.1.4, total shrub cover (sagebrush plus other shrubs) for sites on the allotment is 8 percent for the shadscale saltbrush, 13 percent for the Wyoming big sagebrush/ bluebunch wheatgrass, and 17 percent for the Wyoming big sagebrush/ Indian ricegrass (Table SSSP 6). Total shrub cover in the intact Wyoming big sagebrush communtities are 11.6 percent (2010) and 13.4 percent (2006) for comparison. Shrub cover in Wyoming big sagebrush communities on the Silver City allotment are comparable to the intact, late-seral Wyoming big sagebrush sites. Sites on the allotment likely provide adequate cover for ground squirrels and cover and food for jackrabbits.

Perennial grass cover (an important diet component of ground squirrels and jackrabbits) is lower than expected for both the Wyoming big sagebrush communities on the allotment, with average cover of 5 and 8 percent, compared to that of the intact, late-seral Wyoming big sagebrush stands of 9.7 and 12.3 percent (Table SSSP 6). Perennial grass cover measurements at individual monitoring sites are very low (0-5 percent) at most sites in pastures 1-3, 7, and 10. In contrast, combined cover of Sandberg bluegrass and invasive annual grass is much higher in the shadscale saltbush and both Wyoiming big sagebrush communities on the allotment (between 36 to 54 percent) than would be expected, and as measured in intact Wyoming big sagebrush communities (6 percent or less) (Table SSSP 6). All of these grass species may provide adequate food sources for ground squirrels and jackrabbits, although the composition of the species points towards variance away from a healthy functioning community. In addition, as mentioned above, Piute ground squirrel densities are negatively correlated with cheatgrass and other exotic annuals across vegetation communities (Yensen et al. 1992).

2.8.1.6 Bats

Owyhee County contains the full assemblage of the 14 Idaho bat species and all have the potential to occur on the allotment. Past bat inventories at mines in the Silver City area includes

breeding populations of silver-haired bats (*Lasionucteris noctivagans*), hoary bats (*Lasiurus cinereus*), and Townsend's big-eared bats (*Corynorhinus townsendii*).

All Idaho bat species use a variety of habitat types, from grassland and shrublands, to forested areas, cliffs and canyons. Bats are often associated with riparian areas when roosting and foraging. Roost sites can include caves, mines, rock crevices, tree cavities and under tree bark, in buildings, and other protected sites. Caves and mines are used as winter hibernacula. Bats are insectivores and often forage over open water, in forest openings, or over shrubs.

Most of the Silver City allotment contains bat habitat, especially the higher elevation areas with a mixture of forest and shrublands, rock outcrops and canyons, abandoned mine features, and abundant water features. The Douglas-fir and mountain mahogany stands on the allotment may provide some roosting habitat in cavities or under loose bark, although smaller or younger trees are less likely to have these attributes. Rock outcrops and canyons are abundant on the allotment and likely provide roosting habitat. Remnants of hundreds of abandoned historic mine features surround the Silver City area, and some of the old mine adits and shafts provide conditions suitable for roosting and hibernacula for bats. These abandoned mines however, can also present safety hazards for the environment and the public. The BLM inventories, prioritizes, and closes sites using a variety of methods in consideration of all applicable issues. If the site provides bat habitat, bat friendly closures are implemented if possible. These can include grates or gated culverts. In other cases, human safety concerns or site instability may dictate complete closure.

Foraging habitat for bats is abundant in the allotment in forest openings, open shrub steppe communities, and the numerous wetland/riparian sites in higher elevation areas. The condition of wetland/riparian areas, which provide forage habitat for bats, is discussed in Standards 2 and 3, and is summarized under the amphibian discussion above. The fact that 82 percent of the stream reaches and 100 percent of the springs assessed were rated in either FAR or NF, and the low ratings were driven in part by the lack of wetland vegetation, this may depress the abundance of insects to provide a prey diet for bats.

2.8.1.7 Bighorn sheep

Bighorn sheep habitat is comprised of rugged canyons, foothills, and mountainous areas with rugged escape terrain and limited amount of tall vegetation. Escape terrain is especially important for ewes with lambs to avoid predators. When foraging on mild slopes, they avoid areas with shrub or canopy cover in excess of 25 percent and shrubs 60 cm (2 ft) or higher; when on steep slopes however, they have been noted to travel through or bed in dense brush (Tesky 1993). Shrubs are a dominant diet component during the summer, fall and winter, but grasses and forbs are important when they are available in the spring. In arid areas, perennial water sources are needed in the summer.

The Silver City allotment includes a portion of the bighorn sheep Owyhee Front Population Management Unit (PMU), an area delineated by Idaho Department of Fish and Game as regularly or periodically occupied by bighorn sheep (Figure APP 4.1 MAP 21). Much of the area within the Owyhee Front PMU is used primarily for travel corridors between isolated patches of critical habitat in Reynolds Creek (northwest of the allotment) and Castle Creek (southeast of the allotment) (IDFG 2010). Unlike most bighorn sheep habitat in Idaho, the Owyhee Front PMU

lacks the deep canyon topography that typifies much of the bighorn habitat in Owyhee County and elsewhere. Population estimates for the PMU in 2016 were 35 sheep, between the Reynolds Creek and Castle Creek groups (IDFG 2017a). In the early 2010s, a bachelor group of about five rams was found occupying a portion of the PMU around the Silver City allotment for several years, but surveys in 2016 did not locate any sheep in the area (R. Curtis, Idaho Department of Fish and Game, email, June 13, 2018).

Within the Silver City allotment, bighorn sheep habitat in the Owyhee Front PMU includes low sagebrush and Wyoming, basin, and mountain big sagebrush communities in pastures 3-6, and 10-11. In these communities on the allotment, total cover falls within preferred bighorn sheep habitat of less than 25 percent cover at all sites except the mountain big sagebrush areas (Table SSSP 11). Shrub heights fall within preferred bighorn sheep habitat of less than 60 cm on the low sagebrush and Wyoming big sagebrush/bluebunch wheatgrass areas, but is greater than 60 cm in the other communities. Perennial grass cover for the low sagebrush and the Wyoming big sagebrush communities is less than 10 percent, but is 17 percent in the mountain big sagebrush and 36 percent in the basin big sagebrush communities.

Table SSSP 11**.** Vegetation measurements in ecological sites providing bighorn sheep habitat on the Silver City allotment.

	Vegatation Parameters Average Percent Cover or Height						
Ecological Sites	Sagebrush	Other Shrub	Perennial Grass	Sandberg Bluegrass	Invasive Annual Grass	Shrub Height (cm)	Grass and Forb Hieght (cm)
Wyoming big sagebrush/ bluebunch wheatgrass – Thurbers needlegrass R011XY001ID	12	1	5	31	11	54	15
Wyoming big sagebrush/ Indian ricegrass R011XY014ID	15	2	8	31	23	62	17
Low sagebrush/ Idaho fescue R025XY010ID	19	1	1	36	0	10	10
Mountain big sagebrush/ bluebunch wheatgrass, Idaho fescue R025XY011ID	20	10	17	26	27	73	29
Basin big sagebrush/ bluebunch wheatgrass R025XY043ID	15	7	27	36	14	76	36

Forage is likely not limiting bighorn sheep habitat in the allotment, and cattle access to grazing is probably low in the canyon areas used most by bighorn sheep. Conifer encroachment into shrub areas, observed in some areas of the allotment, can degrade and fragment bighorn sheep habitat, and interfere with sheep movement between higher quality habitats of river canyons.

Risk of transmission of lethal disease from domestic sheep to bighorn sheep is a threat to bighorn populations were there is risk of contact between the species. Domestic sheep can be non-symptomatic carriers of respiratory pneumonia, a disease that is often fatal to bighorn sheep, and are capable of transmitting the disease to bighorn sheep. In bighorn sheep populations the disease is attributed to die-offs that can kill some, many, or all adult bighorn sheep in a herd. Outbreaks are often followed by subsequent years or decades of sporadic cases of pneumonia in adult sheep and annual epizootics (a temporarily prevalent and widespread disease in an animal population) of pneumonia in lambs (Besser et al. 2013). Bighorn sheep, especially rams, are known to make occasional long-distance exploratory movements between suitable habitat areas. In the BLM Owyhee Field Office, the Poison Creek Grazing Association is the only operator to graze and trail domestic sheep through multiple allotments from May to November to graze the Rockville and Flint Creek allotments. Portions of the trailing routes and the Rockville allotment occur within the Owyhee Front PMU, and the Flint Creek allotment is south of the PMU. There is a risk of contact between these domestic sheep and bighorns in the PMU. The Poison Creek Grazing Association is working with BLM to convert their sheep grazing permit to cattle grazing in these allotments and trailing authorizations. In the interim, efforts are being made to reduce contact between bighorn and domestic sheep through a Separation Response Plan with BLM and a Best Management Practices for Separation agreement with the IDFG, as long as domestic sheep grazing continues.

Other threats to bighorn sheep in the Owyhee Front PMU, and in the allotment, is disturbance from recreation use, such as off-road vehicle use, hiking, horseback riding, wildlife viewing, hunting, and recreational shooting (IDFG 2010). With the allotments proximity to the population center of Boise and surrounding areas, and the off-road vehicle use areas of Silver City and the Murphy Subregion, the area is popular for recreationists.

2.8.1.8 Mule Deer

Mule deer are an important big game management species for the IDFG and the BLM, with objectives to provide habitat for healthy populations and hunting opportunities for the public. The allotment is within IDFG Game Management Unit (GMU) 40. IDFG does not survey for population estimates of big game in GMU 40 due to the large and generally inaccessible area during the winter survey months. Year-round mule deer habitat occurs across the allotment, and breeding – bearing - rearing habitat in the higher elevation pastures (Figure APP 4.1 Map 22). Shrub-steppe communities provide summer and winter habitat. Riparian areas and aspen stands can provide mature trees for thermal and screening cover, and a greater diversity of important dietary shrubs and forbs. These areas are particularly important for fawning and during drought years. Mule deer diet includes grasses and forbs when available, and browse species (i.e., shrubs and small trees) year-round. Woody browse is critical during the winter when other forage is not available. Deer cannot subsist on a diet of only sagebrush for extended periods of time and other shrub species are important on winter range, including serviceberry, bitterbrush, mountain mahogany, and four-wing saltbush. Milner (1995) analyzed deer pellets from mule deer in the

Jordan Creek area (study area adjacent to and northwest of the Silver City allotment) for the months of July through October, 1993. The study found the majority of the summer/fall diet of mule deer in the area consisted of bitterbrush and mountain mahogany (total shrub ranged between 72-85 percent during July-October; *Artemesia tridentata* was only observed in July at 2 percent). Grasses and forbs were much less during this period (grasses 1-4 percent, forbs 4-18 percent), although they are an important diet component during spring and early summer.

Milner (1995) found mule deer selected for mountain brush and sage/bitterbrush habitat and against low sage and grass types, and females selected for riparian areas during dry years. These preferred habitat types are found in the higher elevation pastures of 5, 6, and 11 on the allotment in the mountain big sagebrush, basin big sagebrush, and curlleaf mountain mahogany - mountain snowberry communities, and year-round habitat in the Wyoming big sagebrush communities in the lower elevation pastures. Within these areas, total shrub cover is 17 percent or less in the Wyoming big sagebrush communities, within 20 – 30 percent in the mountain and basin big sagebrush communities, and 56 percent in the curlleaf mountain mahogany community (Table SSSP 12). In the mountain mahogany community, shrub species other than sagebrush comprises 49 percent cover, and includes preferred browse species such as curl-leaf mountain mahogany (*Cercocarpus ledifolius*), mountain snowberry (*Symphoricarpos oreophilus*), and shiny leaf ceanothus (*Ceanothus velutinus*), and inclusions of western juniper, spruce, and Douglas-fir trees in some areas.

Perennial grass cover is less than 10 percent in the Wyoming big sagebrush communities, and within 16 – 27 percent in the mountain and basin big sagebrush, and the mountain mahogany community. Percent cheatgrass was moderately high in the three big sagebrush communities (11 – 27 percent) and low (5 percent) in the mountain mahogany community.

Table SSSP 12. Vegetation measurements in ecological sites providing mule deer habitat on the Silver City allotment

	Vegatation Parameters Average Percent Cover and Height						
Ecological Sites	Sagebrush	Other Shrub	Perennial Grass	Sandberg Bluegrass	Invasive Annual Grass	Shrub Height (cm)	Grass and Forb Hieght (cm)
Wyoming big sagebrush/ bluebunch wheatgrass – Thurbers needlegrass R011XY001ID	12	1	5	31	11	54	15
Wyoming big sagebrush/ Indian ricegrass R011XY014ID	15	2	8	31	23	62	17
Mountain big sagebrush/ bluebunch wheatgrass, Idaho fescue	20	10	17	26	27	73	29

Ecological Sites	Vegatation Parameters Average Percent Cover and Height						
	Sagebrush	Other Shrub	Perennial Grass	Sandberg Bluegrass	Invasive Annual Grass	Shrub Height (cm)	Grass and Forb Hieght (cm)
R025XY011ID							
Curlleaf mountain mahogany-mountain snowberry/ Idaho fescue- needlegrass R025XY018ID	7	49	16	12	5	54	42
Basin big sagebrush/ bluebunch wheatgrass R025XY043ID	15	7	27	36	14	76	36

Riparian and spring areas are also important habitat components for mule deer during fawning and hot dry summer months, providing cover, shade, and diverse shrub and herbaceous vegetation. Riparian and wetland areas in the allotment are discussed in Standard 2, and are evaluated using lentic and lotic proper functioning condition (PFC) assessments and multiple indicator monitoring (MIM) data. PFC ratings consider whether the age class and structural diversity of riparian/wetland vegetation is appropriate for the site, and MIM data considers forage utilization of woody and herbaceous riparian vegetation. These parameters are applicable to the health and condition of big game habitat. As discussed in Standard 2, lotic PFC assessments rated 5 miles of stream (18%) in PFC, 23.2 miles (81%) in FAR, and 0.3 miles (1%) in NF, and lentic PFC assessments rated 30 springs (88%) in FAR and 4 springs (12%) in NF. Streams and springs in FAR or NF condition are a result of a lack or a reduction in diverse plant communities capable of resisting erosional forces and maintaining functional riparian and wetland attributes.

MIM monitoring was conducted on multiple streams within pastures 5 and 6, in high elevation watersheds and lower elevation canyons. Measurements of herbaceous stubble heights and woody species browse relates to the condition of forage and cover for mule deer. Considering all MIM measurements (all locations and all years), 74 percent of herbaceous stubble heights are greater than 10 cm, and 94 percent of woody browse utilization are at levels less than 50 percent of current year growth.

Upland browse utilization measurements were also collected in pastures 5 and 6 to assess the allotment meeting a permit Term and Condition: “In deer winter range, utilization of bitterbrush or other key browse should not exceed 30 percent of annual leader growth. In all other deer habitat, utilization should not exceed 50 percent annual leader growth.” Based on the Idaho Department of Fish and Game’s 2012 modeled mule deer winter range, the Silver City allotment does not contain winter range and therefore the 50 percent utilization threshold applies (Figure APP 4.1 Map 22) (IDFG file, received August 2012, and B. Jost, BLM Memo to file, May 1, 2013; this updated the BLM mule deer winter range from that in the Owyhee RMP). To monitor

upland browse utilization on the allotment, three extensive browse transects were measured following BLM protocols (USDI BLM 1999). All plants measured on the transects were mountain mahogany, and average utilization was under 50 percent (31, 24, and 39 percent per transect). All transects combined, 80 percent of the mountain mahogany was mature plants, 14 percent less than 10 years, 2 percent less than three years, and 4 percent decadent. In addition, 50 percent of all plants showed little to no hedging, 22 percent moderate hedging, 26 percent severe hedging, and 2 percent out of reach to animals.

2.8.1.9 Pronghorn Antelope

Like mule deer, pronghorn antelope are an important big game management species for the IDFG and the BLM. The allotment is within IDFG Game Management Unit (GMU) 40, and IDFG does not survey the GMU for antelope population numbers due to inaccessiblity during the winter survey months.

Pronghorn antelope habitat contains rolling topography with shrub steppe and grassland communities. Riparian areas are especially important as fawning areas as they provide security cover and higher quality forage for reproduction. In the Silver City allotment, year-round antelope habitat occurs at lower elevations, generally in pastures 1-3 and 7-9 (Figure APP 4.1 Map 23). During the spring/summer/fall while antelope are fawning and rearing young, they may move up to slightly higher elevation drainages and riparian areas that provide water, succulent forage, and taller vegetation and terrain that support and conceal does and fawns. On the allotment, these seasonal use areas include pastures 3, 4, 10, 11, and lower portions of pastures 5 and 6 (Figure APP 4.1 Map 23).

Rangeland fencing can block antelope movements or cause collision or injury as they are reluctant to jump and often crawl under fences. On the allotment, 68 miles of fencing occur within antelope habitat. When building new or replacing older fence, the BLM installs fence with wildlife friendly specifications (BLM Memo, Subj. Facilitating Big Game Passage of Livestock Fences. Feb 20, 1987) in an effort to minimize negative impacts to wildlife.

Antelope diets consist of grasses, forbs, and browse, although proportions vary over the seasons with availability. During the spring, grasses and forbs comprise a significant proportion while during the winter browse is the main component. Important browse species include sagebrush, rabbitbrush, bitterbrush, saltbush, and winterfat. Vegetation cover is important for antelope for security and winter browse above snow levels, however too tall or dense cover limits their visibility and mobility which are key components in defense of predators and/or disturbances. A pronghorn Habitat Suitability Index Model (Allen 1984) suggests rangelands with an average vegetation height of 15 inches (38 cm) is optimal, heights of 24 inches (61 cm) are less preferred, and heights of 30 inches (76 cm) were rarely used by pronghorn. In winter range, they suggest optimal habitat has 15-30 percent shrub cover and shrub height between 8-18 inches (20-46 cm), although typical snow depth for the area should be considered in optimal shrub height.

Vegetation cover and height measurements for antelope habitat areas on the allotment, and compared with intact Wyoming and mountain big sagebrush communities (Davies and Bates 2010, Davies et al. 2006) are shown in Table SSSP 13. Shrub and herbaceous vegetation heights within saltbush and low sagebrush communities fall within optimal heights for antelope, the

Wyoming big sagebrush communities are in the less preferred category, and the mountain and basin big sagebrush communities are in the rarely used category identified the Habitat Suitability Index Model (Allen 1984). However, the mountain and basin big sagebrush communities occur in pastures 3-6 and 10-11 within antelope breeding/bearing/rearing habitat, and taller shrub cover in addition to greater perennial grass cover, provide security cover and higher quality forage during reproduction.

Table SSSP 13. Vegetation measurements in ecological sites providing pronghorn antelope habitat on the Silver City allotment, and in similar intact communities in eastern Oregon

Ecological Sites	Vegatation Parameters Average Percent Cover and Height						
	Sagebrush	Other Shrub	Perennial Grass	Sandberg Bluegrass	Annual Invasive Grass	Shrub Height (cm)	Grass and Forb Height (cm)
Shadscale saltbush-Bud sagebrush/ Indian ricegrass, Thurber's needlegrass R011XY010ID	0	8	7	25	11	24	18
Low sagebrush/ Idaho fescue R025XY010ID	19	1	1	36	0	10	10
Wyoming big sagebrush/ bluebunch wheatgrass,Thurber's needlegrass R011XY001ID	12	1	5	31	11	54	15
Wyoming big sagebrush/ Indian ricegrass R011XY014ID	15	2	8	31	23	62	17
Mountain big sagebrush/ bluebunch wheatgrass, Idaho fescue R025XY011ID	20	10	17	26	27	73	29
Basin big sagebrush/ bluebunch wheatgrass R025XY043ID	15	7	27	36	14	76	36

The low sagebrush and Wyoming big sagebrush communities, which occur in pastures 1-3 and 7-9 in antelope yearlong habitat and are utilized during the winter, have optimal shrub cover at 12-20 percent. Shrub heights in the low sagebrush are lower than optimal heights in winter

range, however during most winters these areas are snow free for the majority of the winter. Shrub heights in the Wyoming big sagebrush areas are 54 and 62 cm, slightly greater than the optimal 20-46 cm height.

The Wyoming and mountain big sagebrush sites on the allotment have comparable shrub cover to the intact sagebrush communities in eastern Oregon (Davies and Bates 2010, Davies et al. 2006). However, these communities in the allotment have lower perennial grass cover, and much higher Sandberg bluegrass and annual invasive grass cover, when compared to the similar but intact sagebrush communities in eastern Oregon. As discussed in Standard 4, these values suggest a degradation of healthy ecosystem processes and consequently a less resilient and resistant community to disturbances.

2.8.1.10 Reptiles

Three special status reptile species, the Great Basin black-collared Lizard (*Crotaphytus bicinctores*), longnose snake (*Rhinocheilus lecontei*), and groundsnake (*Sonora semiannulata*), have potential to occur on the allotment.

The black-collared lizard in Idaho is limited to lower elevations along the Snake River, mainly in Owyhee County. Habitat is rocky, sparsely vegetated areas within bunchgrass, saltbush, and sagebrush dominant communities. Scattered rocks are a habitat requirement for basking perches and population densities increase with rock cover. Rock sizes in occupied habitat are typically 0.25 - 1.00 m (0.8 – 3.28 ft) in diameter (IDFG 2017b). Their diet consists of insects and other lizards. Cheatgrass and other invasive plants that tend to grow in dense stands can reduce habitat quality through loss of sparsely-vegetated habitat and changes in prey abundance (IDFG 2017b).

The long-nosed snake in Idaho occurs at lower elevations along the Snake River in Owyhee, Canyon, Ada and Elmore counties. It occurs in xeric, shrub-dominated habitat with rocky or sandy and loose soil with numerous rodent burrows, which they use along with rock crevices for cover and hibernation. Their diet includes lizards, small snakes and small mammals.

The ground snake in Idaho also occurs along the Snake River in Owyhee, Canyon, Ada and Elmore counties (Diller and Wallace 1981). Western ground snakes appear to have restricted habitat requirements and in Idaho were only collected in or near talus or scree slopes (Diller and Wallace 1981). Their diet is primarily insects.

These three species have similar habitats of rocky areas in shrub steppe communities, which occur in lower elevation pastures on the allotment. Rock outcrops and scattered rocks are abundant within these pastures along canyons and mountain ridges, and as components of the shadscale saltbush/ bud sagebrush and Wyoming big sagebrush communities. These rocky areas are often sparsely vegetated due to soil components, although shallow rooted cheatgrass can invade the areas. As discussed in the small mammal section above, annual invasive grasses are moderately-high to high in the shadscale saltbush/ bud sagebrush community (11 percent cover) and Wyoming big sagebrush communities (20 percent cover) on the allotment, compared to less than 1 percent in intact Wyoming big sagebrush communities (Davies and Bates 2010, and Davies et al. 2006). Areas of high cheatgrass cover (such as sites in pastures 1-3, 5, 7, and 10-11

with greater than 20 percent cover) can affect community function, and may negatively impact abundance of these three special status reptile species.

2.8.1.11 Special Status Fish and Invertebrates– Standard 8

This assessment of Special Status Fish and Invertebrates considers the indicators and associated information sources in Table SSSP 14.

Table SSSP 14. Redband trout riparian habitat indicators and associated information sources

INFORMATION SOURCE	INDICATOR	ASSUMPTION
Lotic Proper Functioning Condition IDT Assessments	Functional condition rating	Indicates if stream channel characteristics are stable and functioning in a sustainable manner.
Multiple Indicator Monitoring (MIM) Data	Herbaceous stubble height	Stubble height of vegetation within riparian areas of less than 6 inches reduces the ability to control erosion and allows excessive amounts of fine sediment to enter the stream channel (Clary, Thornton and Abt 1996).
	Woody browse use	Utilization of woody vegetation by livestock decreases the amount of shade and leads to elevated stream temperatures (Rickard and Cushing 1982).
	Streambank alteration	Bare and trampled soil caused by livestock allows excessive amounts of fine sediment to enter and stay within the stream channel (Meehan and Platts 1978).
IDEQ 2014 Integrated Report (IDEQ, 2017)	Category 4A	Waters of the State impaired for one or more beneficial uses with an approved Total Maximum Daily Load (TMDL).
	Category 4C	Waters of the State impaired for one or more beneficial uses not needing a TMDL, since the impairment is not caused by a pollutant, but by pollution, such as flow or habitat alteration
	Categroy 5	Waters of the State impaired for one or more beneficial uses for which a TMDL is needed.

The Silver City allotment contains habitat for one special status fish and no special status invertebrates. The redband trout is a BLM sensitive species and a State of Idaho species of special concern. Based upon IDFG, BLM, and other sources, redband trout are present in 57 miles of perennial and intermittent streams on BLM managed lands within the Silver City allotment (Figure APP 4.1 MAP 24).

Redband trout habitat objectives would consist of 60-80 percent stream shading, streambank vegetation mostly over 6 inches in height, and less than 10 percent bare soil and broken sod on stream banks. It would also consist of less than 10 percent of streambanks actively eroding, less than 5 percent lateral movement of the stream, less than 15 percent of the stream channel bottom covered in fine sediment (<2mm), and 20-50 percent of the stream channel containing in-stream cover (Owyhee Resource Management Plan Objectives FISH 1, FISH 2, and LVST 1).

Using the Lotic Proper Functioning Condition (PFC) assessments (USDI BLM 1998), Multiple Indicator Monitoring (MIM), and the IDEQ 2014 integrated report (IDEQ 2017), the redband trout occupied streams were evaluated for habitat suitability by comparing these indicators to the habitat objectives (Table SSSP 15). The current condition for these streams is discussed within Standards 2, 3, and 7 of this document.

Table SSSP 15. Analyzed streams, distances analyzed, and distance of reduced function

Stream	BLM miles meeting habitat objectives	BLM miles not meeting one or more habitat objectives	Reason not meeting habitat objectives
Bates Creek	2	1	PFC rating (FAR)
Diamond Creek	3	1	PFC rating (FAR)
Jordan Creek and tributaries[1]	1	13	IDEQ 4a and 5
North Fork Sinker Creek and tributaries[2]	9	6	PFC ratings (FAR and NF)
OroFino Gulch	1	1	PFC rating (FAR)
Pedracini Fork	0	1	PFC rating (FAR)
Scotch Bob Creek and unnamed tributaries	2	3	PFC rating (FAR)
Sinker Creek and unnamed tributary	2	0	
South Fork Sinker Creek	2	4	PFC rating (FAR)
Stobie Gulch and unnamed tributaries	5	1	PFC rating (FAR)

[1] Tributaries of Jordan Creek include Bull Frame Creek, Presby Creek, Sawpit Gulch, Long Gulch, Silver Cord Gulch, Slaughterhouse Gulch, and Webfoot Gulch.
[2] Tributaries of North Fork Sinker Creek include Tiddie Creek, Horse Ranch Creek and unnamed tributary, Cosmopolitan Creek, and Gray Eagle Creek.

Redband trout occur in perennial and intermittent stretches of the streams in Table SSSP 15 within the allotment. Of the 57 miles of redband trout habitat analyzed, 26 miles are meeting habitat objectives. To meet habitat objectives, streams would have IDEQ categorizations of 2 or 3, or ratings of PFC. The remaining 31 miles of streams analyzed are not meeting habitat objectives due to IDEQ stream categorizations of 4a or 5, for excessive sediment, temperature, or mercury and below PFC. Generally, streams with excessive fine sediment have fewer pools, higher width-to-depth ratios, reduced numbers and diversity of macroinvertebrates, and increased fine sediment in the substrate, which makes the habitat less suitable to redband trout (Wood and Armitage 1997). Generally, streams with an increased temperature, above 61^0F (16^0C), have a lower occurrence of redband trout (Meyer, Lamansky and Schill 2010). Mercury exposure to fish, and those that consume fish that contain mercury, can be fatal if the dosage is high enough (Macleod and Pessah 1973). Further discussion of high fine sediment, increased temperature, and mercury in these streams is in Standard 7 of this document.

2.8.2 Evaluation of Standard 8 – Threatened and Endangered Species

Evaluation Finding- Allotment/watershed is:
___ Meeting Standard
___ Not meeting the Standard, but making significant progress toward meeting
_X_ Not meeting the Standard

OWYHEE RESOURCE MANAGEMENT PLAN (1999)

Objectives and Management Actions & Allocations:

Special Status Species

SPSS 1: Manage special status species and habitats to increase or maintain populations at levels where their existence is no longer threatened and there is no need for listing under the Endangered Species Act of 1973, as amended.

- Special status plant habitat has decreased in quality/suitability over the evaluation period. Therefore the objective is not being met for special status plant species.

Fishery Habitat

FISH 1: Improve or maintain perennial stream/riparian areas to attain satisfactory conditions to support native fish.

- The Silver City allotment currently contains 82% of assessed streams not in PFC. Reduced hydric vegetation cover and vigor was a primary cause for riparian areas in reduced functional condition. Hydric vegetation is necessary for stabilizing stream channels, reducing stream sediment input, and decreasing stream temperatures. Given these conditions, maintenance or improvement of perennial stream/riparian areas is not occurring and the Silver City allotment is not meeting this objective.

IDAHO APPROVED RESOURCE MANAGEMENT PLAN AMENDMENT (2015/2019)

Objectives and Management Actions & Allocations:

Livestock Grazing

MD LG 4: PHMA & IHMA: During the land health assessment process, identify the type(s) of seasonal habitat the assessed areas are capable of supporting. Utilize the habitat assessment framework, (Stiver et al. 2015) or other BLM approved methodology, in accordance with current policy and guidance to determine whether vegetation structure, condition and composition are meeting GRSG habitat objectives including riparian and lentic areas (Objective SSS 2; Table 2-2). Use appropriate Ecological Site Descriptions, reference sheets and state and transition models to inform desired habitat conditions and expected responses to management changes for the land unit being assessed.

- The HAF (Stiver et al. 2015) is used, in conjunction with seasonal habitat areas and ecological site sescriptions, to assess whether habitat objectives are being met on the allotment.

MD LG 12: During the land health assessment and grazing permit renewal process, evaluate existing livestock management range improvements with respect to their effect on GRSG habitat. Consider removal of projects that are not needed for effective livestock management, are no longer in working condition, and/or negatively affect GRSG habitat, with the exception of functional projects needed for management of habitat for other threatened, endangered or proposed species or other sensitive resources.

- Multiple livestock infrastructure projects are not currently working and affecting functional condition of riparian and wetland areas. This has led to a reduced hydric vegetation cover and vigor, resulting in a decrease of functional condition. The reduced vegetation cover and vigor can lower the quality of habitat the riparian areas provide for sage-grouse throught the year, and particularly diring the spring and summer when herbaceous forage and insects are the main diet source for sage-grouse.

MD LG 16: Grazing in the PHMA and IHMA will be managed according to the process outlined in the text below, and the grazing permit renewal process will be managed according to 43 CFR 4100, Subpart 4180, and as outlined in the process below.

b. Conduct habitat assessments using appropriate monitoring methods. Where appropriate, make a determination of factors causing any failure to achieve the desired conditions in Table 2.2 [of the 2015 Final EIS]. The assessment will be conducted at a resolution and scale sufficient to document the habitat condition and will include local, spatial, and interannual variability. Any determination relative to the habitat characteristics (Table 2.2 [of the 2015 Final EIS]) will be based on existing ecological condition, ecological potential, and existing vegetation information. This is to ensure the assessment recognizes whether these habitat characteristics are achievable. c. The assessment will rely on published characteristics of Greater Sage-Grouse habitat and the ecological site descriptions, on Table 2.2 [of the 2015 Final EIS as amended], and where available and applicable, rangeland health determinations made in accordance with 43 CFR 4180.2(c).

- A habitat assessment is conducted using HAF (Stiver et al. 2015), in conjunction with seasonal habitat areas and ecological site sescriptions, to assess whether habitat objectives are being met on the allotment. A determination of factors leading to current habitat characteristics is based on existing ecological conditions, ecological potential, existing vegetation information.

2.8.2.1 Evaluation and Rationale for Evaluation Finding

Plants - The standard is not being met for special status plants due to overall loss or degradation of quality habitat, specifically in sensitive soil types in the lower pastures. Consistently, disturbance from livestock, OHV use, and general poor habitat conditions are cited as causal elements affecting population conditions. Data derived from HAF/AIM, Trend and MIM/PFC, further substantiate degraded habitat conditions, which are not conducive for the maintenance and recruitment of rare species. This is consistent across pastures.

Wildlife - The standard is not being met for special status wildlife due to degraded functionality of riparian and wetland areas, and degraded functional grass components in the shadscale saltbush and big sagebrush plant communities at lower elevations on the allotment.

The wetland and riparian PFC ratings illustrate the reduced capacity of these areas to provide food and cover resources to many wetland dependant wildlife species; including cover and shading for amphibians, nesting cover and insects for birds, insects for bats, and forage and cover for big game species, especially mule deer and antelope with fawns. Unsuitable PFC conditions often result in the inability of wetland areas to maintain moisture later into the summer period, which impacts habitat necessary for the year-round persistence of amphibians, and important late season forage for big game animals.

In the upland areas, shrub cover and height in most areas is sufficient for many avian species, (including sage-grouse), big game species, and small mammal species that rely on shrub communities. Some sagebrush areas on the allotment were infested with the sagebrush defoliating moth in 2014, and is reflected in the 2014 HAF sagebrush data at those locations. The level of sagebrush mortality at the locations is uncertain, although affected areas usually have enough live shrubs capable of supporting future sagebrush regeneration. Upland woody browse utilization in pastures 5 and 6 on the allotment was less than 50 percent, and most plants showed little to no hedging.

The sage-grouse habitat assessment of the SUA on the allotment (spring and winter) indicated the majority of sites provided suitable or marginal habitat (80 percent for spring and 62 percent for winter). Factors affecting unsuitable or marginal ratings at sites was lack of sagebrush cover (caused by the defoliating moth at all sites unsuitable sites) and lack of perennial grass and forb cover and forb availability. At these degraded sites, the supplemental factors of percent cover of Sandberg bluegrass and invasive annual grasses was much higher than expected or than found at intact sites in the literature. Both Sandberg bluegrass and annual invasive grasses, like cheatgrass, most often outcompete perennial bunchgrasses and forbs.

Cheatgrass degrades habitats for species, such as ground nesting birds and reptiles and small mammals (which are also prey items for other wildlife) that prefer sparsely vegetated areas. Cheatgrass can become dense and inhibit movement and predator detection. Cheatgrass competes with native bunchgrasses, which have higher stature for concealment from predators while still providing open vegetation for movement, for species such as sage-grouse, some small mammals, mule deer and antelope with fawns. When cheatgrass competes with perennial bunchgrasses and forbs, it also degrades the forage quality and quantity for many species, in terms of herbaceous browse (big game species, sage-grouse, small mammals), seeds (small mammals, many avian species), and as a host for insect species (amphibians, reptiles, small mammals, avian species, sage-grouse, bats). In addition, high levels of cheatgrass results in higher risk for large scale wildfires. A long-term consequence of large wildfires would be the loss of shrubs and degradation of shrub steppe habitat so important to most all of the special status wildlife species with potential to occur within the allotment.

Fish - The standard for special status fish is not being met due to 54 percent of streams not meeting habitat objectives within the allotment. Some streams not meeting habitat objectives have IDEQ categorizations of 4a or 5, which shows indications of excessive fine sediment, temperature, or mercury within their systems (Standard 7). The remaining streams not meeting habitat objectives have ratings below PFC. Issues noted in the PFC assessments include high

sediment and reduced riparian herbaceous vegetation vigor. These items lead to a decreased habitat suitability for redband trout.

2.8.3 Information Sources

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3 Summary

This Rangeland Health Assessment and Evaluation has determined that six of the eight Idaho Standards for Rangeland Health are not being met (Table SUMM-1). Standard 5 is meeting the standard, Standard 6 does not apply to Silver City allotment, and Standards 1-4, 7 and 8 are not meeting the Standard (Table SUMM-1).

Table SUMM-1. Evaluation of rangeland health standards for the Silver City allotment

STANDARD	EVALUATION
Standard 1 - Watersheds	Not meeting the Standard
Standard 2 – Riparian Areas	Not meeting the Standard
Standard 3 – Stream Channel/Floodplain	Not meeting the Standard
Standard 4 – Native Plant Communities	Not meeting the Standard
Standard 5 – Seedings	Meeting Standard
Standard 6 – Exotic Plant Communities	Standard Does Not Apply
Standard 7 – Water Quality	Not meeting the Standard
Standard 8 – Threatened & Endangered Species	Not meeting the Standard

Standard 1 – Watersheds is not being met due to a change in vegetation structure across the allotment impacting soil and site stability and hydrologic function.

Standard 2 - Riparian Areas is not being met due to a lack or reduction in stabilizing vegetation cover needed to protect against erosional forces.

Standard 3 – Stream Channel/Floodplain is not being met due to geomorphic alterations of streams and springs resulting in excessive erosion and deposition of sediment which has reduced the functional condition of the streams and springs.

Standard 4 – Native Plant Communities is not being met due to a replacement of deep rooted cool season perennial bunchgrasses with shallow rooted cool season bunchgrasses, and overall lack of species diversity.

Standard 5 – Seedings is meeting due to the dominance of perennial grasses (Crested wheatgrass and Sandberg bluegrass), with low site diversity and minimal annual grasses.

Standard 7 – Water Quality is not being met due to impairment from sediment, temperate, and mercury.

Standard 8 – Threatened and Endangered Species is not being met across all sub-categories (Plants, Wildlife, Fish & Invertebrates). The standard is not being met for special status plants due to overall loss or degradation of quality habitat, specifically in sensitive soil types in the lower pastures. The standard is not being met for special status wildlife due to degraded functionality of riparian and wetland areas, and degraded functional grass components in the shadscale saltbush and big sagebrush plant communities at lower elevations on the allotment. The standard for special status fish is not being met due to 54 percent of streams not meeting habitat objectives within the allotment.

These issues will be further analyzed in the allotment Determination and the permit renewal NEPA Environmental Assessment for the Silver City allotment. The anticipated completion of the Environmental Assessment is December 2019.

4 Maps and Appendices

4.1 Maps

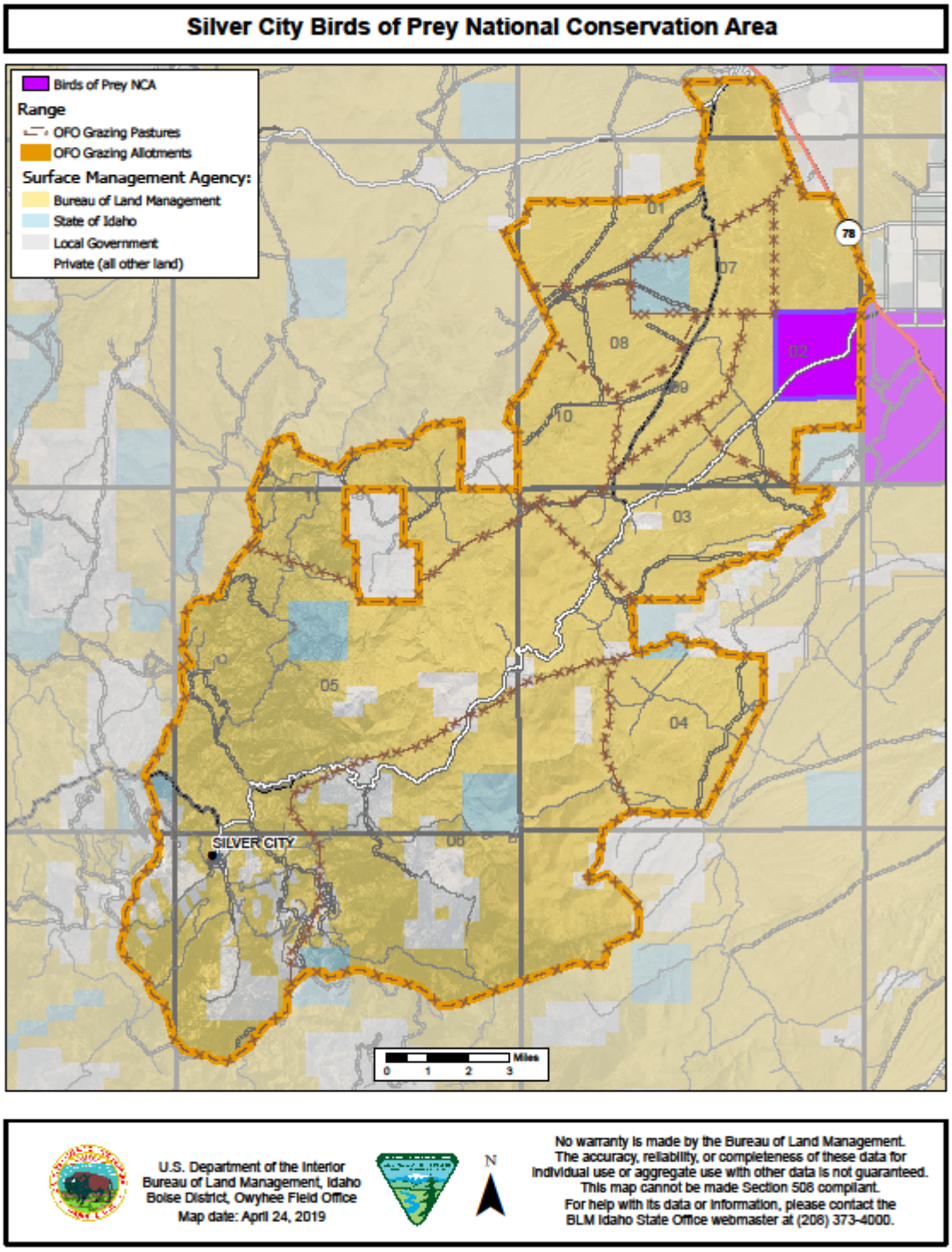

Figure APP 4.1 MAP 1. Silver City Birds of Prey National Conservation Area

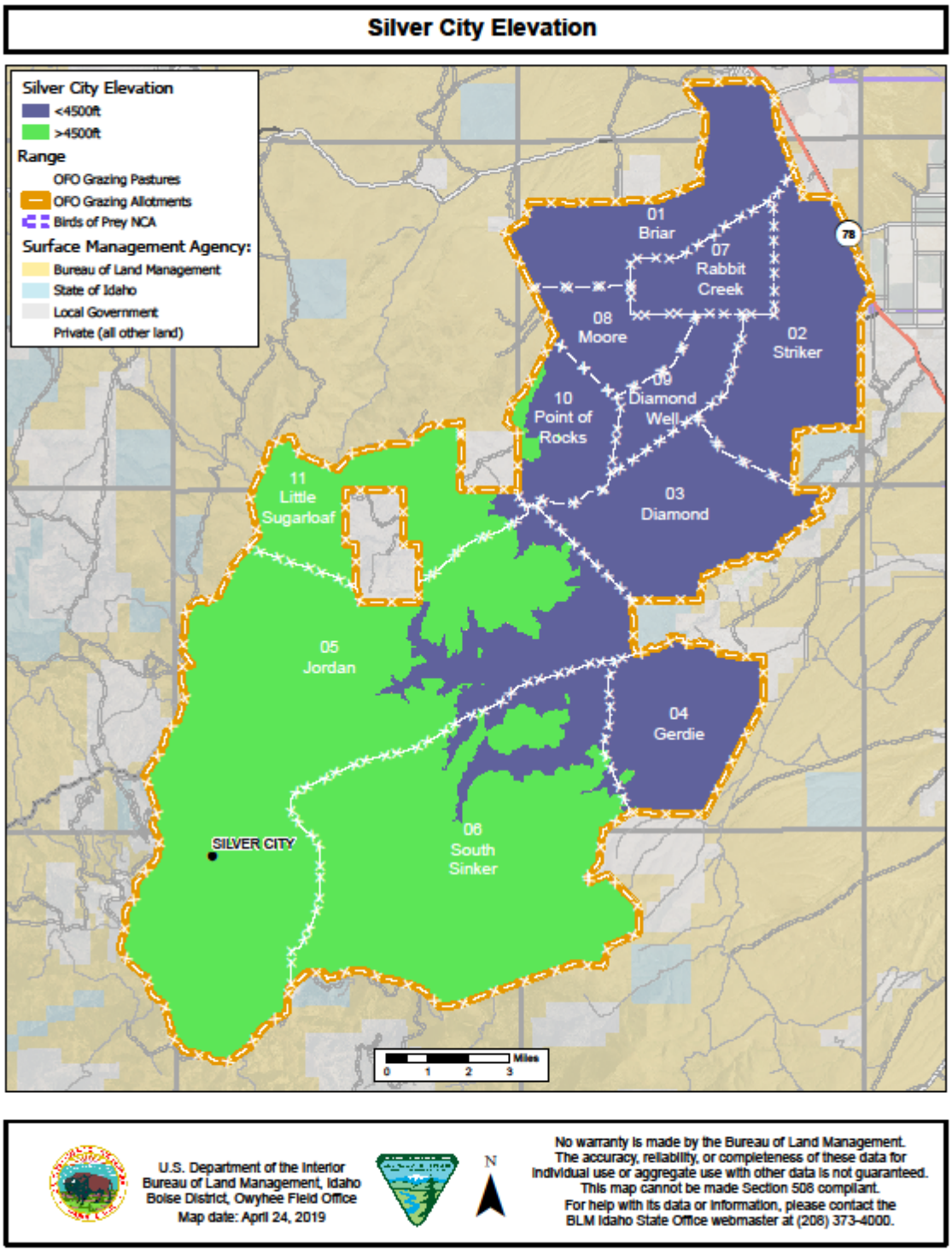

Figure APP 4.1 MAP 2. Silver City elevation

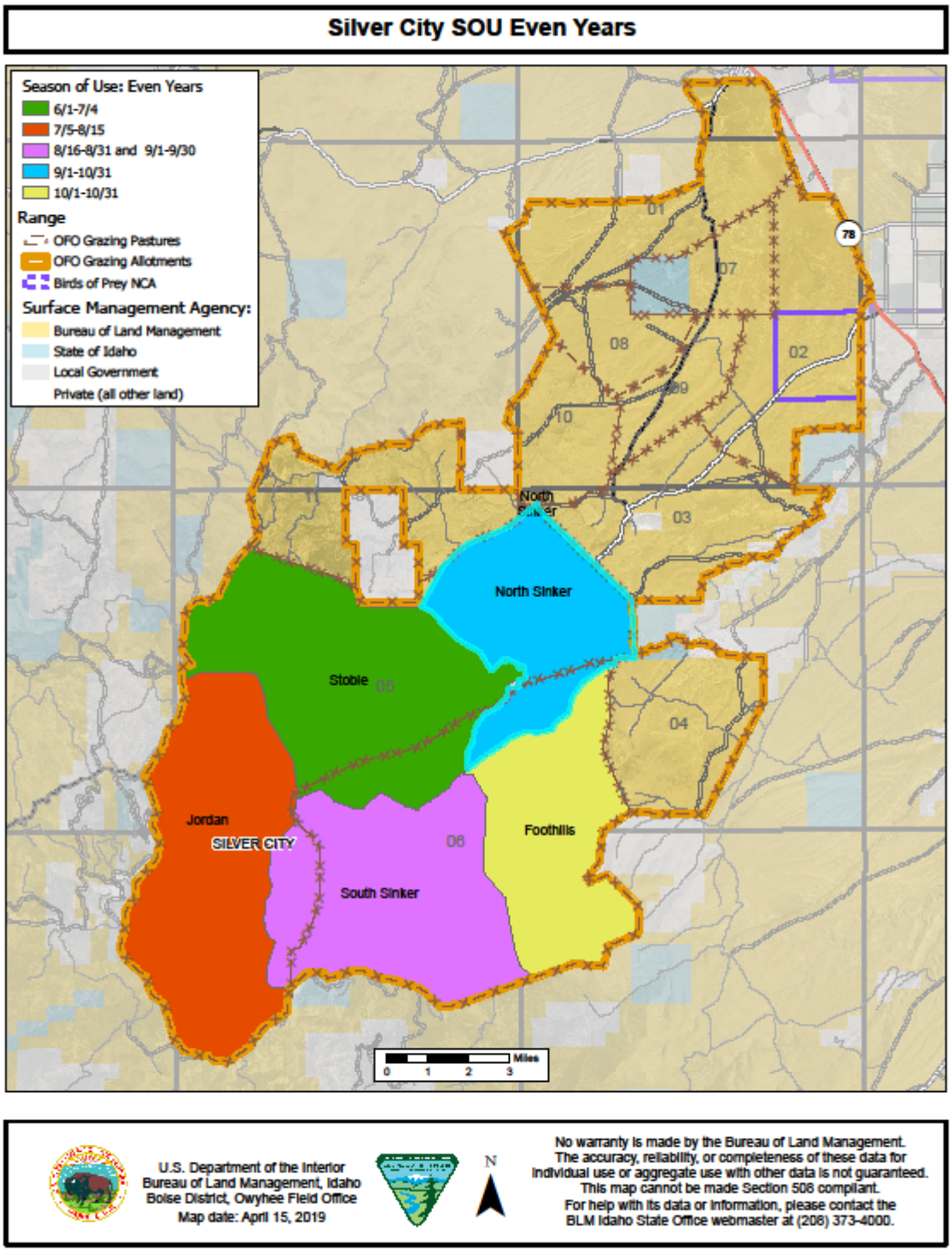

Figure APP 4.1 MAP 3. Silver City season of use (SOU) even years

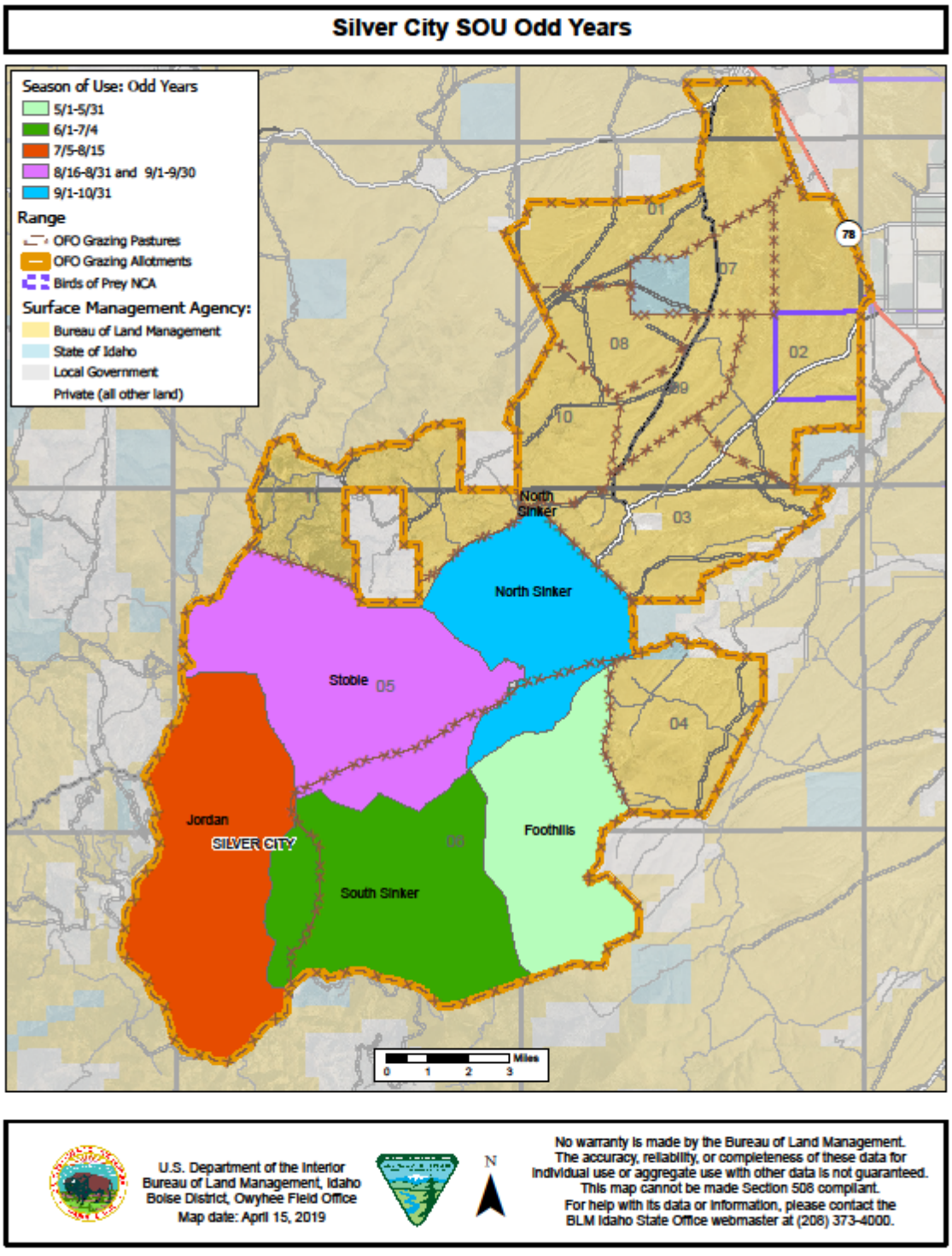

Figure APP 4.1 MAP 4. Silver city season of use (SOU) odd years

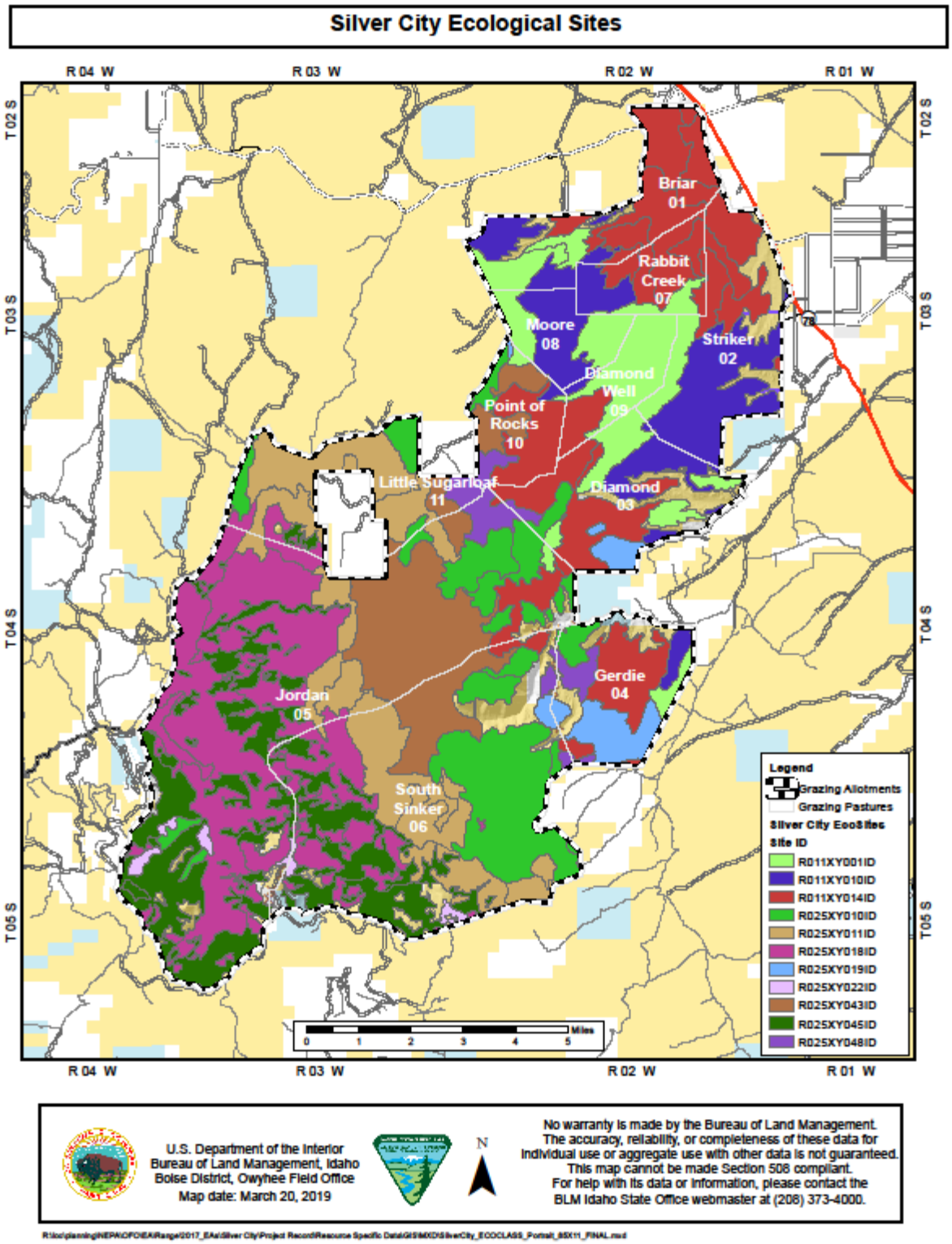

Figure APP 4.1 MAP 5. Silver City ecological sites

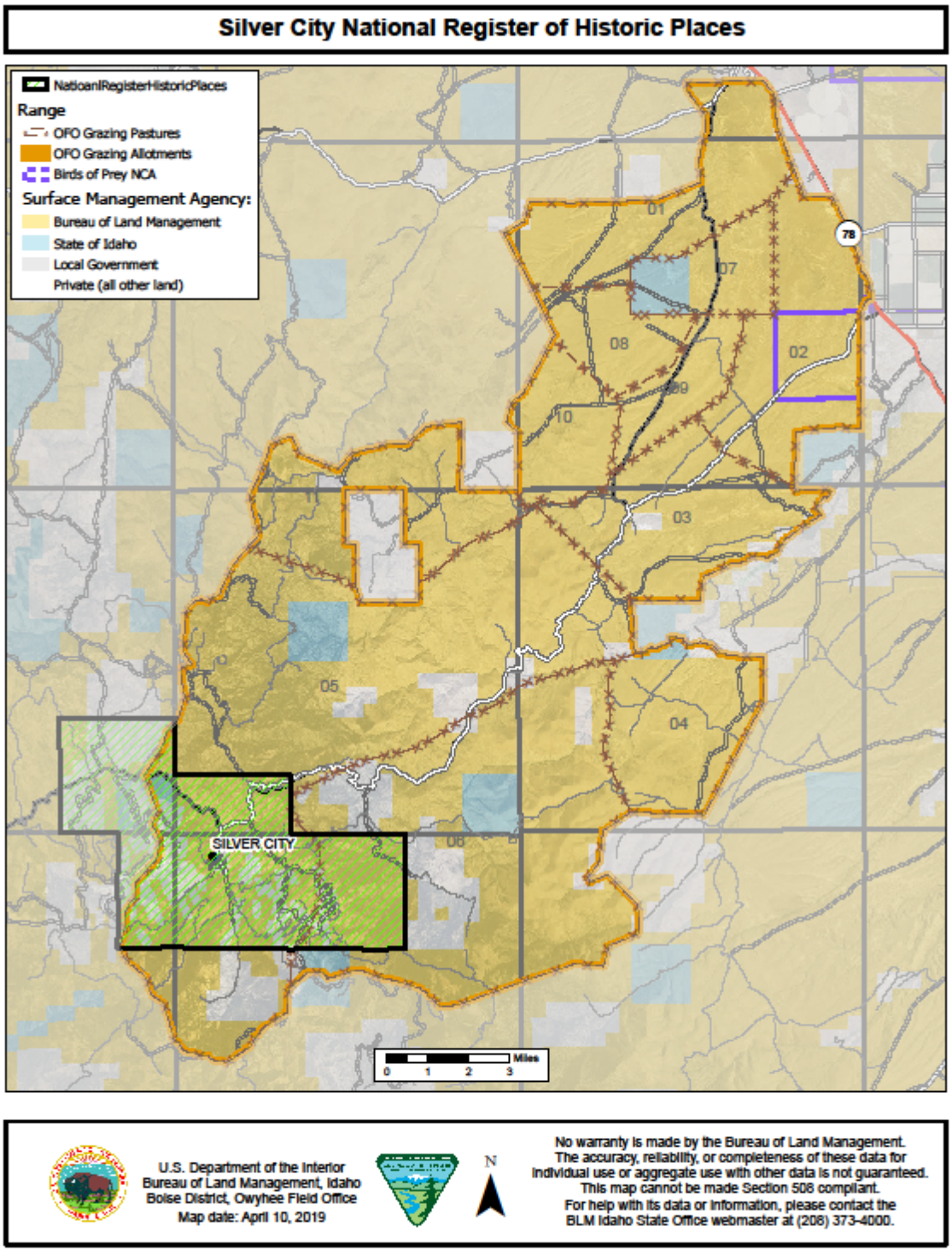

Figure APP 4.1 MAP 6. Silver City National Register of Historic Places

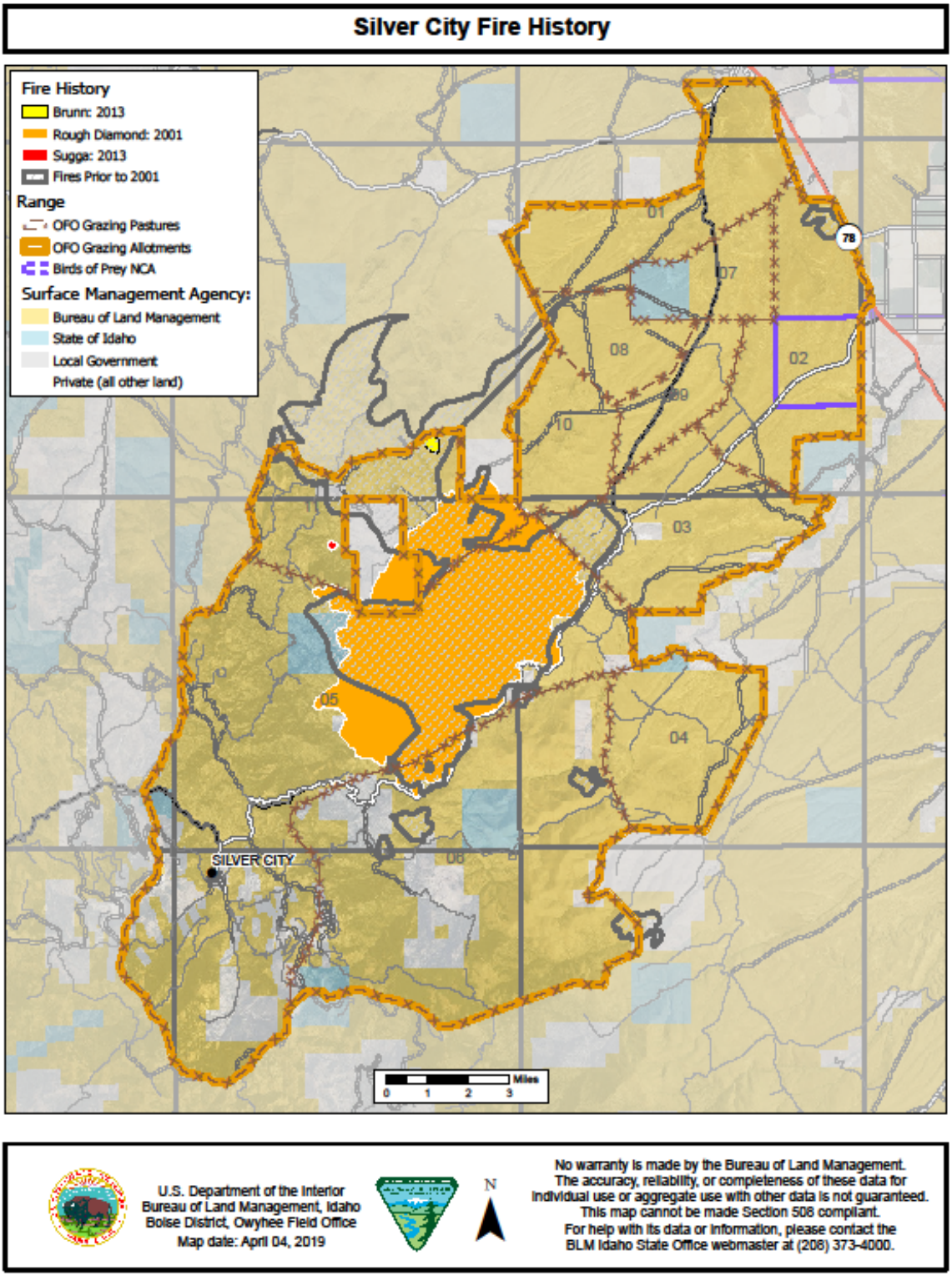

Figure APP 4.1 MAP 7. Silver City fire history

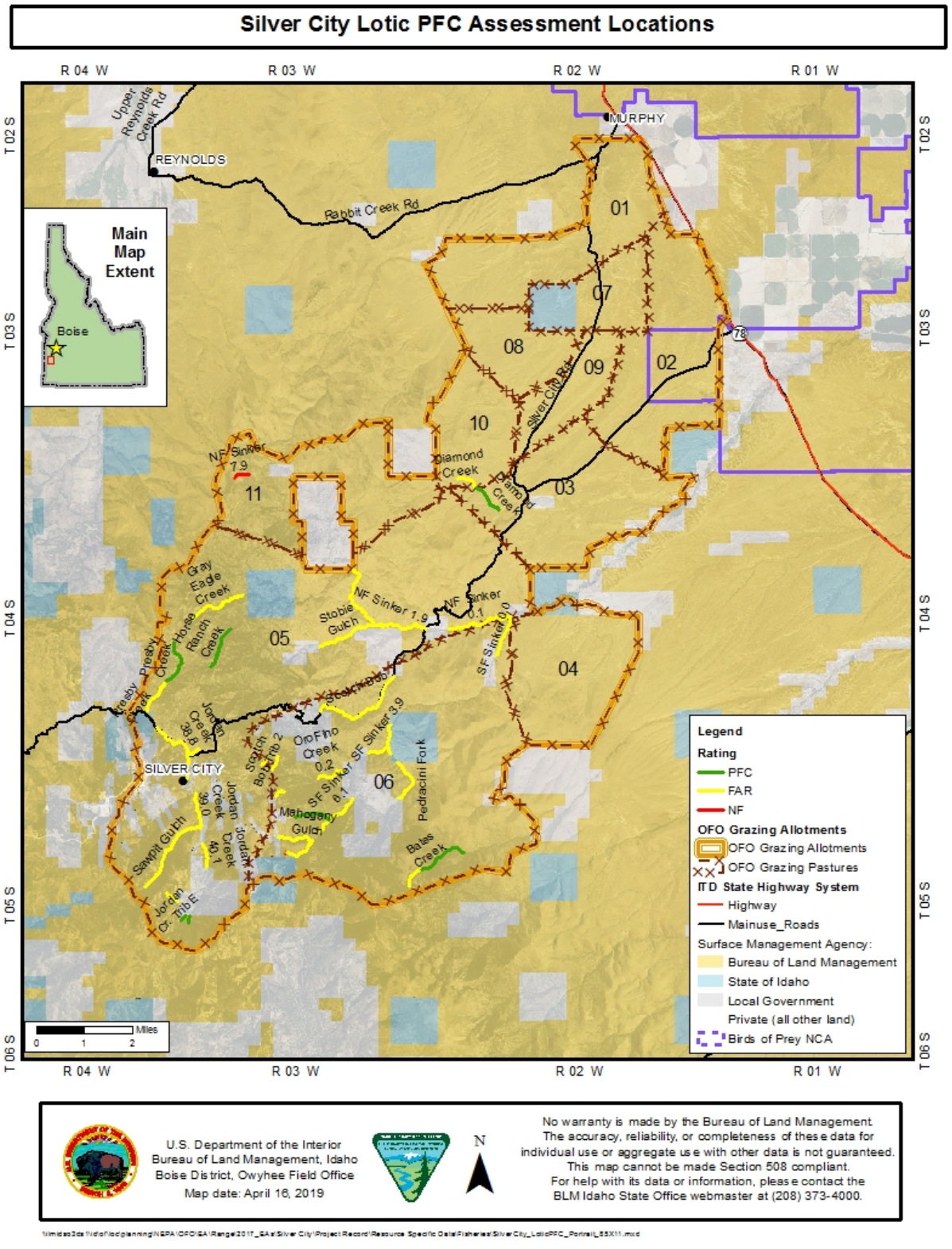

Figure APP 4.1 MAP 8. Silver City lotic proper functioning condition (PFC) assessment locations

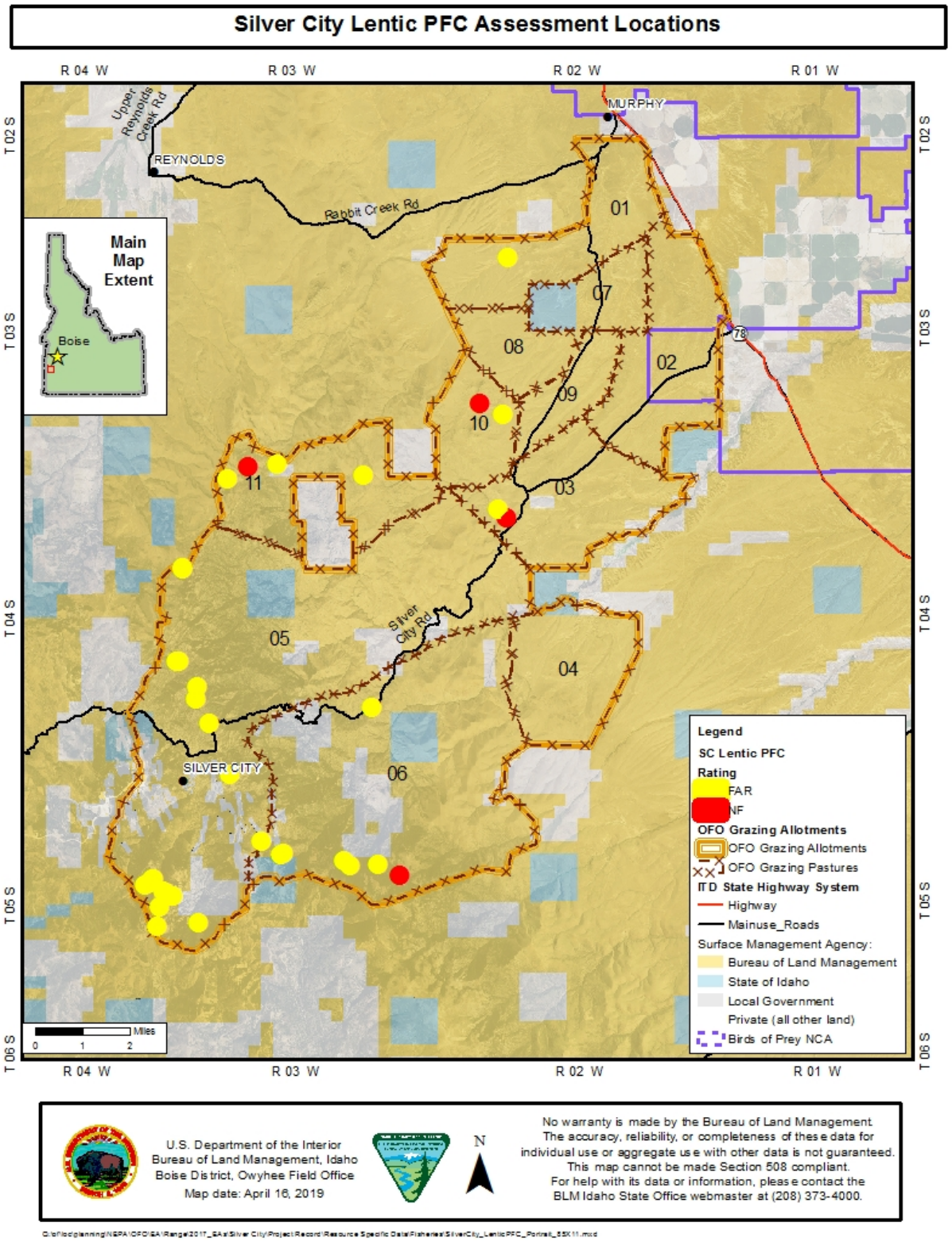

Figure APP 4.1 MAP 9. Silver City lentic proper functioning condition (PFC) assessment locations

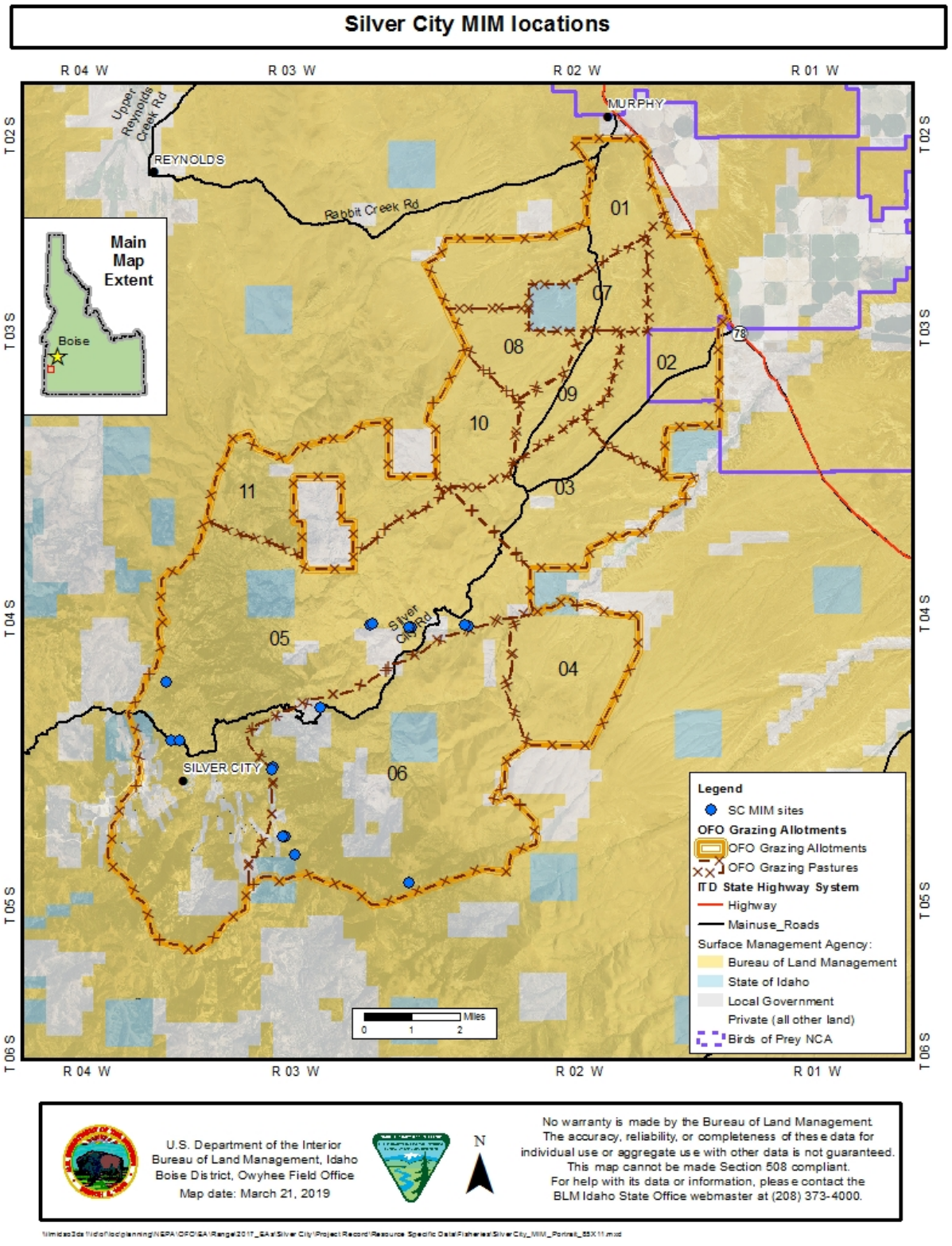

Figure APP 4.1 MAP 10. Silver City multiple indicator monitoring (MIM) locations

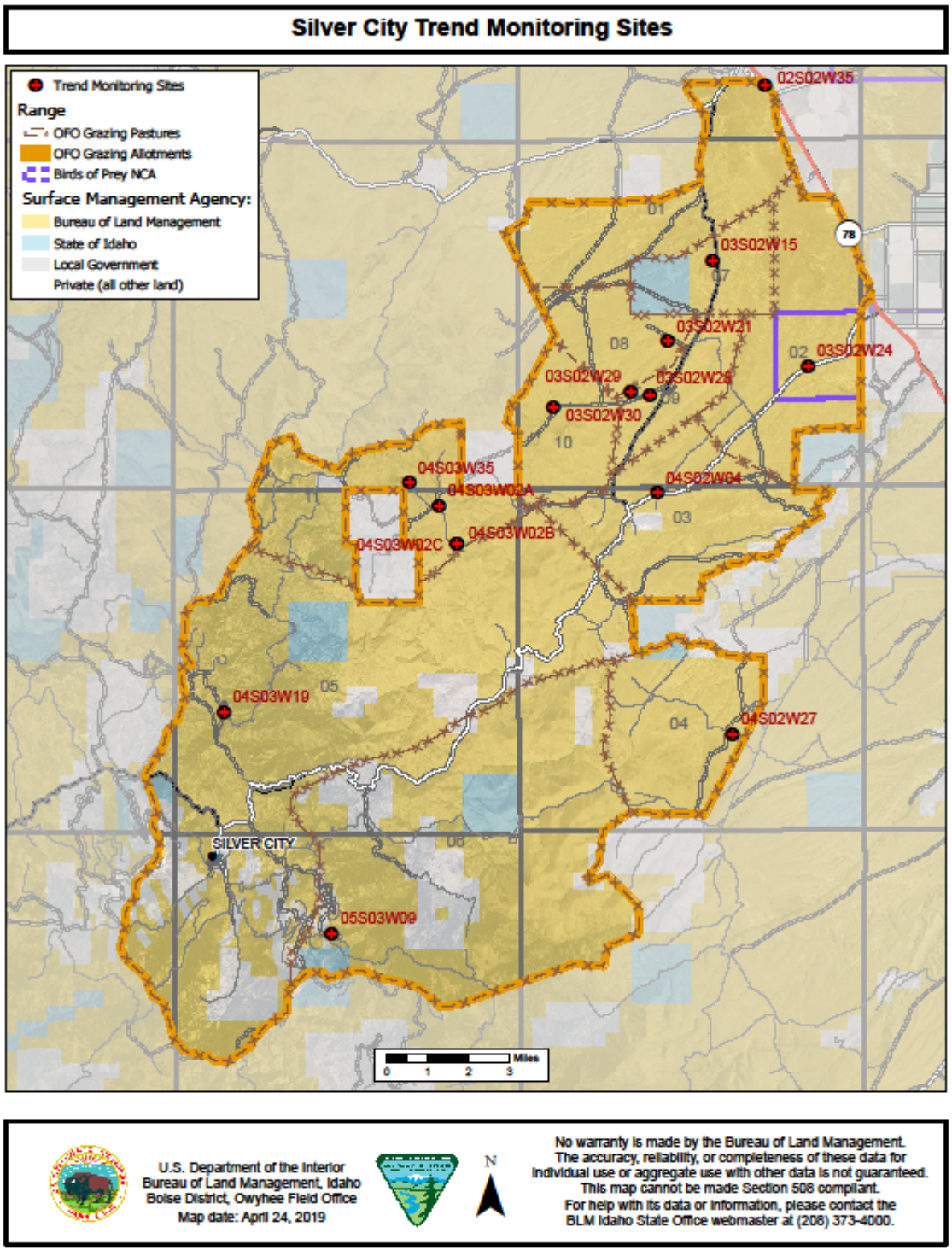

Figure APP 4.1 MAP 11. Silver City trend monitoring sites

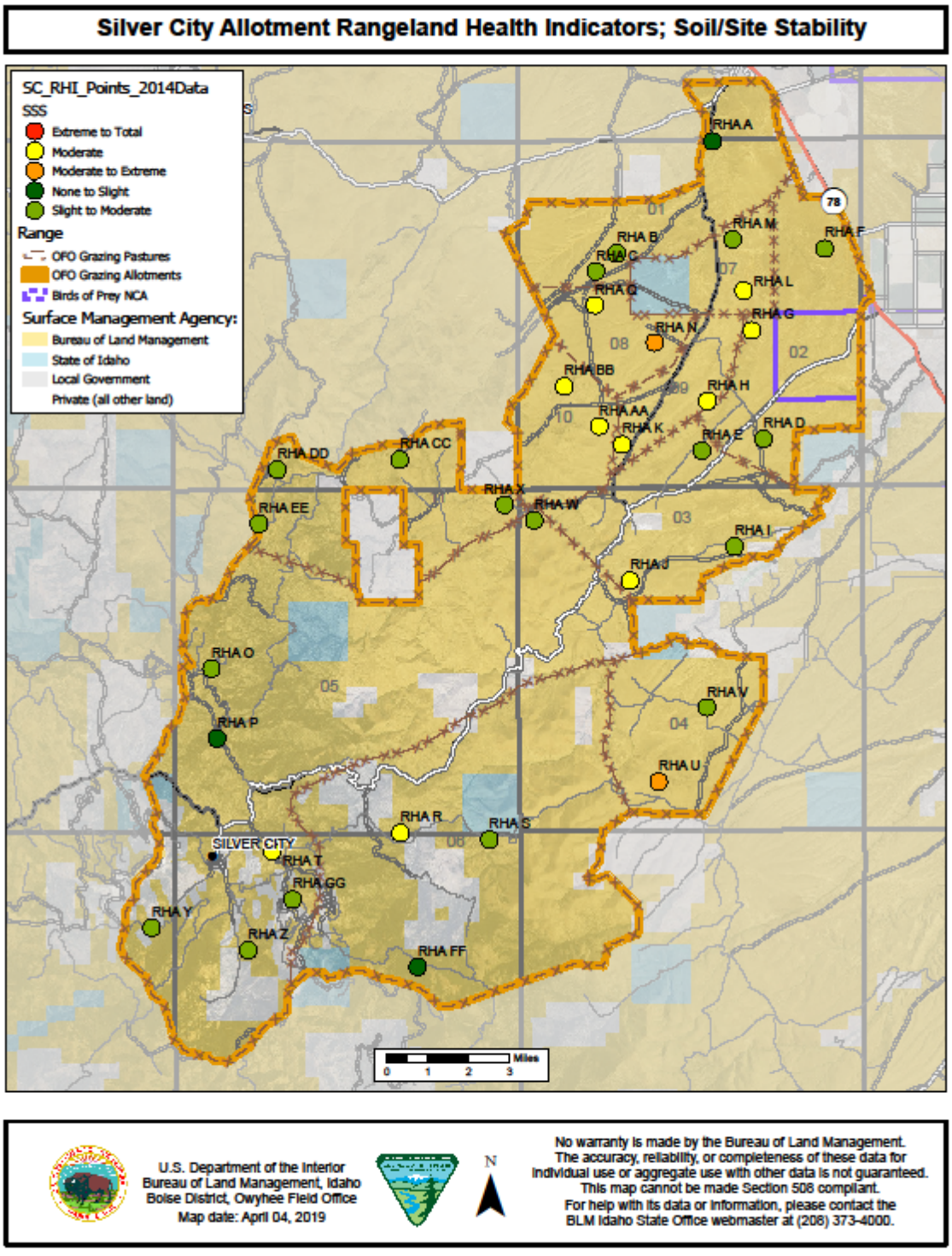

Figure APP 4.1 MAP 12. Silver City allotment rangeland health indicators; soil/site stability

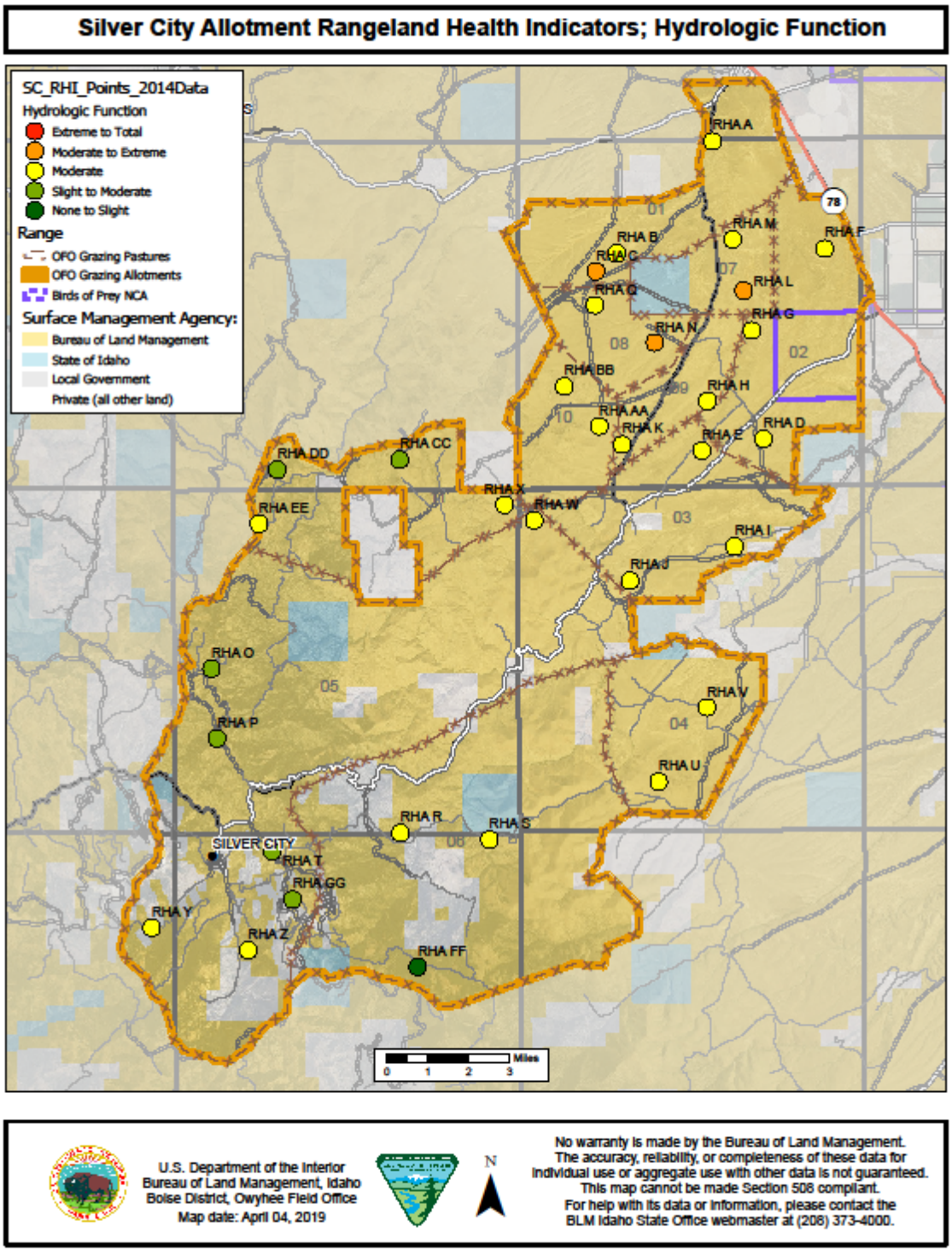

Figure APP 4.1 MAP 13. Silver City allotment rangeland health indicators; hydrologic function

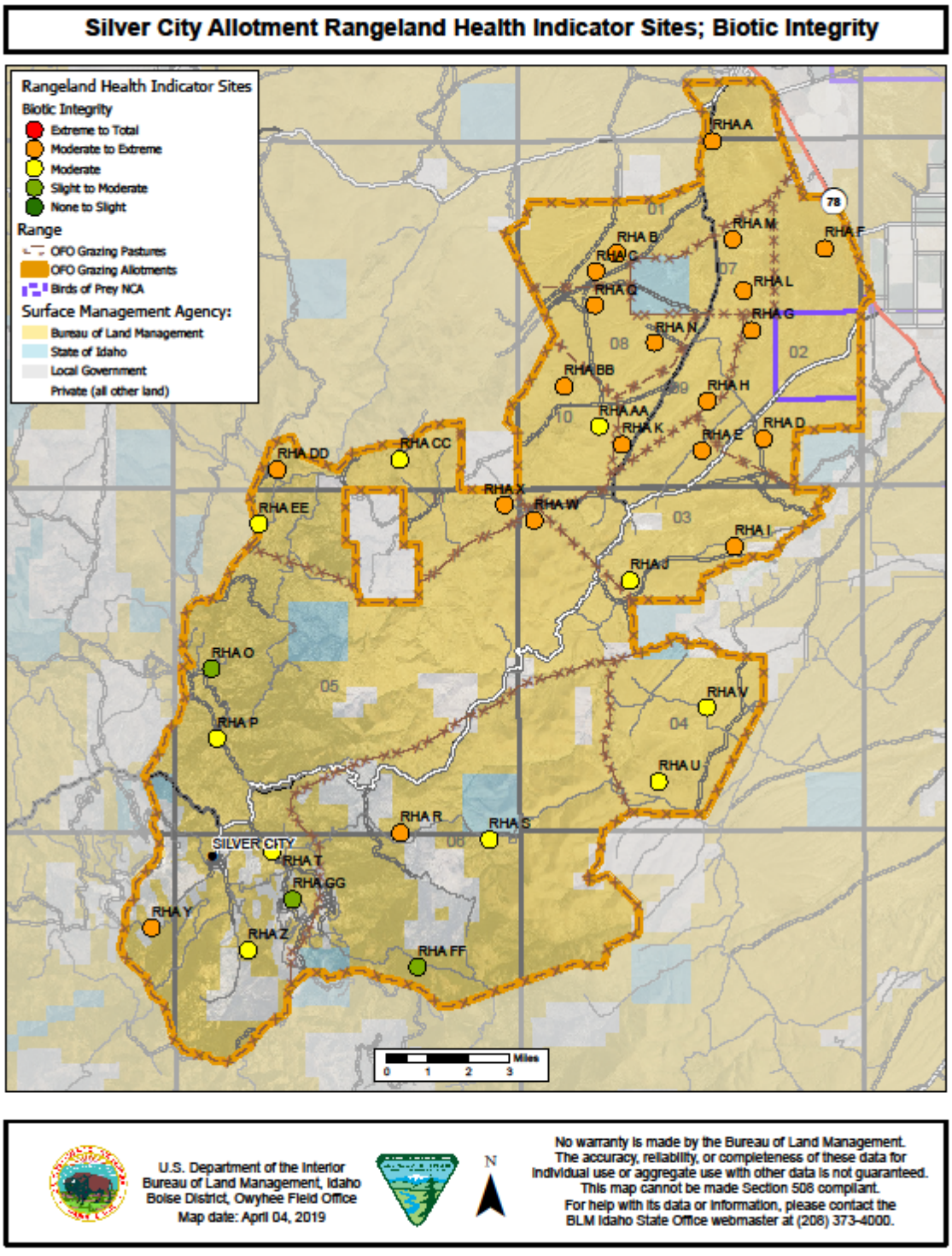

Figure APP 4.1 MAP 14. Silver City allotment rangeland health indicators; biotic integrity

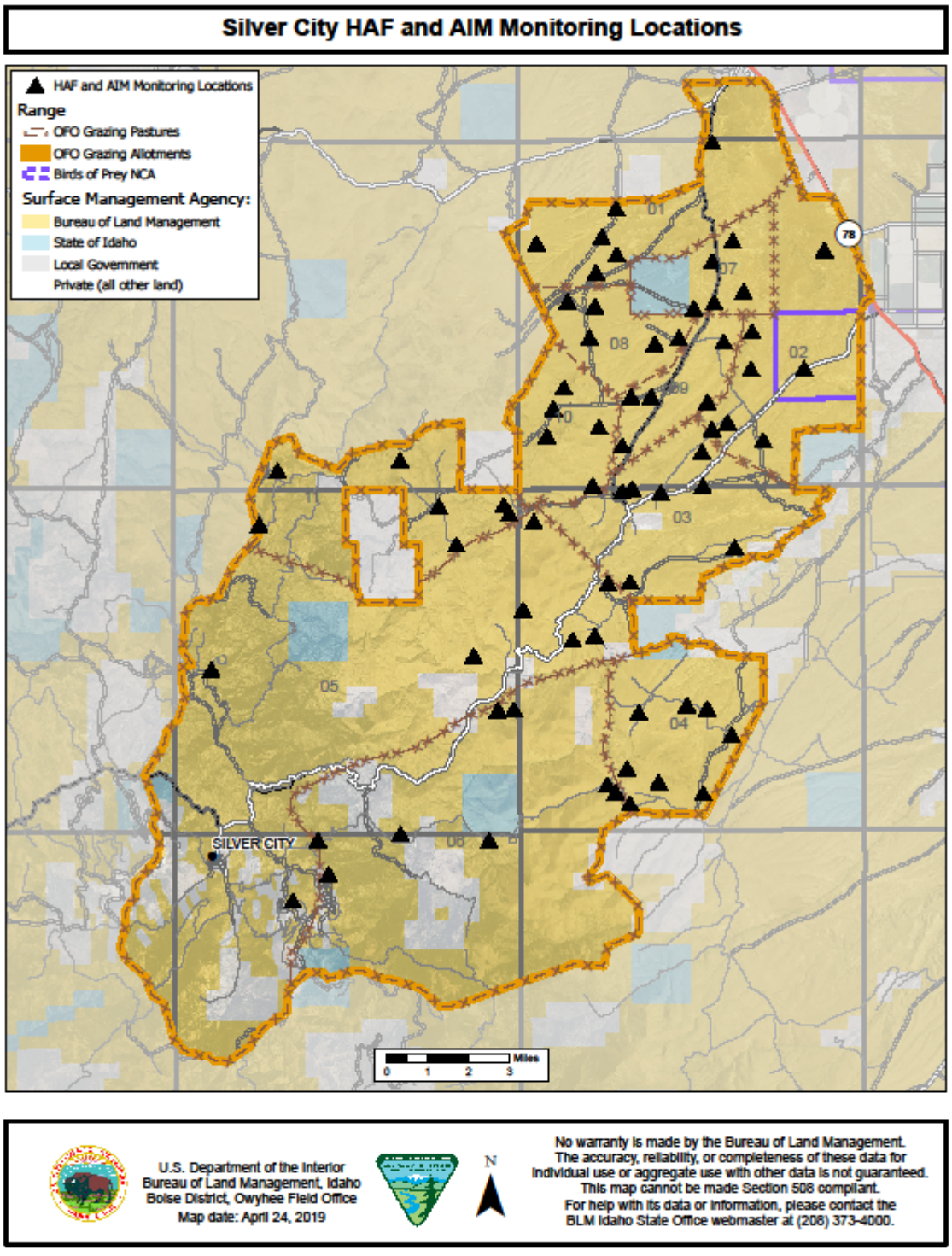

Figure APP 4.1 MAP 15. Silver City habitat assessment framework (HAF) and assessment, inventory and monitoring (AIM) locations

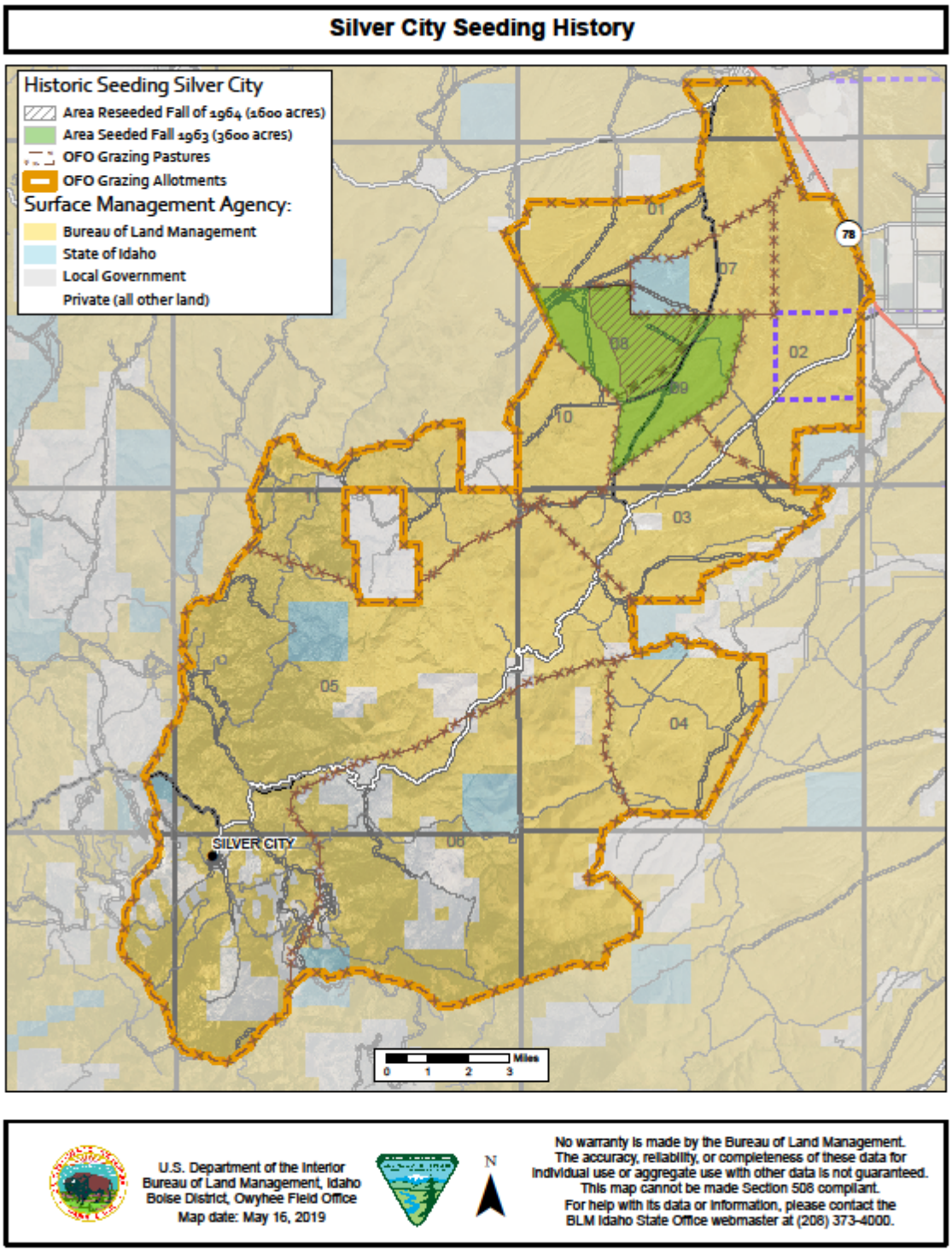

Figure APP 4.1 MAP 16. Silver City seeding history

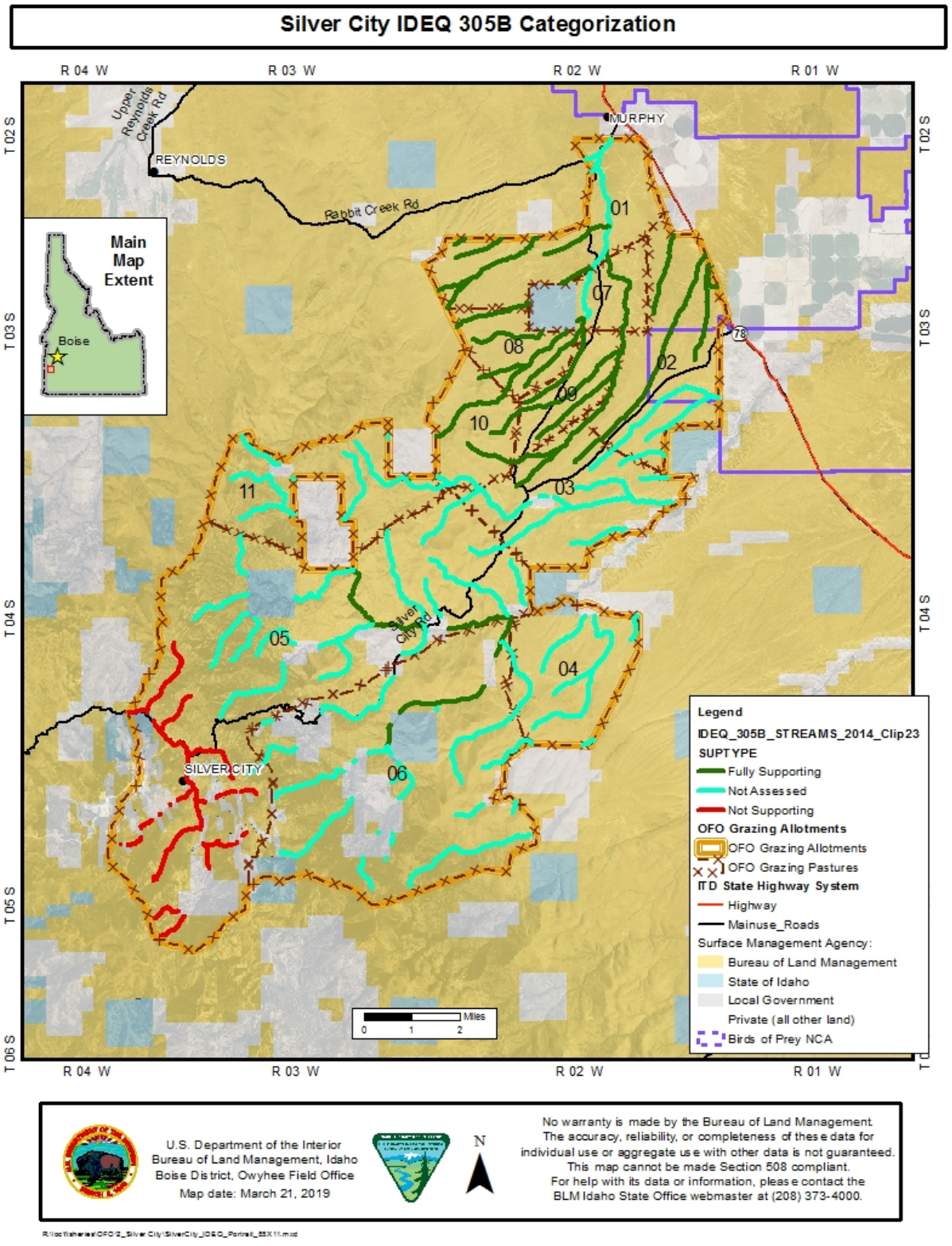

Figure APP 4.1 MAP 17. Silver City Idaho Department of Environmental Quality 305B categorization

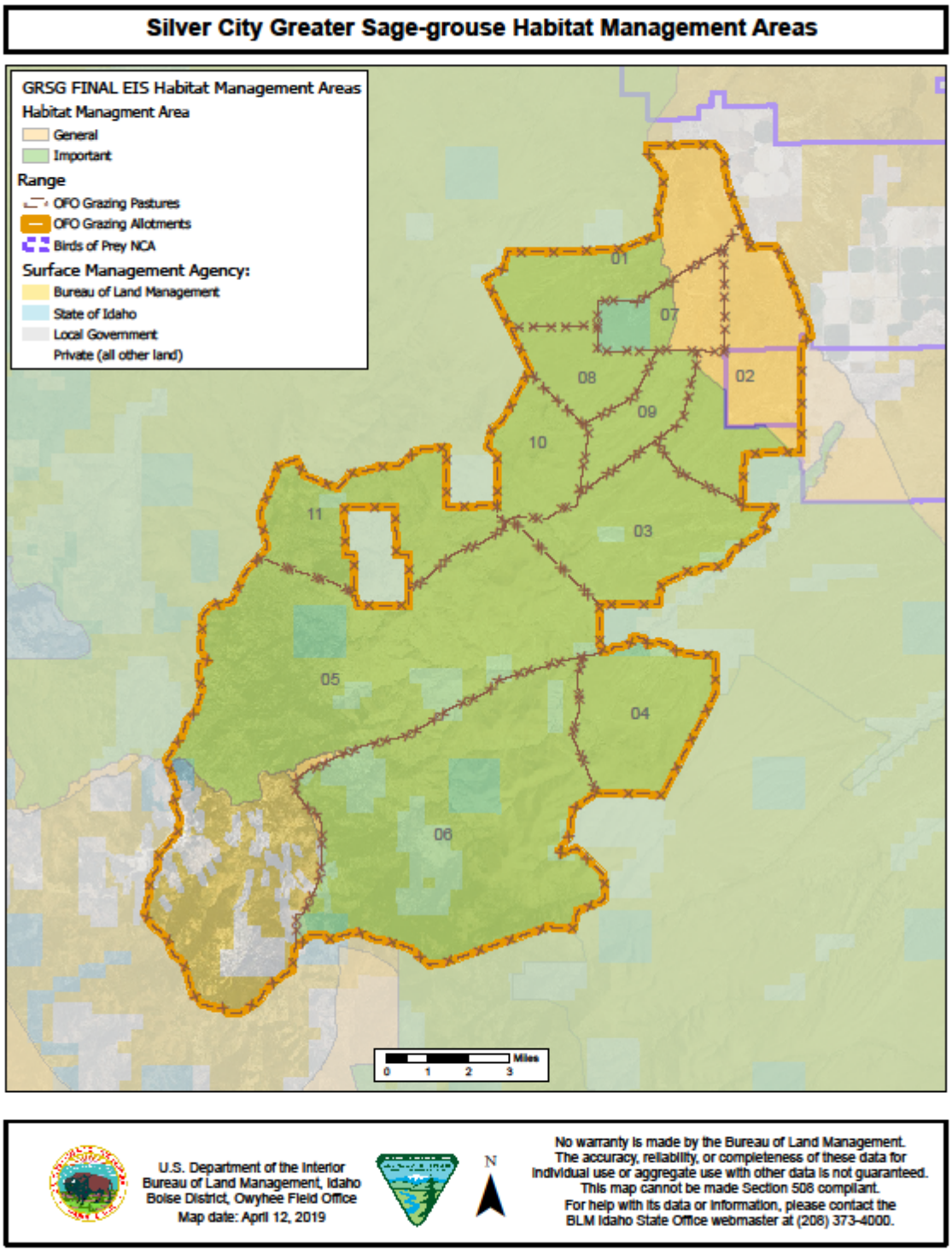

Figure APP 4.1 MAP 18. Silver City greater sage-grouse habitat management areas

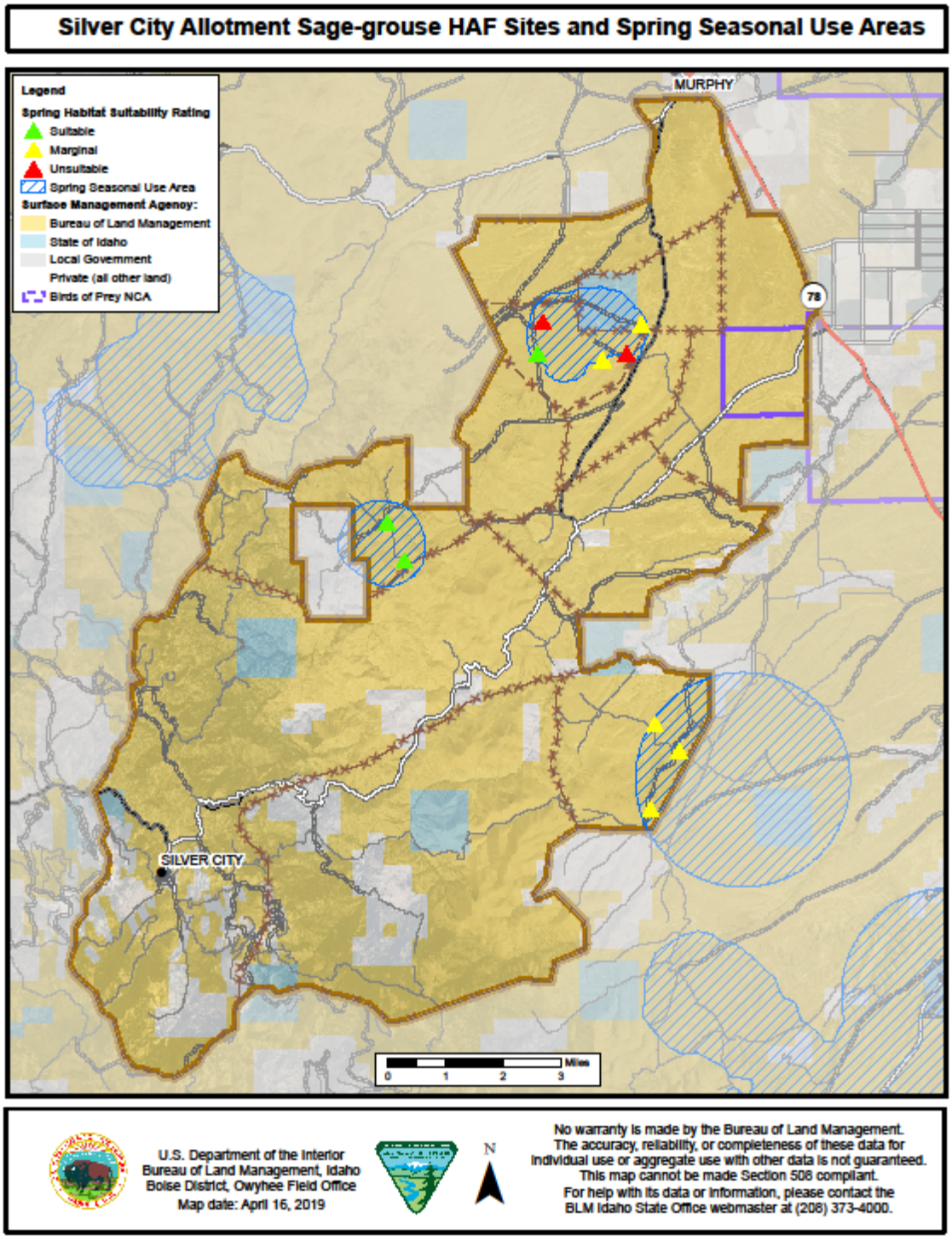

Figure APP 4.1 MAP 19. Greater sage-grouse HAF points within spring seasonal use areas (SUA)

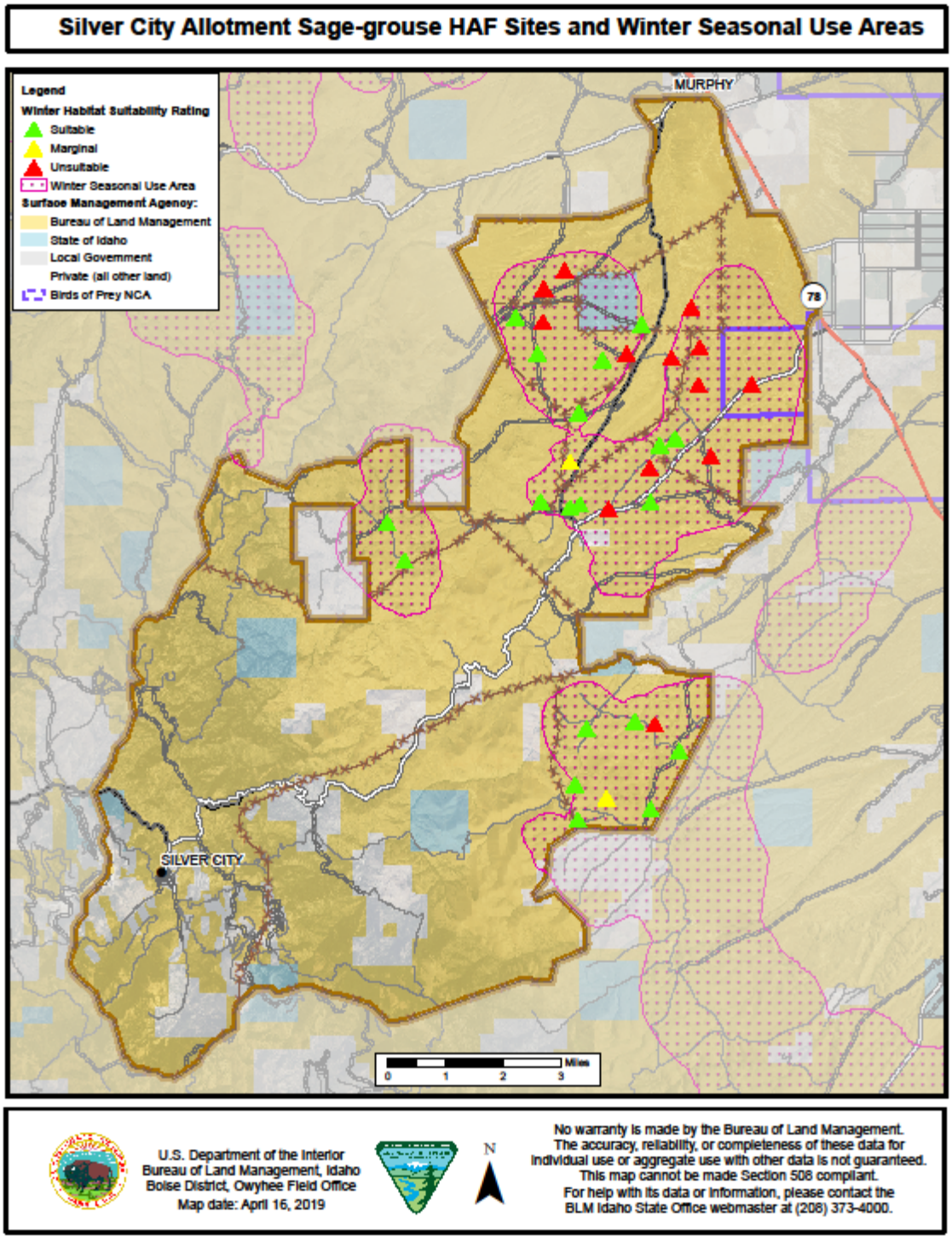

Figure APP 4.1 MAP 20. Greater sage-grouse HAF points within winter seasonal use areas (SUA)

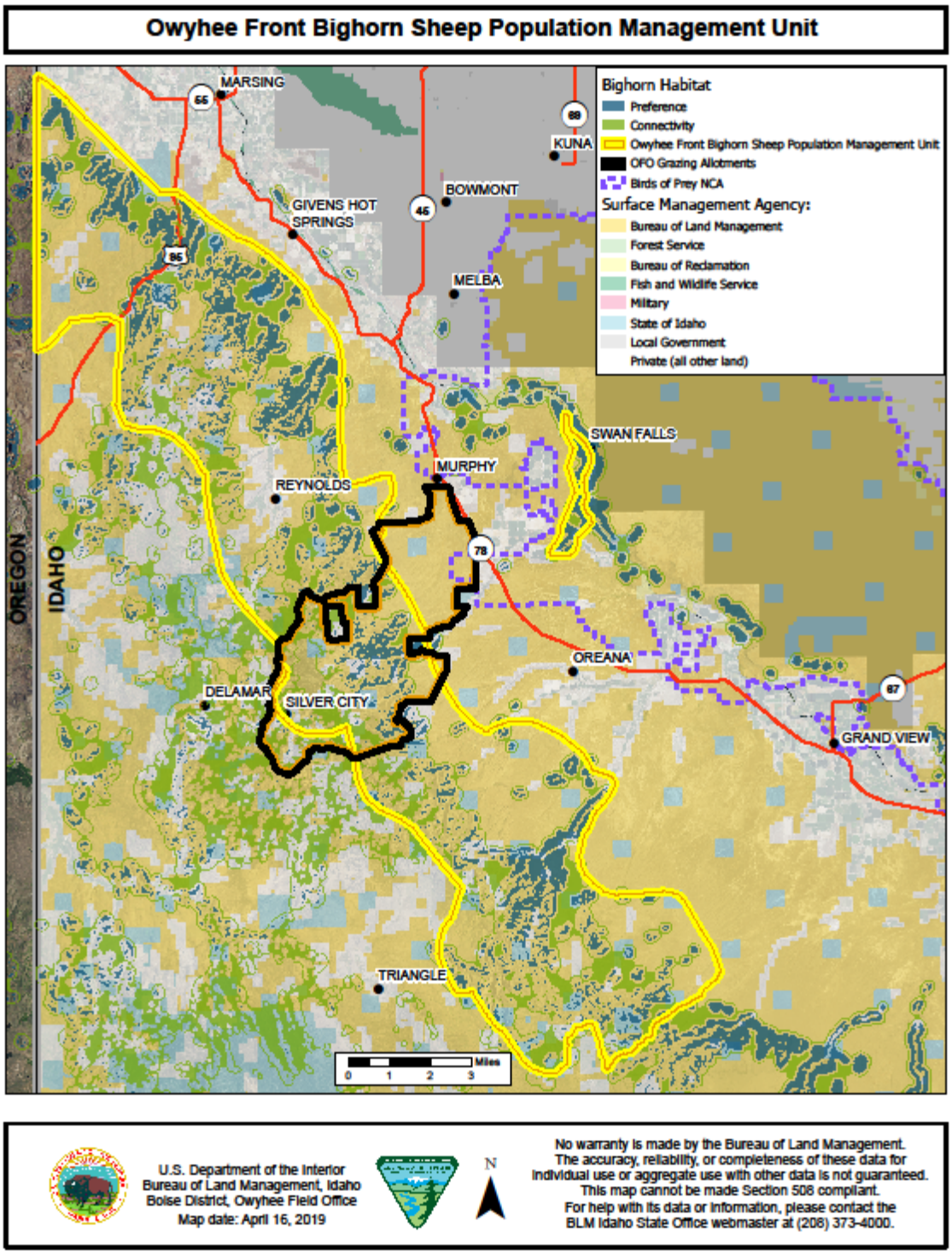

Figure APP 4.1 MAP 21. Owyhee Front bighorn sheep population management unit

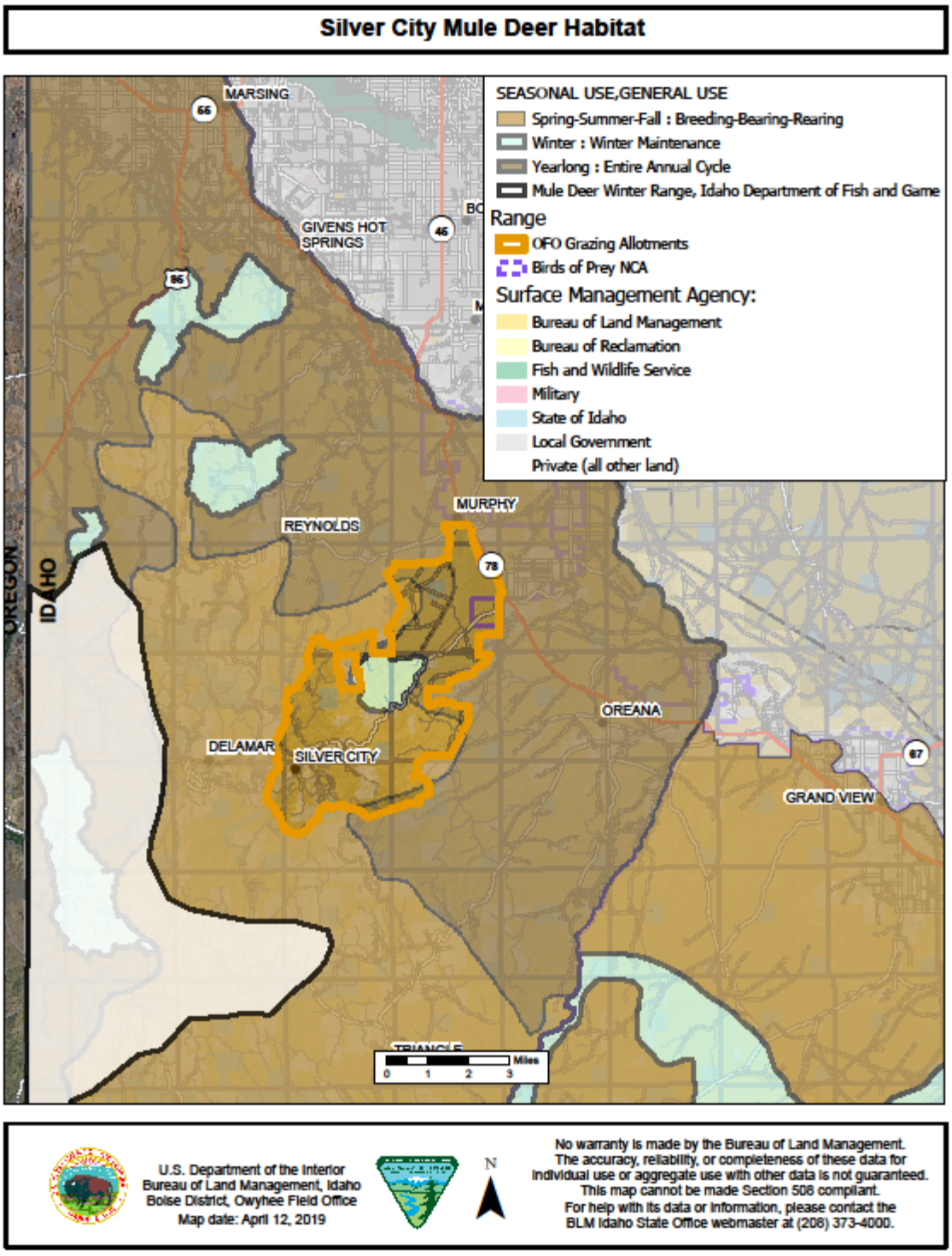

Figure APP 4.1 MAP 22. Silver City mule deer habitat

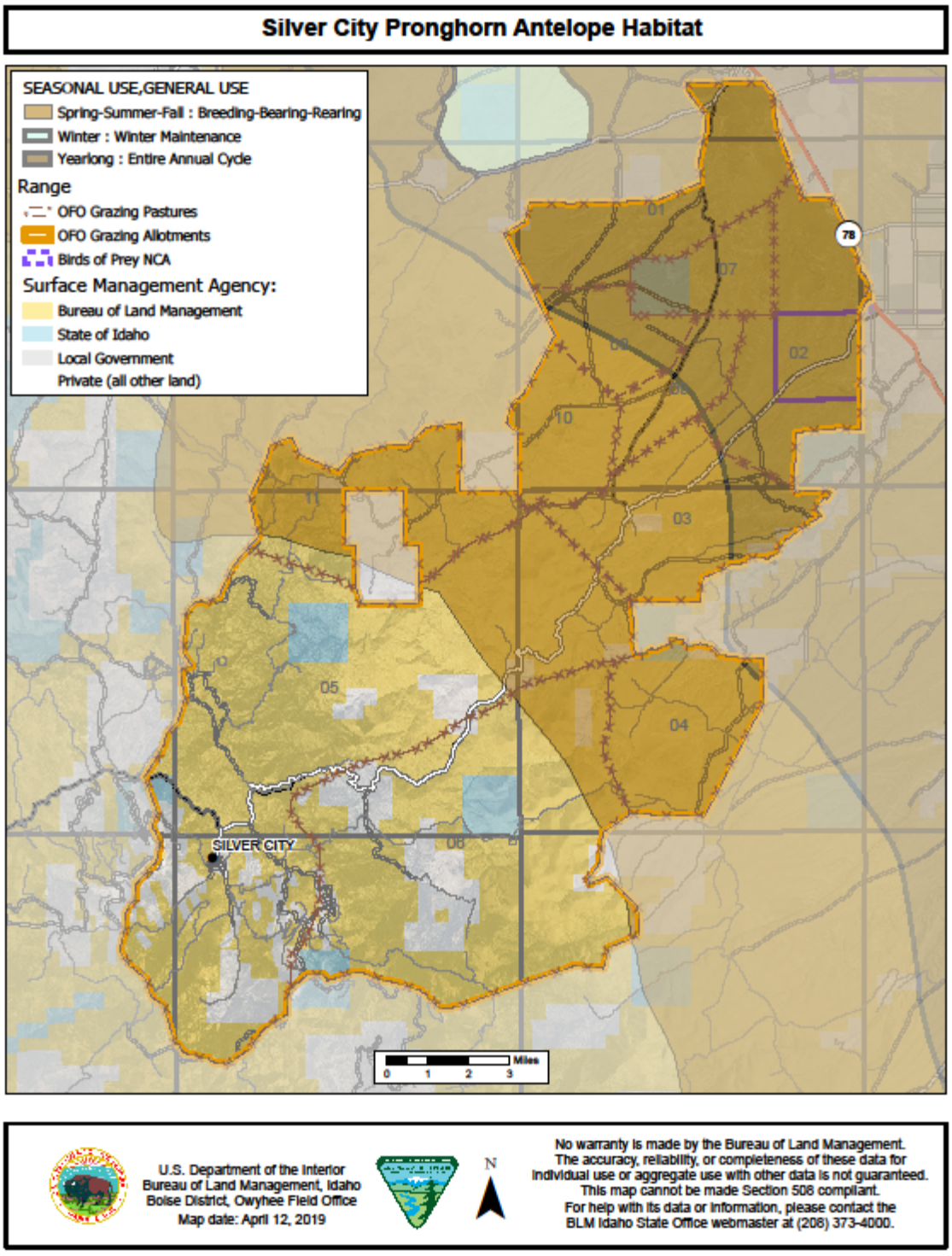

Figure APP 4.1 MAP 23. Silver City pronghorn antelope habitat

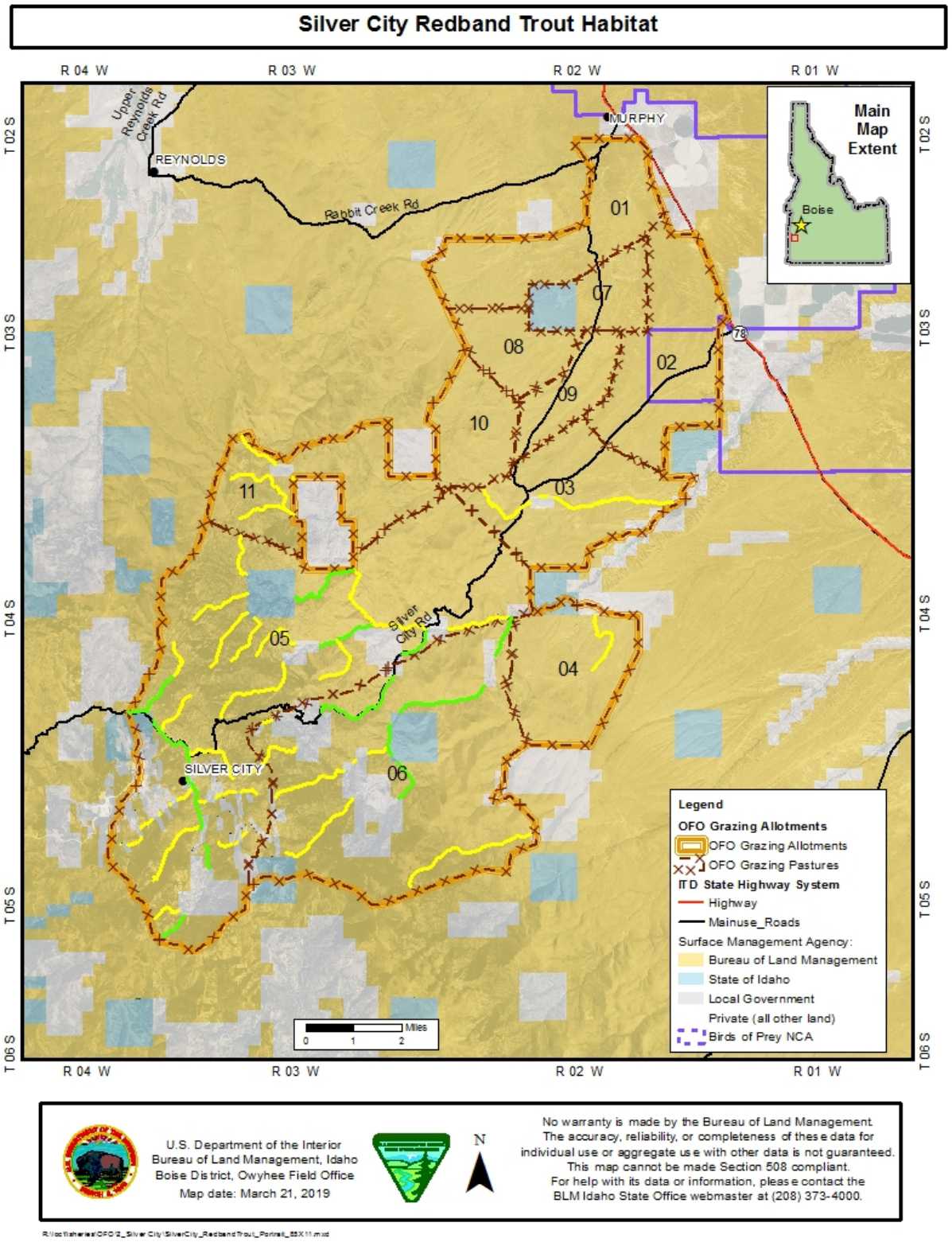

Figure APP 4.1 MAP 24. Silver City redband trout habitat

4.2 Special Status Wildlife

Table APP 4.2 – 1. Idaho BLM special status animal species for the Owyhee Field Office and their potential for occurrence within the Silver City Allotment.

Species Name	Status[1]	General Habitat[2]	Habitat Present[3]	Species Present[4]
Amphibians				
Western/Boreal Toad Western (*Anaxyrus boreas*) and Eastern (*Anaxyrus boreas boreas*) sub-groups	Type 2	Wide variety of habitats such as desert springs and streams, meadows and woodlands, and in and around ponds, lakes, reservoirs, and slow-moving rivers and streams.	Yes	Present
Columbia Spotted Frog (*Rana luteiventris*)	Type 2	Cool, permanent, quiet water in streams, rivers, lakes, pools, springs, and marshes usually in hilly areas from sea level to about 3000 m. Highly aquatic, but may disperse into forests, grasslands, and shrublands.	No	Not Present
Northern Leopard Frog (*Lithobates pipiens*)	Type 2	Permanent water sources on plains, foothill, and in montane zones.	Yes	Possible
Woodhouse's Toad (*Anaxyrus woodhousii*)	Type 2	Found in grasslands, shrub steppe, woods, river valleys, floodplains, and agricultural lands, usually in areas with deep, friable soils.	Yes	Possible
Birds				
Bald Eagle (*Haliaeetus leucocephalus*)	Type 2	Associated with aquatic ecosystems, including lakes, rivers, coastlines, marshes, and reservoirs.	No	Not Present
Black Tern (*Chlidonias niger*)	Type 2	Rivers and ponds. Nests in or on emergent vegetation in alkaline lakes and freshwater marshes, or in marshy areas along rivers, lakes, or ponds.	No	Not Present
Black-throated Sparrow (*Amphispiza bilineata*)	Type 2	In Idaho prefers open shrub areas dominated by big sage, spiny hopsage, or horsebrush exceeding 50cm in height.	Yes	Possible
Brewer's Sparrow (*Spizella breweri*)	Type 2	Sagebrush steppe. Distribution influenced by both local vegetation cover and landscape-level features such as patch size.	Yes	Present
Burrowing Owl (*Athene cunicularia*)	Type 2	Breeds in open, well-drained grasslands, prairies, farmlands, and shrub-steppes.	Yes	Present
Cassin's Finch (*Carpodacus cassinii*)	Type 2	Inhabits dry, open coniferous forests. They are most common in mid-elevation Ponderosa pine forests but can also be found in Douglas fir, spruce, or fir forests.	Yes	Present
Ferruginous Hawk (*Buteo regalis*)	Type 2	Found in shrub steppe at periphery of juniper or other woodlands.	Yes	Probable
Flammulated Owl (*Otus flammeolus*)	Type 2	In Idaho, occupies older ponderosa pine, Douglas-fir, and mixed coniferous forests.	Yes	Improbable
Golden Eagle (*Aquila chrysaetos*)	Type 2	In Idaho, prefers open and semi-open areas in deserts and mountains.	Yes	Present

Species Name	Status[1]	General Habitat[2]	Habitat Present[3]	Species Present[4]
Grasshopper Sparrow (*Ammodramus savannarum*)	Type 2	Appears to prefer moderately open grasslands and prairies with patchy bare ground, occupying lusher areas with shrub cover in arid grasslands.	Yes	Possible
Greater Sage-grouse (*Centrocercus urophasianus*)	Type 2	Habitat includes foothills, plains, and mountain slopes where sagebrush is present, often with a mixture of sagebrush, meadows, and aspen, in close proximity.	Yes	Present
Green-tailed Towhee (*Pipilo chlorurus*)	Type 2	In shrub-steppe environments, usually occurs in areas with high diversity of shrub species, often dominated by sagebrush, or within open piñon-juniper forest.	Yes	Present
Lewis' Woodpecker (*Melanerpes lewis*)	Type 2	Breeding sites generally occur in burned ponderosa pine forests, riparian forests, aspen groves, and oak woodlands.	Yes	Present
Loggerhead Shrike (*Lanius ludovicianus*)	Type 2	Found in open country with scattered trees and shrubs, in savannas, desert scrub and, occasionally, in open juniper woodlands.	Yes	Present
Long-billed Curlew (*Numenius americanus*)	Type 2	Long-billed curlews nest in open short-grass or mixed-prairie habitat with level to slightly rolling topography and generally avoid areas with trees, high-density shrubs, and tall, dense grasses.	Yes	Present
Northern Goshawk (*Accipiter gentilis*)	Type 2	In Idaho, summers and nests in coniferous and aspen forests; winters in riparian and agricultural areas.	Yes	Possible
Olive-sided Flycatcher (*Contopus borealis*)	Type 2	Primarily occurs in montane and northern coniferous forests. Associated with forest openings, forest edges near natural openings (e.g., meadows, canyons, rivers) or human-made openings (e.g., harvest units), or open to semi-open forest stands.	Yes	Possible
Sage Sparrow (*Amphispiza belli*)	Type 2	Prefers big sagebrush—whether pure stands or interspersed with bitterbrush, saltbush, shadscale, rabbitbrush, or greasewood. Rarely in mixed sagebrush-juniper, except in ecotones adjacent to shrub-steppe habitat.	Yes	Present
Sage Thrasher (*Oreoscoptes montanus*)	Type 2	Shrub-steppe dominated by big sagebrush. Considered a sagebrush obligate.	Yes	Present
Short-eared Owl (*Asio flammeus*)	Type 2	Associated with open landscapes such as marshes, grasslands, tundra, and agricultural lands.	Yes	Possible
Trumpeter Swan (*Cygnus buccinator*)	Type 2	Nests on a wide variety of freshwater marshes, ponds, lakes, and occasionally rivers.	No	Not Present

Species Name	Status[1]	General Habitat[2]	Habitat Present[3]	Species Present[4]
White-headed Woodpecker (*Picoides albolarvatus*)	Type 2	Requires montane coniferous forests dominated by pines, with tree species composition varying geographically.	Yes	Improbable
Willow Flycatcher (*Empidonax trailii*)	Type 2	In general, prefers moist, shrubby areas, often with standing or running water.	Yes	Present
Fish				
Redband Trout (*Oncorhynchus mykiss gairdneri*)	Type 2	Found in a range of stream habitats from desert areas in southwestern Idaho to forested mountain streams in central and northern Idaho.	Yes	Present
White Sturgeon (*Acipenser transmontanus*) – Snake River population above Hells Canyon Complex only	Type 2	Rely on streams, rivers, and estuarine habitat as well as marine waters during their lifecycle. Prefer to spawn in rivers with swift currents and large cobble; no nest is built.	No	Not Present
Invertebrates				
Snake River Physa (*Haitia [Physa] natricina*)	Type 1: E	Inhabits deep water on the margins of moderately swift rapids or riffles. Individuals have been found in relatively undisturbed areas with gravel, boulder, or cobble substrates.	No	Not Present
Ashy (Columbia) Pebblesnail (*Fluminicola fuscus*)	Type 2	Found in larger tributaries and rivers, on upper surfaces of stable rocks, boulders and bedrock outcrops in fast current, in relatively shallow water.	No	Not Present
California Floater (*Anodonta californiensis*)	Type 2	Occurs in lakes and large streams at low elevations. This species is typically found on soft substrates and in areas with relatively slow current.	No	Not Present
Mammals				
Big Brown Bat (*Eptesicus fuscus*)	Type 2	Various wooded and semi-open habitats, including cities. More abundant in regions dominated by deciduous forest than in coniferous forest areas. Summer roosts are generally in buildings; also hollow trees, rock crevices, tunnels, and cliff swallow nests.	Yes	Possible
Bighorn Sheep (*Ovis canadensi spp.*)	Type 2	Populations occupy rugged canyons, foothills, and mountainous terrain. Key habitat features include steep, rugged “escape” terrain, grasses and forbs for forage, and a limited amounts of tall vegetation.	Yes	Possible
California Myotis (*Myotis californicus*)	Type 2	Occurs in dry conifer forest, sagebrush steppe, riparian, and juniper habitats. Roost types in Idaho are poorly known. Mines and caves are reportedly used.	Yes	Possible

Species Name	Status[1]	General Habitat[2]	Habitat Present[3]	Species Present[4]
Canyon Bat (*Parastrellus hesperus*)	Type 2	Deserts and lowlands, desert mountain ranges, desert scrub flats, and rocky canyons. Day and night roosts include rock crevices, under rocks, burrows and sometimes buildings or mines. May hibernate in cave, mine, or rock crevice.	Yes	Possible
Dark Kangaroo Mouse (*Microdipodops megacephalus*)	Type 2	Soft, sandy soils in hot dry sagebrush areas. In Idaho found in loose sands and gravel in shadscale scrub, sagebrush scrub, and alkali plant communities.	No	Not Present
Fringed Myotis (*Myotis thysanodes*)	Type 2	This species is has been encountered most frequently in Idaho at low- and mid-elevation mines. Dominant vegetation at capture sites has included sagebrush, mountain mahogany, and ponderosa pine. The species has often been encountered in steep river valleys, large canyons, or other sites having steep and rocky terrain.	Yes	Possible
Hoary Bat (*Lasiurus cinereus*)	Type 2	Habitat includes primarily deciduous and coniferous forests and woodlands, including areas altered by humans. Roost sites are usually in tree foliage 3-5 meters above ground, with dense foliage above and open flying room below, often at the edge of a clearing and commonly in hedgerow trees. Sometimes these bats roost in rock crevices, rarely in caves.	Yes	Present
Kit Fox (*Vulpes macrotis*)	Type 2	Closely associated with desert shrub and shrub-steppe habitats. Shadscale, black greasewood, and big sagebrush are often dominant plants in occupied habitat.	Yes	Improbable
Little Brown Bat (*Myotis lucifugus*)	Type 2	Use a wide range of habitats and often use human-made structures for resting and maternity sites; they also use caves and hollow trees. Foraging habitat requirements are generalized; foraging usually occurs in woodlands near water.	Yes	Possible
Long-eared Myotis (*Myotis evotis*)	Type 2	Mostly forested areas, especially those with broken rock outcrops; also shrubland, over meadows near tall timber, along wooded streams, over reservoirs. Often roosts in buildings, also in hollow trees, mines, caves, fissures, etc.	Yes	Possible
Long-legged Myotis (*Myotis volans*)	Type 2	Primarily in montane coniferous forests; also riparian and desert habitats. Uses caves and mines as hibernacula, but winter habits are poorly known.	Yes	Possible

Species Name	Status[1]	General Habitat[2]	Habitat Present[3]	Species Present[4]
Merriam's Ground Squirrel (*Urocitellus canus*)	Type 2	Mainly in high desert (sagebrush, shadscale, greasewood, western juniper), grasslands, pastures; also in river valley bottomland. In Idaho, occurs south of the Snake River and west of Reynolds Creek.	No	Not present
Pallid Bat (Antrozous pallidus)	Type 2	Arid deserts and grasslands, often near rocky outcrops and water. Less abundant in evergreen and mixed conifer woodland. Usually roosts in rock crevice or building, less often in cave, tree hollow, mine, etc.	Yes	Possible
Piute Ground Squirrel (*Urocitellus mollis*)	Type 2	Mainly in high desert (sagebrush, shadscale, greasewood). In southwestern Idaho, highest densities were in winterfat-Sandberg's bluegrass communities, with intermediate densities in big sagebrush-dominated communities and lowest densities in shadscale communities; scarce in communities dominated by exotic annuals.	Yes	Possible
Pygmy Rabbit (*Brachylagus idahoensis*)	Type 2	Habitat comprises dense, tall stands of big sagebrush growing on deep, friable soils.	Yes	Improbable
Silver-haired Bat (*Lasionycteris noctivagans*)	Type 2	Habitat is primarily forested (frequently coniferous) areas adjacent to lakes, ponds, or streams, including areas that have been altered by humans.	Yes	Present
Spotted Bat (*Euderma maculatum*)	Type 2	This species characteristically occurs in association with xeric and riparian habitats in deep, narrow canyons where massive cliffs predominate. Individuals roost solitarily in cracks or crevices in rocky outcrops and cliffs.	Yes	Possible
Townsend's Big-eared Bat (*Corynorhinus townsendii*)	Type 2	Commonly occur in mesic habitats characterized by coniferous and deciduous forests. Distribution and abundance is highly correlated with suitable cavity forming rock formations and historic mining districts.	Yes	Possible
Western Small-footed Myotis (*Myotis ciliolabrum*)	Type 2	Roosts in summer in rock crevices, caves, tunnels, under boulders, beneath loose bark, or in buildings. Hibernates in caves and mines.	Yes	Possible
Yuma Myotis (*Myotis yumanensis*)	Type 2	More closely associated with water than most other North American bats. Found in a wide variety of upland and lowland habitats, including riparian, desert scrub, moist woodlands and forests, but usually found near open water.	Yes	Possible
Reptiles				

Species Name	Status[1]	General Habitat[2]	Habitat Present[3]	Species Present[4]
Great Basin Black-collared Lizard (*Crotaphytus bicinctores*)	Type 2	Occurs mainly in xeric, sparsely vegetated rocky areas; sometimes in adjacent areas lacking much rock; it perches atop rocks, and hides under rocks or in rodent burrows.	Yes	Present
Longnose Snake (*Rhinocheilus lecontei*)	Type 2	Typical habitats include deserts, dry prairies, arid river valleys, thornbrush, and shrubland.	Yes	Possible
Groundsnake (*Sonora semiannulata*)	Type 2	Habitats include arid and semiarid regions: river bottoms, desert flats, sand hummocks, rocky hillsides with pockets of loose soil; from prairie and desert lowlands to pinyon-juniper and oak-pine zone; soil may be rocky to sandy, vegetation dense to sparse.	Yes	Possible

[1] Status includes Type 1 (federally listed Threatened (T) or Endangered (E) Species, Experimental Essential populations, and designated Critical Habitat listed under the Endangered Species Act (16 U.S.C. § 1531-1544) and Type 2 (Idaho BLM Sensitive Species, including USFWS Proposed (P) and Candidate (C) species, ESA species delisted during the past 5 years, and ESA Experimental Non-essential populations (USDI-BLM 2014).

[2] Habitat descriptions modified from IFWIS CWCS 2010 and NatureServe 2015.

[3] Presence of habitat within project area was determined from IFWIS Observation Data 2018; Idaho Fish and Game State Wildlife Action Plan 2017; Idaho BLM unpublished data; and specialist expertise.

[4] Categories include: **Present** = species presence documented; **Probable** = species likely to occur based on preferred habitat and local species abundance and nearby (<5 miles) occurrences; **Possible** = species may occur based on preferred habitat and/or occurrences within 25 miles; **Improbable** = species not likely to occur based on limited or lack of preferred habitat and/or occurrence over 50 miles; and **Not Present** = species not present due to lack of habitat.

4.3 Monitoring Methods

This appendix summarizes the methods for data collection and analysis used for the 2018 Silver City Assessment.

Indicators of Rangeland Health

Indicators of Rangeland Health were evaluated by an interdisciplinary team (IDT) in the summer of 2015 at 33 different locations within the eleven pastures (Figure APP 4.1 Map 12, 13 and 14). Indicators were evaluated and recorded using *Interpreting Indicators of Rangeland Health* BLM Technical Reference 1734-6 (USDI BLM 2005). Locations were selected within each major ecological site in each pasture, generally (but not exclusively) using the following criteria:

- Between about 0.25 and 1.0 miles from water
- Not more than 30% slope
- At least 100 yards from fences and roads
- When practical, randomly generated points for sage-grouse habitat assessments were used.

The IDT intentionally did not go back to the exact same location as the 2002 Indicators, in part because the current Rangeland Health Assessment replaces the 2003 work with updated information; the current assessment focuses on information collected between 2003 and 2017. Also, because Rangeland Health Indicators are qualitative rather than quantitative data and are not designed to monitor trend, a direct comparison of 2002 and 2014 Indicators is not appropriate.

In addition to Indicator locations, the IDT also took three photo points, with photos and notes rather than recording all the indicators, if an area appeared similar to an indicator stop within the pasture. These photos provide supporting information on conditions within a pasture.

At each stop, 17 Rangeland Health Indicators were rated. The 17 Indicators are listed in Table 1; see TR 1734-6 for a description of each indicator. Each indictor is rated on the degree of departure from the appropriate ecological site description or ecological reference area. The indicators are compiled into three interlocking attribute categories representing soil/site stability, hydrologic function, and biotic integrity. The preponderance of evidence of each attribute determines the condition of the site. Reference sheets from the most recent ecological site descriptions were used.

Table APP 4.3 - 1. Interpreting Indicator numbers and correspond Rangeland Health Standard.

Indicator Number	Indicator	Applicable Idaho Rangeland Health Standard(s)
1	Rills	1
2	Water-flow Patterns	1
3	Pedestals and/or terracettes	1
4	Bare Ground	1
5	Gullies	1
6	Wind-scoured, blowouts, and/or deposition areas	1
7	Litter movement	1

Indicator Number	Indicator	Applicable Idaho Rangeland Health Standard(s)
8	Soil surface resistance to erosion	1,4,5
9	Soil surface loss or degradation	1,4,5
10	Plant community composition and distribution relative to infiltration	1
11	Compaction layer	1,4,5
12	Functional/structural groups	4,5
13	Plant mortality/decadence	4,5
14	Litter amount	1,4,5
15	Annual production	4,5
16	Invasive plants	4,5
17	Reproductive capability of perennial plants	4,5

In addition to rating the 17 indicators at each site, we collected soil stability tests (per TR 1734-6) and recorded species present on Functional/Structural Groups sheets (also per TR 1734-6). At most sites we also measured vegetation using the sage-grouse HAF (Stiver et al. 2015), collecting canopy and ground cover (point intercept), shrub canopy cover (line intercept), and forb availability (frequency plots); see the wildlife section for details.

Rangeland Health Indicators from 2002 were considered in a general sense, but because the 2014 Assessment focuses on conditions since the previous 2004 assessment, those indicators were not analyzed in depth.

Ecological Sites

Ecological sites descriptions (ESDs) were developed by the USDA NRCS. They are derived from soil survey information (USDA NRCS n.d.) which identified map units of predominant soil types. These soil units are mapped at a large scale. To verify the ecological site, the IDT dug a soil pit sufficient to determine the specific soil type from the predominant soils listed within the map unit.

The IDT used a combination of draft and approved ESDs. Currently, there are provisionally approved ESDs for all major ecological sites in the Silver City allotment (https://esis.sc.egov.usda.gov/ Accessed February 2015).

The definition of Provisional ESDs from https://esis.sc.egov.usda.gov/ follows:

> A provisional ecological site is established after ecological site concepts are developed and an initial state-and-transition model is drafted. Following quality control and quality assurance reviews of the ecological site concepts, an identification number and name for the provisional ecological site are entered into ESIS [Ecological Site Information System]. A provisional ecological site may include literature reviews, land use history information, some soils data, legacy data, ocular estimates for canopy and/or species composition by weight, and even some line-point intercept information. A provisional ecological site does not meet the NESH 2014 standards for an Approved ESD, but does

provide the conceptual framework of soil-site correlation for the development of the ESD.

Utilization

Utilization data are used to measure the levels of herbivory and browsing (USDI BLM 1999b). Utilization is expressed as a percentage of available forage , twigs, etc., that have been consumed. Generally, utilization transects are performed at the permanent trend sites, and at other locations throughout a pasture or allotment. The forage utilization data used in this assessment were collected using the Key Species Method (USDI BLM 1999b).

Long-term Vegetation Monitoring (Trend)

Fifteen permanently located monitoring sites have been established in uplands in the Silver City allotment, one nested plot frequency transect (NPFT) in each of the eleven pastures and additional photo points (PP) in pastures 8 and 11 (1 and 3 sites respectively). Methods are derived from *Measuring and Monitoring Plant Populations* (Elzinga et al. 1998).

These sites are located in key areas subjectively selected to represent livetock grazing use in the allotment or pasture. These locations are coordinated with the livestock operators to ensure locations represent the mid-line of livestock use; they should not be in areas of non-use or near watering areas with high use. The locations also should represent the dominant plant community that livestock use to determine changes in frequency (increasing, decreasing, or static) of forage species. Trend sites are labor intensive data collection sites, and therefore few sites are established in a pasture or allotmenet. Trend data are repeated measurements for a site, and are highly valuable for comparisons across years. The data are representative of frequency, ground cover, and density values at that site, and used to represent changes in plant composition within the pasture.

The trend sites were established in the 1980s, and re-read in 2003/2004, 2008/2009, and 2013/2014. At photo-plots, trend is determined qualitatively through visual evidence of changes in plant community composition and vigor, as well as field notes collected at each site.

At the NPFT sites, data collected includes nested plot frequency for all species (perennial only before 2003), canopy and ground cover, and shrub density. At both NPFT and PP sites, photographs are taken, of a 3 ft x 3 ft plot and landscape photos. Frequency data illustrate changes in occurences of plants and provides information on reproductive episodes. Data shown are the percentage of plots at a site that contain the specific plant species. Ground cover data represents the percent of ground in contact with plant material (non-persistent and persistent litter), biologic soil crusts, gravel, rock, and plant bases; canopy and middle layer cover measure vegetation above the ground. For data collection specifics, see USDI BLM 2005 (Boise District Procedures for NPFT). For data analysis specifics, see below.

Nested Plot Frequency Data

This quantitative data are summarized and analyzed graphically, to visualize the relative frequency of various grasses, shrubs, and forbs by year at a site giving an overall representation of apparent trend and the relative abundance of species.

For each site and species, the total number of hits for the 20 quadrats per belts was used as the sampling unit, providing an n=5 for each site/species/year combination. The largest plot size (plot 4: 50 cm x 50 cm) of the nested frequency set was used for each species. The five samples per site were averaged, and the standard deviation calculated. Then a paired, two-tailed Student's T test was run to determine whether the difference between the means of two years was significantly different at $p<0.05$.

Ground Cover
Ground cover is recorded as a point intercept for 80 points at each of the five belts, resulting in 400 hits per site. Ground cover categories recorded were bare ground, gravel, stone, non-persistent litter, persistent litter, biologic soil crust, and live basal vegetation. Paired, two-tailed Student's T tests were calculated on mean percentage of each belt. Changes were deemed significant at $p<0.05$

Shrub Density
Shrub density was measured at two 1/200-acre or 1/100-acre plots at each NPFT monitoring site. These data are expressed as plants per acre. The average shrub density each year was mapped, by species or species group. Because of the small sample size (two plots per site), apparent trend is inferred from the graphs.

Photo Plots
At each trend monitoring site (NPFT and PP), photographs were taken of the fixed 3 ft x 3 ft photo plot, and landscape photos from each end of the monitoring baseline (centerline). A sketch of plants, rocks, etc. within the photo plot was also made in order to correlate with the photograph to document plant vigor and health.

Sage-grouse Habitat Assessment Framework Monitoring
The conditions of sage-grouse seasonal habitats were assessed following protocols outlined in the Sage-grouse Habitat Assessment Framework (HAF; Stiver et al. 2015).

Below, in Tables APP 4.3 - 2 to APP 4.3 – 6, are the indicators used to evaluate sage-grouse seasonal habitat suitability. A range of additional supplemental habitat indicators were also collected to help determine suitability for these upland seasonal habitats (e.g., non-sagebrush shrub cover and height, annual grass cover and height, and bare ground cover). Habitat indicators and suitability ranges should not be viewed independently but rather as an assembly of vegetation components that contribute to providing for sage-grouse seasonal habitat requirements. For clarification, Sandberg bluegrass was not included in generating average perennial grass canopy cover and height estimates for habitat suitability. This approach is consistent with Stiver et al. (2015) and provides more accurate information on large stature perennial bunchgrasses with greater effective growth form and vertical height.

Table APP 4.3 - 2. Sage-grouse lek habitat suitability indicators (Stiver et al. 2015)

Habitat Indicator	Suitable Habitat	Marginal Habitat	Unsuitable Habitat
Availability of Sagebrush Cover	Lek has adjacent sagebrush cover (within 100 m)	Sagebrush provides very little protective cover adjacent to the perimeter of the lek	Adjacent nesting habitat unavailable
Proximity of Detrimental Land Uses	Detrimental land uses are not within line of sight of lek and absent to uncommon within 3 km of lek	Detrimental land uses are within line of sight of lek and uncommon or few within 3 km of lek	Detrimental land uses are within the vicinity of the lek site
Proximity of Trees or Other Tall Structures	Trees or other tall structures are not within line of sight of lek and absent to uncommon within 3 km of lek	Trees or other tall structures are within line of sight of lek though uncommon or scattered within 3 km of lek	Trees or other tall structures are within the vicinity of the lek site

Table APP 4.3 - 3. Sage-grouse breeding habitat suitability indicators (Stiver et al. 2015)

Habitat Indicator	Suitable Habitat	Marginal Habitat	Unsuitable Habitat
Sagebrush Canopy Cover (mean)	15% - 25%	5 to < 15% or > 25%	< 5%
Sagebrush Height (mean) Mesic Arid	 40 to 80 cm[1] 30 to 80 cm[1]	 20 to < 40 cm or > 80[1] 20 to < 30 cm or > 80[1]	 < 20 cm[1] < 20 cm[1]
Predominant Sagebrush Shape	Spreading	Mix of spreading and columnar	Columnar
Perennial Grass and Forb Height (mean)	> 18 cm[1]	10 to < 18 cm[1]	< 10 cm[1]
Perennial Grass Canopy Cover (mean)[2] Mesic Arid	 ≥ 15% ≥ 10%	 5 to < 15% 5 to < 10%	 < 5% < 5%
Perennial Forb Canopy Cover (mean) Mesic Arid	 ≥ 10% ≥ 5%	 5 to < 10% 3 to < 5%	 < 5% < 3%
Preferred Forb Availability	Preferred forbs are common with several species present	Preferred forbs are common but only a few species are present	Preferred forbs are rare

[1]Information is collected in metric units. U.S unit conversion (rounded): 10cm = 4”; 18cm = 7”; 20cm = 8”; 30cm = 12”; 40cm = 16”; 80cm = 32”

[2]Average perennial grass canopy cover does not include Sandberg bluegrass.

Table APP 4.3 - 4. Sage-grouse upland summer habitat suitability indicators (Stiver et al. 2015)

Habitat Indicator	Suitable Habitat	Marginal Habitat	Unsuitable Habitat
Sagebrush Canopy Cover (mean)	10% - 25%	5 to < 10% or > 25%	< 5%
Sagebrush Height (mean)	40 to 80 cm[1]	20 to < 40 cm or > 80[1]	< 20 cm[1]
Perennial Grass and Forb Height (mean)	> 18 cm[1]	10 to < 18 cm[1]	< 10 cm[1]
Perennial Grass Canopy Cover (mean)[2]	≥ 15%	5 to < 15%	< 5%
Preferred Forb Availability	Preferred forbs are common with several species present	Preferred forbs are common but only a few species are present	Preferred forbs are rare

[1]Information is collected in metric units. U.S unit conversion (rounded): 10cm = 4 inches; 18cm = 7 inches; 20cm = 8 inches; 30cm = 12 inches; 40cm = 16 inches; 80cm = 32 inches
[2]Average perennial grass canopy cover does not include Sandberg bluegrass.

Table APP 4.3 - 5. Sage-grouse riparian summer habitat suitability indicators (Stiver et al. 2015)

Habitat Indicator	Suitable Habitat	Marginal Habitat	Unsuitable Habitat
Riparian and wet meadow Stability (mode) PFC[1] (n) FAR[1] (n) NF[1] (n)	Majority of areas are in PFC	Majority of areas are FAR	Majority of areas are NF
Forb availability (relative to site potential)	Preferred forbs are common with several species present	Preferred forbs are common but only a few species present	Preferred forbs are rare
Proximity of sagebrush cover	Sagebrush cover is adjacent to brood-rearing area (< 90m)[2]	Sagebrush cover is in close proximity of brood-rearing areas (90m to 275 m)[2]	Sagebrush cover is unavailable (> 275m)[2]

[1] PFC = proper functioning condition; FAR = functioning at-risk; NF = non-functioning.
[2] Conversions: 90m = near 100 yards; 275m = near 300 yards.

Table APP 4.3 - 6. Sage-grouse winter habitat suitability indicators (Stiver et al. 2015)

Habitat Indicator	Suitable Habitat	Marginal Habitat	Unsuitable Habitat
Sagebrush Canopy Cover (mean)	≥ 10%	5 to < 10%	< 5%
Sagebrush Height Above Snow (mean)	> 25 cm	> 10 cm to < 25 cm	< 10 cm[1]

[1]Information is collected in metric units. U.S unit conversion (rounded): 10cm = 4 inches; 25cm = 10 inches.

HAF transect locations were randomly generated in GIS using the following criteria:

- Create polygons by intersecting sage-grouse Preliminary Priority Habitat x allotment pastures x ESD grouping x < 40% slope.
    - Use grouped ESDs (ARTRW/ARTRV/ARTRX, ARNO/ARAR, and ARTRT) – based on recommendations from Boise District ecologists.
- Create 100m buffer from known fences, roads, and water sources.
- Randomly generate 10 points within the aforementioned unit

HAF transects were established using the following criteria:

- Establish transects in ESD polygons listed under Priority 1 data file on GPS unit. ESD polygons of ≤ 320 acres within pastures are listed under Priority 2 data file.
- Establish transects so all portions of the transect are at least 100-m from fences, roads, and water sources, as well as other anthropogenic features
- If possible, complete a minimum of three HAF transects in all Priority 1 polygons within each allotment pasture. Complete HAF transects in Priority 2 polygons as time allows.

Ground cover data from the HAF transects were also used to assess soils, and both ground cover and foliar cover were used to assess upland vegetation conditions. For the discussion of soils or vegetation, different ground cover categories were grouped for analysis, depending on the resource emphasis.

Assessment, Inventory, and Monitoring (AIM)

Upland areas are assessed using methods described in the *Monitoring Manual for Grassland, Shrubland, and Savanna Ecosystems* (Herrick et al 2009). Data collected for AIM inform a number of soil, hydrologic and vegetative characteristics at the landscape scale. Sites were selected according to a spatially balanced model which distributes points across the landscape.

Core AIM methods include line point intercept (LPI) which informs foliar cover, soil surface and vegetation height; canopy gap which informs canopy cover and interspace size/connectivity; and soil stability which describes soil aggregates and overall site stability. Basal gap was also performed on these sites, although not a core method, which describes the space between perennial plants. Sagebrush shape and height as well as forb abundance were added to the core methods to fufill HAF monitoring requirements. For additional information see https://aim.landscapetoolbox.org/.

Special Status Plants

The Silver City allotment has occurrences of eleven species of special status plant recorded. Following is the best available information on conditions of each occurrence within the allotment. Element occurrence (EO) numbers are assigned by Idaho Department of Fish and Game Heritage Program (IDFG 2016), to facilitate tracking between years; occurrences without an assigned EO# are identified by the date of the record and initials of observer. Note that some occurrences consist of several patches (subpopulations) that may span multiple pastures or allotments; conditions refer only to the part of the occurrence within that particular pasture.

Noxious Weeds
Noxious weed infestations and treatments information is based on BLM GIS records (as of 2015, the most recent year available), compiled by the Boise District BLM weed specialist. The database only includes noxious weeds, not invasive species.

Riparian Areas, Wetlands, and Water Quality
Riparian areas and wetlands are assessed using protocols developed by the BLM USDI, 1999a; USDI, 1998). Springs (lentic environments) were assessed with TR 1737-16 *A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lentic* Areas. Stream systems (lotic environments) were assessed with TR 1737-15 *A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas*. Sites were selected for assessment based on previous monitoring site visits to include lentic and lotic PFC assessment, riparian stubble height monitoring, and photographic monitoring.

Stubble height, streambank alteration, and woody species use are measured using the MIM protocol with TR 1737-23 *Multiple Indicator Monitoring (MIM) of Stream Channels and Streamside Vegetation* (BLM 2011). These measurements are taken in the fall, or after livestock have been removed, along the greenline of creeks to document utilization of riparian plants and streambank alteration.

Water quality is regulated by Idaho Department of Environmental Quality (IDEQ) which follows protocols established or approved by the EPA. IDEQ has conducted several different water quality sampling events to include bank stability investigations, sediment load analysis, and water temperature monitoring. BLM has conducted bacteria sampling for E. coli following EPA protocols.

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4.4 Utilization Data

4.4.1 Utilization Data provided by Joyce Livestock Co.

Table APP 4.4 - 1. Pasture 1 utilization data

Pasture	Year	Squirreltail	Squirreltail/Indian ricegrass
1	2016	17.2	9.3

Table APP 4.4 - 2. Pasture 2 utilization data

Pasture	Year	Squirreltail
2	2017	4.1
		6.2

Table APP 4.4 - 3. Pasture 3 utilization data

Year	Sandberg bluegrass	Squirreltail	Crested wheatgrass	Bluebunch wheatgrass	Idaho fescue
2017	5.2	5	-	17.7	-
	4.6	4.1	-	-	-
2016	7.5	3	-	-	-
	7	-	-	-	-
2015	-	19	-	-	-
	-	18	-	-	-
	-	28	-	-	-
2014	-	-	20	-	-
2013	-	8.4	-	0	0
	-	15	-	-	-
2012	-	-	14	-	-
	-	-	15.6	-	-
2009	-	18	-	-	-
	-	15	-	-	-
	-	28	-	-	-
	-	27	-	-	-
2008	-	3	-	-	-

Table APP 4.4 - 4. Pasture 4 utilization data

Pasture	Year	Squirreltail	Squirreltail/Bluebunch wheatgrass
4	2017	11.2	10.9

Table APP 4.4 - 5. Pasture 5 utilization data

Pasture	Year	Squirreltail	Bluebunch wheatgrass	Mountain brome	Bluebunch wheatgrass/ Mountain brome	Bluebunch wheatgrass/ Mountain brome/Squirreltail/Idaho fescue	Bluebuncj wheatgrass/ Mountain brome/Idaho fescue
5	2016	-	-	29.9	18.5	-	-
	2015	-	-	-	19	-	-
		-	-	-	28.6	-	-
	2014	9.8	16.6	26	-	-	-
	2013	-	27	-	-	-	-
		-	20.4	-	-	-	-
	2011	-	-	-	-	29	23
		-	-	-	-		26

Table APP 4.4 - 6. Pasture 6 utilization data

Pasture	Year	Bluebunch wheatgrass	Idaho fescue	Bluebunch wheatgrass/Mountain brome	Bluebunch wheatgrass/Idaho fescue	Squirreltail/Bluebunch wheatgrass	Bluebunch wheatgrass/Idaho fescue/Squirreltail	Bluebunchwheatgrass/BRMA4/ Squirretail /Idaho fescue	Bluebunch wheatgrass/Mountainbrome/Idaho fescue
6	2017	-	-	-	-	19.2	10.1	14.3	-
		-	-	-	-	9.6	-	-	-
	2016	0	0	25.8	0	9.6	-	-	-
	2015	21	-	-	-	16	-	-	-
		-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-
	2013	19.7	-	-	-	-	-	-	-
		25.9	-	-	-	-	-	-	-
		20.9	-	-	-	-	-	-	-
		15.1	-	-	-	-	-	-	-
	2011	-	-	-	-	12	14	-	26
		-	-	-	-	18	28	-	-
		-	-	-	-	25	-	-	-

Table APP 4.4 - 7. Pasture 7 utilization data

Pasture	Year	Squirreltail/Indian ricegrass
7	2016	7.3
		8.9

Table APP 4.4 - 8. Pasture 8 utilization data

Pasture	Year	Crested wheatgrass/Squirreltail
8	2016	10.3
		27.8

Table APP 4.4 - 9. Pasture 9 utilization data

Pasture	Year	Crested wheatgrass/Squirreltail
9	2016	12.5
		8.7

Table APP 4.4 - 10. Pasture 10 utilization data

Pasture	Year	Squirreltail/Bluebunch wheatgrass
10	2016	14.3
		13.3

Table APP 4.4 - 11. Pasture 11 utilization data

Pasture	Year	Bluebunch wheatgrass	Bluebunch wheatgrass /Idaho fescue	Squirretail/ Bluebunch wheatgrass	Bluebunch wheatgrass /Idaho fescue/ Squirretail	Bluebunch wheatgrass /Mountain brome/ Squirretail /Idaho fescue
11	2017	7.1	0	15.4	-	-
	2016	-	6.5	17.8	-	-
		-	23.5	17.5	-	-
		-	18.9	-	-	-
	2015	6.1	3.7	-	-	-
		-	0	-	-	-
	2014	21.2	-	-	17	13
	2013	12.8	-	-	24	19

4.4.2 Perennial Grass Utilization Collected by the BLM

Records of utilization completed on Poa ssp were not included due to the number of *Poa* species in the area. Landscape appearance method was conducted once on the allotment by BLM. This data was not included since it was the only time it was completed.

Table APP 4.4 - 12. Pasture 1 Utilization Data

Year	Squirreltail	Indian Ricegrass
2016	-	10.6
2014	5.4	10
	11	-
	10	-
2012	12.4	6.17

Table APP 4.4 - 13. Pasture 2 Utilization Data

Year	Sandberg bluegrass	Squirreltail	Bluebunch wheatgrass
2017	5.5	3.6	-
	5.6	4	-
2016	2.5	2.5	-
2013	-	21.7	-
	-	14.5	-
	-	11.3	-
2011	-	-	16.5
	-	-	12
	-	-	15.5
2009	-	22	-
	-	20	-
	-	16	-

Table APP 4.4 - 14. Pastire 3 Utilization Data

Year	Sandberg bluegrass	Squirreltail	Crested wheatgrass	Bluebunch wheatgrass	Idaho fescue
2017	5.2	5	-	17.7	-
	4.6	4.1	-	-	-
2016	7.5	3	-	-	-
	7	-	-	-	-
2015	-	19	-	-	-
	-	18	-	-	-
	-	28	-	-	-
2014	-	-	20	-	-

Year	Sandberg bluegrass	Squirreltail	Crested wheatgrass	Bluebunch wheatgrass	Idaho fescue
2013	-	8.4	-	0	0
	-	15	-	-	-
2012	-	-	14	-	-
	-	-	15.6	-	-
2009	-	18	-	-	-
	-	15	-	-	-
	-	28	-	-	-
	-	27	-	-	-
2008	-	3	-	-	-

Table APP 4.4 - 15. Pasture 4 Utilization Data

Year	Sandberg bluegrass	Squirreltail	Bluebunch wheatgrass	Idaho fescue
2017	10	11.2	-	-
2016	-	7.8	-	-
2015	-	53	-	-
	-	33	-	-
	-	28	-	-
2014	-	28.7	-	15.2
	-	-	-	22
2013	-	11.3	12.8	-
	-	17.8	-	-
2009	-	25	10	-
	-	53	21	-

Table APP 4.4 - 16. Pasture 5 utilization Data

Year	Sandberg	Squirreltail	Bluebunch wheatgrass	Idaho fescue	Mountain brome
2017	-	-	-	-	-
2016	6.8	-	-	-	-
2014	-	-	17	28	24.6
	-	-	-	-	21
2013	-	6.4	18	-	-
	-	8.5	-	-	-
2012	-	-	-	10	38
	-	-	-	44	-
	-	-	-	20	-
	-	-	-	22	-
2008	-	2.5	5	-	-

Year	Sandberg	Squirreltail	Bluebunch wheatgrass	Idaho fescue	Mountain brome
	-	65.15	35	-	-
	-	33.34	-	-	-

Table APP 4.4 - 17. Pasture 6 Utilization Data

Year	Bluebunch wheatgrass	Idaho fescue	Mountain brome
2017	-	-	-
2016	3.5	-	-
2014	-	-	19
2013	19	-	-
	18	-	-
2012	16	27	-
	13	7	-

Table APP 4.4 - 18. Pasture 7 Utilization Data

Year	Crested wheatgrass	Idian ricegrass
2014	4.6	3.3
2012	-	5.6

Table APP 4.4 - 19. Pasture 8 Utilization Data

Year	Crested wheatgrass
2016	15.8
	16.5
2014	29
	12
	12
2012	15
	5

Table APP 4.4 - 20. Pasture 9 Utilization Data

Year	Crested wheatgrass
2016	10.3
	19.6
2014	17
	20

Year	Crested wheatgrass
	22

Table APP 4.4 - 21. Pasture 10 Utilization Data

Year	Sandberg bluegrass	Squirreltail	Bluebunch wheatgrass	Idaho fescue
2016	13.8	-	21.3	-
2014	-	29	-	15.2
	-	-	-	22
2013	-	14	-	-
	-	3.3	-	-
2012	-	22.9	16.4	-
2008	-	-	40	-

Table APP 4.4 - 22. Pasture 11 Utilization Data

Year	Squirreltail	Bluebunch wheatgrass	Idaho fescue
2016	-	16.9	-
	-	21.5	-
2014	-	15.4	30.7
	-	15	23
	-	25.3	-
	-	11.2	-
2013	10.2	15	-
	10.4	-	-
2012	13.9	35.3	33

4.4.3 BLM Woody Browse Utilization

Table APP 4.4 - 23. Woody Browse Utilization

Year	Pasture	Species	Percent Use
2013	3	Antelope bitterbrush	21
2013	10	Antelope bitterbrush	8
2013		Rabbitbrush	7
2013		Rabbitbrush	2
2013		Antelope bitterbrush	10
2014	5	Curlleaf mtn. mahogany	54
2014		Mountain snowberry	49
2014		Curlleaf mtn. mahogany	43

Year	Pasture	Species	Percent Use
2014		Mountain snowberry	38
2014		Antelope bitterbrush	37
2014		Curlleaf mtn. mahogany	24

4.5 Actual Use

Table APP 4.5 - 1. Actual use numbers for the two grazing authorizations on Silver City allotment

Year	1100735	1101423*	Total
2005	0	4,127	4,127
2006	690	3,519	4,209
2007	787	4,091	4,878
2008	765	3,953	4,718
2009	627	2,501	3,128
2010	684	3,958	4,642
2011	615	3,673	4,288
2012	648	3,770	4,418
2013	645	4,076	4,721
2014	681	4,087	4,768
2015	691	4,076	4,767
2016	695	4,076	4,772
2017	695	4,076	4,772
2018	0	4,076	4,076

*Horse and cattle use are combined.