

**United States Department of the Interior  
Bureau of Land Management**

---

**RANGELAND HEALTH ASSESSMENT AND EVALUATION REPORT**

**SIGNAL BUTTE ALLOTMENT #01092  
SHEEP TRAIL ALLOTMENT #01063**

February 10, 2016

---

U.S. Department of the Interior  
Bureau of Land Management  
Jarbidge Field Office  
2878 Addison Avenue East  
Twin Falls, Idaho 83301  
Phone: 208-736-2350  
FAX: 208-735-2076



DRAFT

This page intentionally left blank.

## TABLE OF CONTENTS

<b>Allotment Information</b> .....	<b>1</b>
<b>Current Permitted Livestock Grazing Use</b> .....	<b>1</b>
<b>Allotment Profile</b> .....	<b>3</b>
Climate.....	3
Grazing Management.....	4
Vegetation.....	10
Wildfire History.....	13
Upland Trend Monitoring.....	20
Noxious Weeds.....	51
<b>Idaho Rangeland Health Standards Assessment</b> .....	<b>54</b>
Standard 1 (Watersheds).....	59
Rangeland Health Assessment.....	59
Evaluation of Standard 1.....	64
Standard 2 (Riparian Areas & Wetlands).....	66
Standard 3 (Stream Channel/Floodplain).....	72
Standard 4 (Native Plant Communities).....	75
Rangeland Health Assessment.....	75
Evaluation of Standard 4 – Canal Field and Devil Creek Pastures.....	79
Standard 5 (Seedings).....	81
Rangeland Health Assessment.....	81
Evaluation of Standard 5 – Inside Lake, Signal Butte and Sheep Trail Pastures:.....	85
Standard 6 (Exotic Plant Communities, Other than Seedings).....	87
Standard 7 (Water Quality).....	87
Evaluation of Standard.....	87
Standard 8 (Threatened, Endangered and BLM Sensitive Plants and Animals).....	89
Rangeland Health Assessment.....	89
Evaluation for Standard 8 (Threatened, Endangered and BLM Sensitive Plants and Animals):.....	103
<b>Literature Cited</b> .....	<b>106</b>
<b>Appendix A: Process For Generating Sage-Grouse Habitat Assessment Framework Sample Sites</b> .....	<b>111</b>
<b>Appendix B: Species List Accumulated During Upland Assessments</b> .....	<b>112</b>

## LIST OF TABLES

Table 1: Signal Butte Allotment Acres .....	1
Table 2: Assessment Participants.....	1
Table 3: Acreage by pasture and ownership in the Signal Butte Allotment.....	5
Table 4: Grazing Schedule by Guerry, Inc. LMP .....	6
Table 5: Total Actual Use (AUMs) from 2004 through 2014 .....	8
Table 6: 2012 Actual Use by Pasture in the Signal Butte Allotment.....	8
Table 7: 2013 Actual Use by Pasture in the Signal Butte Allotment.....	9
Table 8: Utilization Summary.....	9
Table 9: Fire Frequency by Pasture 1993 to 2012 .....	11
Table 10: Vegetation Community in Acres and Percentage by Pasture .....	14
Table 11: Summary of 2006 Ecological Site Inventory Production Data (Total Dry Weight) ....	16
Table 12: Summary of 2006 Ecological Site Inventory Production Data (Total Dry Weight) ....	17
Table 13: Percent Vegetative Cover (Top Layer) from 2006 ESI data .....	18
Table 14: Percent Vegetative Cover (Top Layer) from 2006 ESI data .....	19
Table 15: Canal Field Pasture Trend Site 14S12E34 Nested Frequency Data Summary .....	24
Table 16: Canal Field Pasture Trend Site 14S12E35 Nested Frequency Data Summary .....	27
Table 17: Devil Creek Pasture Trend Site 14S12E28 Nested Frequency Data Summary.....	30
Table 18: Devil Creek Pasture Trend Site 14S12E33 Nested Frequency Data Summary.....	32
Table 19: Inside Lake Pasture Trend Site 14S12E26 Nested Frequency Data Summary .....	35
Table 20: Inside Lake Pasture Trend Site 14S12E27B Nested Frequency Data Summary.....	38
Table 21: Sheep Trail Pasture Trend Site 14S12E31 Nested Frequency Data Summary .....	41
Table 22: Sheep Trail Pasture Trend Site 14S12E06 Nested Frequency Data Summary .....	44
Table 23: Signal Butte Pasture Trend Site 14S13E18 Nested Frequency Data Summary .....	47
Table 24: Signal Butte Pasture Trend Site 14S12E25C Nested Frequency Data Summary .....	50
Table 25: Standards Applicable by Pasture .....	54
Table 26: Summary of 17 Rangeland Health Indicators.....	57
Table 27: Rangeland Health Attribute Rating by Site .....	58
Table 28: Riparian Condition Assessment Ratings by Stream, Pasture, Reach and Year.....	67
Table 29: Devil Creek (DC) and House Creek (HC) vegetation indicators from PFC assessments by stream reach and year.....	68
Table 30: Hydrology and Erosion/Deposition Indicators from Riparian Condition Assessments in the Signal Butte Allotment by Stream Reach and Year.....	73
Table 31: IIRH Data – Percent Vegetative Cover (Top Layer Only).....	75

Table 32: HAF Data - Percent Vegetative Cover (Top Layer Only) .....	76
Table 33: IIRH and HAF Data – Percent Vegetative Cover (Top Layer Only) .....	82
Table 34: Slickspot Peppergrass Potential Habitat (Acres) .....	90
Table 35: Sage-grouse Attendance at Occupied Leks within Five Miles of the Signal Butte Allotment, 2000-2014 .....	93
Table 36: Sage-grouse Habitat Assessment Worksheet for Nesting and Early Brood Rearing Habitat (Arid Site).....	97
Table 37: Ferruginous Hawk Nest Data.....	100
Table 38: Overall Habitat Suitability for BLM Sensitive Wildlife Species by Pasture.....	103

### **LIST OF FIGURES**

Figure 1: Annual Precipitation (2004 – 2013) at the Horse Butte RAWs Station .....	4
Figure 2: Annual Spring Temperatures (2004 – 2013) at the Horse Butte RAWs Station .....	4

### **LIST OF MAPS**

Map 1: Allotment Vicinity.....	2
Map 2: Range Infrastructure and Key Utilization Sites.....	7
Map 3: Fire Frequency.....	12
Map 4: Existing Vegetation Communities, Ecological Site Inventory (ESI) & Production and/or Cover Plots.....	15
Map 5: Upland Trend Monitoring Plots.....	21
Map 6: Noxious Weed Management .....	53
Map 7: Idaho Indicators of Rangeland Health (IIRH) Sites .....	56
Map 8: Slickspot Peppergrass Potential Habitat and Area Surveyed .....	91
Map 9: Shrubland Habitat and Sage-grouse Leks.....	95
Map 10: Sage-grouse Habitat Assessment Framework (HAF) Sites .....	96

DRAFT

This page intentionally left blank.

## ALLOTMENT INFORMATION

**Field Office:** Jarbidge Field Office (JFO)

**Name of Permittee:** Guerry, Inc.

**Allotment Name/Number:** Signal Butte (#01092) and Sheep Trail (#01063)

**Dates of Field Assessment:** July 24, 30, & 31, 2013

**Stream Miles on Public Land:** 2.8 miles of perennial stream and 2.1 miles of intermittent stream

**Table 1: Signal Butte Allotment Acres**

BLM Acres	State Acres	Private Acres	Other Acres	Total Acres
10,974	618	372	0	11,963

**Table 2: Assessment Participants**

Name	Position
Kate Crane	TFD Fisheries Biologist
Scott Maclean	JFO Fisheries Biologist
Jim Klott	JFO Wildlife Biologist
Michael Haney	JFO Wildlife Biologist
Andrea J. Cox	JFO Rangeland Management Specialist
Bonnie Ross	TFD GIS Specialist

## CURRENT PERMITTED LIVESTOCK GRAZING USE

### Signal Butte Allotment (01092)

**Total Active Use:** 1,182 AUMs

**Livestock Type:** Cattle

**Livestock Numbers:** 1,198 Cattle

**Season of Use:** 06/01 to 06/30

### Sheep Trail Allotment (01063)

**Total Active Use:** 52 AUMs

**Livestock Type:** Sheep

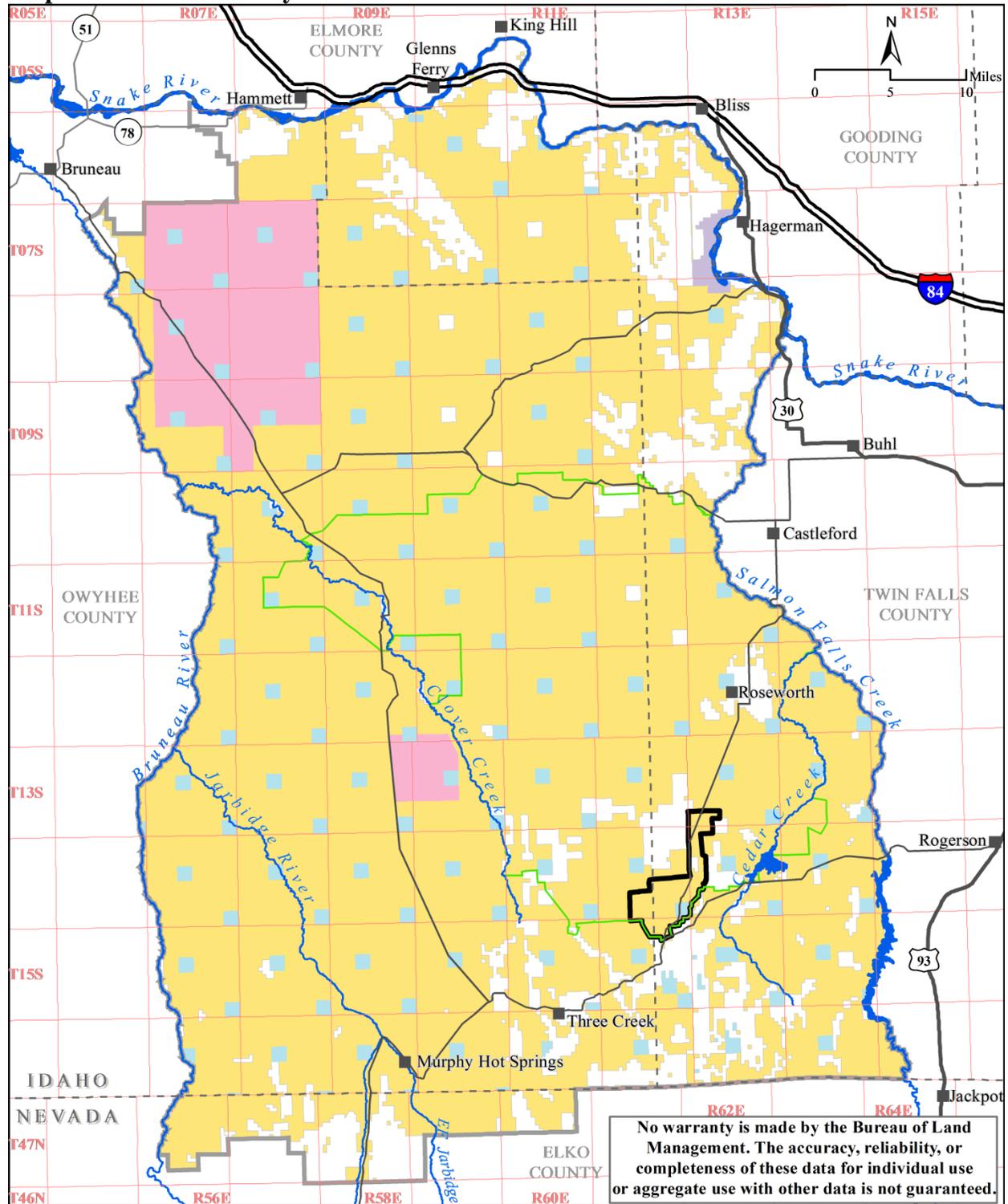
**Livestock Numbers:** 3,975 Sheep

**Season of Use:** 06/01 to 06/30

**Current Land Use Plan:** 2015 Jarbidge Resource Management Plan (RMP)

**Current Stocking Level:** 9.2 Acres/AUM

**Map 1: Allotment Vicinity**



Signal Butte Allotment	Bureau of Land Management	Private; other
Devil Creek Sub-region	Military, Department of Defense	State
	National Park Service	Map projection: UTM zone 11 NAD 1983

## **ALLOTMENT PROFILE**

The Signal Butte and Sheep Trail Allotments are located approximately 7 miles south/southwest of Roseworth, Idaho (Map 1). The elevation ranges from approximately 5,260 at John Boyd Flat to 5,913 feet on Signal Butte.

The Sheep Trail Allotment is currently a separate allotment but shares the same boundaries as the Sheep Trail Pasture of the Signal Butte Allotment. To aid discussion in the rangeland health assessment and evaluation both allotments will be referred to as the Signal Butte Allotment in this evaluation, with the Sheep Trail Allotment being referred to as the Sheep Trail Pasture. The Sheep Trail Allotment and Signal Butte Allotment permits are held by the same permittee and for ease of administration the permits may be combined during permit renewal.

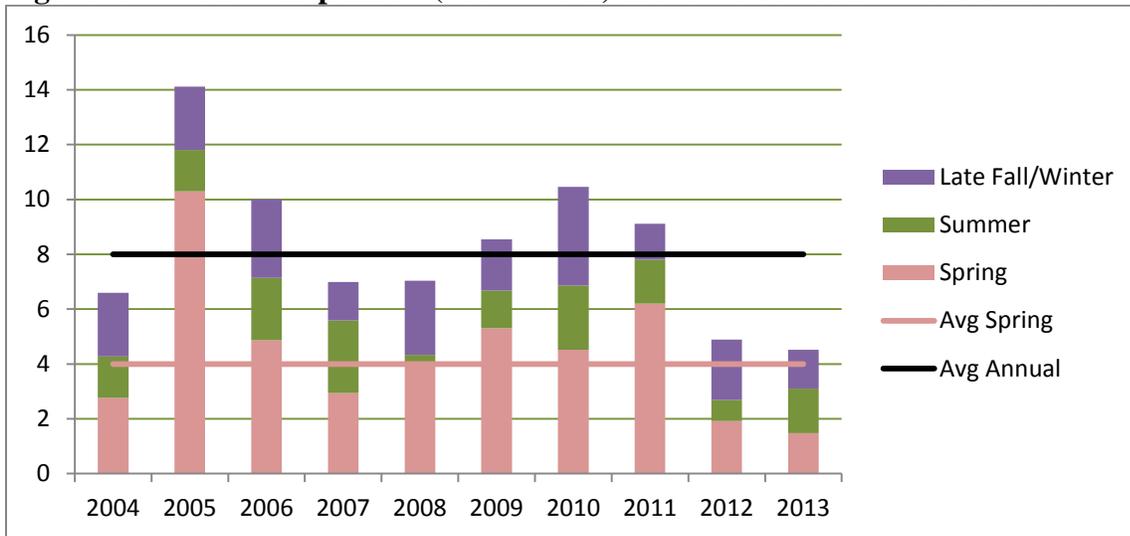
### **Climate**

Climatic conditions in south central Idaho are characterized by low humidity, clear skies, large diurnal variation in temperature, and wind patterns reflecting the westerly direction of the prevailing storm track. Annual rainfall in the Signal Butte and Sheep Trail Allotments ranges from 10 to 16 inches based on the ecological site descriptions. The bulk of the moisture typically falls as rain and snow from late-fall through late-spring.

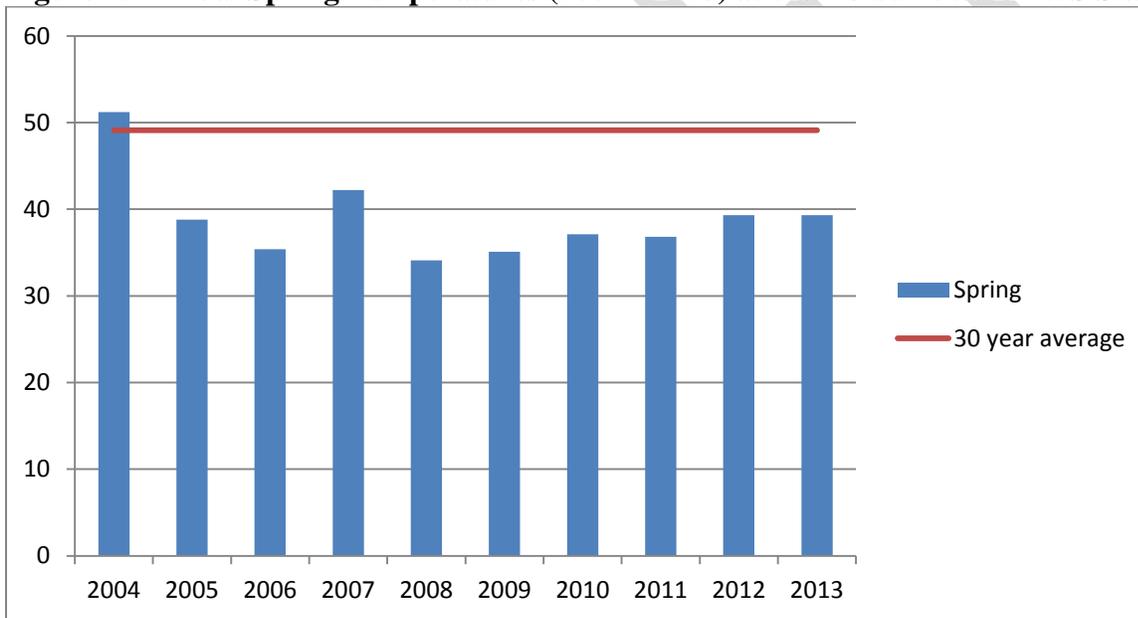
Weather data collected at the Horse Butte RAWS station is used to assess precipitation and temperature trends from 2004 to 2013. The RAWS station is located in an 8 to 12 inch precipitation zone approximately 17 miles northwest of the Signal Butte Allotment. The thirty-year annual average precipitation at the Horse Butte RAWS station is 8.1". Annual precipitation at the station was below the thirty-year average during five of the ten years, especially in 2012 and 2013 (Figure 1). Total rainfall in 2012 was 4.89" and in 2013 it was 4.52". Rainfall was above the thirty-year average the remaining five years. Moisture exceeded the thirty-year average by at least two inches in 2005 (14.12), 2006 (10.1") and 2010 (10.46) (Figure 1).

The thirty- year average for rain that fell during the growing season (March–June) is 4" (Figure 1). Growing season precipitation was below the thirty-year average during four of the ten years (2004, 2007, 2012 and 2013). Rainfall was especially low in 2012 (1.92") and 2013 (1.48"). Plant growth was likely enhanced in 2005 and 2011 due to higher amounts of spring rainfall (2" or more above the spring average). Except for 2004, temperatures during the growing season were cooler than the thirty-year average (Figure 2).

**Figure 1: Annual Precipitation (2004 – 2013) at the Horse Butte RAWs Station**



**Figure 2: Annual Spring Temperatures (2004 – 2013) at the Horse Butte RAWs Station**



**Grazing Management**

The Signal Butte Allotment has been a transitional use area as livestock are moved south in the spring/early summer from private and public lands near Castleford, Idaho to summer grazing lands near the Idaho/Nevada border, then back north in the fall/winter. The Guerry, Inc. livestock operation has historically (from mid 1930s to present) been a sheep and cattle operation, so both classes of livestock have historically made use of the area. The Signal Butte Allotment has generally been grazed in conjunction with the Pigtail Butte, Cedar Butte 10, South Crows Nest and Little House Creek FFR Allotments as well as private land in both the spring and fall use periods.

The allotment is divided into six pastures (Table 3). Approximately 8.0 miles of fence and canyon rim divides the Signal Butte Allotment into five pastures: Canal Field, Devil Creek, Inside Lake, Sheep Trail, and Signal Butte. Approximately 0.7 miles of fence delineates a 56 acre wildlife enclosure and another 0.3 miles of fence protects another wetland and part of a pond. Neither enclosures are grazed by livestock and will not be discuss further. Approximately 1 miles of fence are associated with corrals and holding pens. Most of the allotment boundaries are completely fenced (approximately 26 miles); however, some (approximately 2 miles) natural barriers (i.e. rim rocks, etc.) are used as pasture/allotment boundaries along the border adjacent to House Creek. The old House Creek gravel pit is located in the southern part of the Canal Pasture and the disturbed area associated with the gravel pit is approximately 15 acres.

Livestock water is available in pipeline-fed water troughs, canals and ponds within the allotment (Map 2). The Worley Ditch and a separate canal, and a portion of House Creek (located on a State section) provide water in the Canal Pasture. Additionally, there is one pond on BLM land that is filled via a pipeline and some small ponds on a State section that rely on precipitation. The Devil Creek Pasture contains pipeline and trough. Other water sources include a pond in the Camas Slough drainage and two ponds in the Devil Creek Pasture. The primary water source in the Inside Lake Pasture is two ponds filled by the Worley Ditch. A playa and one other pond rely solely on winter and spring precipitation and have limited water available in some years. Livestock water in the Signal Butte Pasture is provided by a pipeline and trough in the north end of the pasture. Other water sources include House Creek and five ponds that rely on precipitation to fill. Water is present in these ponds primarily in the spring. In the Sheep Trail Pasture, a pipeline provides water to three troughs and two ponds provide additional water sources in the spring, depending on precipitation.

**Table 3: Acreage by pasture and ownership in the Signal Butte Allotment**

<b>Pasture Name</b>	<b>Public</b>	<b>State</b>	<b>Private</b>	<b>Total*</b>
Canal Field	3,023	618	46	3,687
Devil Creek	1,516	0	0	1,516
Inside Lake	1,458	0	0	1,458
Sheep Trail	2,319	0	1	2,320
Signal Butte	2,602	0	324	2,926
Wildlife Exclosure*	56	0	0	56
<b>Allotment Total</b>	<b>10,974</b>	<b>618</b>	<b>372</b>	<b>11,963</b>

Total acres may not match the sum of individual ownership acres due to rounding

\*Livestock grazing is excluded

The Signal Butte and Sheep Trail Allotments were included in the 2005 Stipulated Settlement Agreement (SSA) and managed per the terms of the SSA through the 2010 grazing season. As a result of a Memorandum Decision and Order by Chief Judge Winmill dated July 22, 2011, the Signal Butte and Sheep Trail Allotments are currently being managed under Interim Grazing Management Plans (IGMP) until BLM issues its final grazing permit renewal decision. Livestock grazing is managed pursuant to Annual Grazing Plans (AGP) implemented at the beginning of each grazing year, which begins on March 1.

The current grazing permits have a permitted active use of 1,182 AUMs in the Signal Butte Allotment and 52 AUMs in the Sheep Trail Allotment for a combined active use of 1,234 AUMs.

Permitted season of use is June 1 to June 30 on the Signal Butte Allotment and June 1 to June 2 on the Sheep Trail Allotment.

Prior to 1990, the area that includes the current Signal Butte Allotment was managed under the Devil Creek Allotment Management Plan (AMP) which was approved on January 16, 1970. The Guerry, Inc. Livestock Management Plan (LMP) was written as an addendum to the AMP, and was put into effect on February 22, 1990. The LMP established “units” within the allotment; Unit 1 included the Devil Creek Pasture and the Canal Field Pasture and Unit 2 included the Inside Lake Pasture and the Signal Butte Pasture. Livestock grazing in the Sheep Trail Pasture was scheduled separately. The LMP initiated a deferred rotation system in which each of two units would be rested from spring/summer grazing on alternate years (Table 2). The Sheep Trail Pasture was to receive light spring grazing and was to be used primarily for fall/winter. The scheduled grazing system is shown in Table 4.

The LMP effectively authorized grazing use of the allotment outside of the permit dates of June 1 to June 30, and also authorized a 10% increase in preference AUMs in the allotment; “...This increase will be limited to 10% of currently recognized Class I preference AUMs...” (BLM, 1990). From 1990 until 2009, under the LMP, sheep used the allotment in the spring during the months of May and June, and in the fall during October and November; cattle use was generally during June and November.

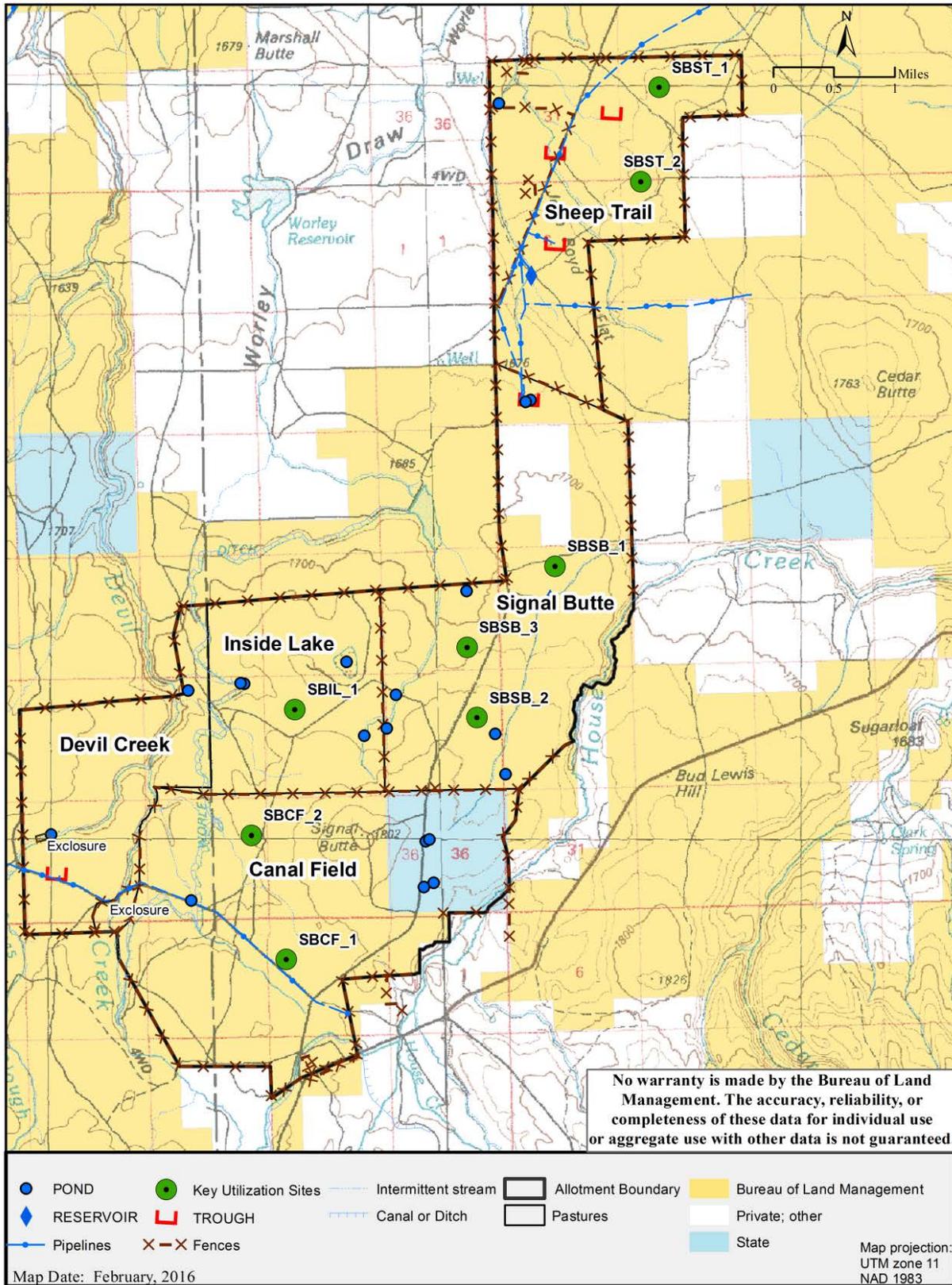
**Table 4: Grazing Schedule by Guerry, Inc. LMP**

Year	Unit	Scheduled Use Period
1	Unit 1	Spring/Summer and Fall Use
	Unit 2	Fall Use
	Sheep Trail	Spring/Summer and Fall Use
2	Unit 1	Fall Use
	Unit 2	Spring/Summer and Fall Use
	Sheep Trail	Spring/Summer and Fall Use

Spring/Summer Use Period: 04/01 – 07/31; Fall Use Period: 10/01 – 01/31

Since the 2005 SSA, management of the allotments has been outlined each year in an AGP for each of the two permittees. Subsequent to the 2005 Court Order, actual use in the allotment has closely followed the grazing schedule outlined in the AGPs. Wildfire greatly influenced management of the allotment during the mid-2000s. Rest following wildfire prevented the scheduled rotations to be carried out in several instances. From 2005 to 2011 the allotment was managed under the SSA and since 2011, the IGMPs have prescribed the livestock management.

**Map 2: Range Infrastructure and Key Utilization Sites**



The Signal Butte Allotment is eligible to be authorized up to 1,610 Temporary Non-Renewable (TNR) AUMs as per the 2004, 2005 and 2008 Appropriations Act. However, the 2005 SSA contained terms that disallowed the BLM’s ability to grant TNR on specific allotments until such time that the grazing permit(s) were fully processed. The SSA included the Signal Butte Allotment; therefore, actual use numbers reflect only permitted active use AUMs, which were also reduced by the SSA.

A summary of actual use from 2004 to 2014 can be seen in Table 5. From 2004 through 2014, actual use within the Signal Butte Allotment has averaged approximately 985 AUMs for cattle and 230 AUMs for sheep. Actual use in 2007 was low due to livestock being removed from the allotment following the 2007 Murphy Complex Fire. Actual use in 2008 was allowed to a limited degree after the growing season. Since 2004, actual use, including active permitted use and TNR has averaged approximately 1,302 AUMs.

**Table 5: Total Actual Use (AUMs) from 2004 through 2014**

Year	Actual Use (Sheep)	Actual Use (Cattle)	Total
2004	419	978	1,397
2005	301	710	1,011
2006	279	1,228	1,507
2007*	219	280	499
2008*	109	152	261
2009	106	1,031	1,137
2010	257	1,011	1,268
2011	254	1,249	1,503
2012	163	1,880	2,043
2013	192	1,334	1,526

\*Years when actual use was reduced due to wildfire

The AGPs were modified in 2012 and 2013. Changes in 2012 were made as a result of wildfire and the need to remove livestock off of burned areas. Changes in 2013 were done to accommodate adjustments in livestock management. The JFO IDT was consulted on these adjustments prior to their approval.

**Table 6: 2012 Actual Use by Pasture in the Signal Butte Allotment**

Pasture	Year	Livestock	Timing of Use*	Actual AUMs	TNR AUMs	Total AUMS
Canal Field	2012	Cattle	Fall/Winter	133	196	329
	2012	Sheep	Spring	73	0	73
	2012	Sheep	Fall/Winter	20	0	20
Devil Creek	2012	Cattle	Fall/Winter	117	84	201
Inside Lake	2012	Cattle	Summer	269	0	269
Sheep Trail	2012	Cattle	Winter	64	465	529
Signal Butte	2012	Cattle	Spring/Summer	552	0	552
	2012	Sheep	Spring/Summer	35	0	35

\*Timing of Use: Spring = 04/20 – 05/31; Early Summer = 06/01 – 06/20; Summer = 06/21 – 07/10; Fall = 10/01 – 11/30; Winter = 12/01 – 01/15

**Table 7: 2013 Actual Use by Pasture in the Signal Butte Allotment**

Pasture	Year	Livestock	Timing of Use*	Actual AUMs	TNR AUMs	Total AUMs
Canal Field	2013	Cattle	Early Summer/Summer	226	0	226
	2013	Cattle	Fall	66	0	66
	2013	Sheep	Spring	0	0	0
Devil Creek	2013	Cattle	Fall	0	99	99
Inside Lake	2013	Cattle	Spring/Early Summer	346	0	346
Sheep Trail	2013	Cattle	Spring	91	0	91
	2013	Cattle	Fall	0	222	22
	2013	Sheep	Spring/Summer	52	0	52
Signal Butte	2013	Cattle	Spring	336	0	336
	2013	Cattle	Fall/Winter	0	148	148
	2013	Sheep	Spring/Early Summer	130	0	130
	2013	Sheep	Fall/Winter	10	0	10

\*Timing of Use: Spring = 04/20 – 05/31; Early Summer = 06/01 – 06/20; Summer = 06/21 – 07/10; Fall = 10/01 – 11/30; Winter = 12/01 – 01/15

Average utilization on bluebunch wheatgrass (*Pseudoroegneria spicata*) and crested wheatgrass (*Agropyron cristatum*) from 2005 to 2013 is shown in Table 8. Utilization data were collected using the Height-Weight Method (Cooperative Extension Service et al., 1999). Locations of key utilization sites are shown on Map 2. Data were collected at the end of the year, and mostly describes cattle use. Utilization data were not collected annually in each pasture. Use was not measured in 2004 and 2007. In 2007 were not collected due to the Murphy Complex Fire which burned the entire allotment.

Bluebunch wheatgrass was the key species measured in the Canal, Inside Lake, Sheep Trail, and Signal Butte pastures. Use levels were less than 20% in most of the years data were collected. In 2006 and 2013, use levels on bluebunch wheatgrass in the Canal and Signal Butte pastures ranged from 21 to 23% (Table 6). Utilization data was collected for crested wheatgrass in the Inside Lake, Sheep Trail, and Signal Butte pastures. Use levels were less than 20% except for in 2006 when it measured 26% (Table 6) in the Signal Butte Pasture.

**Table 8: Utilization Summary**

Year	Pasture	% Utilization			
		Bluebunch Wheatgrass	Crested Wheatgrass	Idaho Fescue	Intermediate Wheatgrass
2005	Inside Lake	12	9	-	-
2006	Canal Field	26	-	-	-
	Sheep Trail	5	13	-	46
	Signal Butte	21	26	-	-
2008	Sheep Trail	-	11	-	17
2009	Canal Field	2	-	-	-
	Sheep Trail	5	11	-	54
	Signal Butte	3	0	-	-
2010	Canal Field	0	-	10	-
	Devil Creek	-	-	3	-
	Inside Lake	11	-	-	-

Year	Pasture	% Utilization			
		Bluebunch Wheatgrass	Crested Wheatgrass	Idaho Fescue	Intermediate Wheatgrass
	Signal Butte	1	-	-	-
2011	Canal Field	1	-	-	-
2012	Canal Field	4	-	-	-
	Sheep Trail	-	2	-	-
2013	Canal Field	23	-	-	-
	Sheep Trail	-	16	-	-
	Signal Butte	22	-	-	-

\*Utilization not measured

In addition to permitted livestock use described above, trailing has historically and continues to be authorized in this allotment. The JFO livestock trailing EA (EA# DOI-BLM-ID-T010-2012-0004-EA) identifies the trailing that can be authorized within the Signal Butte Allotment.

Devil Creek Ranch is permitted to 100 head of cattle through the allotment via the identified route along the 17-mile Road to the Turner Cedar Butte Allotment. Trailing occurs on one day between April 10 and April 30. The trailing permit authorizes 3 AUMs. The second trailing event is also Devil Creek Ranch also trails approximately 550 cattle through the allotment on the identified route near Grassy Hills Road through the allotment. Trailing occurs on one day between March 10 and April 10. The trailing permit authorizes 18 AUMs

JRS Properties III LP (Cedar Creek Cattle Co.) trails approximate 600 head of cattle through the allotment on the identified route along the Grassy Hills Road to the Three Creek Highway.

### **Vegetation**

Vegetation in the Signal Butte and Sheep Trail Allotments was initially mapped in 2006 using field observations, field cover data, and 2004 National Agriculture Imagery Program (NAIP) imagery. The vegetation map was updated in 2013 using field observations and NAIP imagery (Map 4). Vegetation communities were classified and mapped based on dominant plant cover using a minimum mapping unit of 20 acres, which is appropriate for landscape-level planning but is not intended to show the complexity of vegetation communities at a finer-scale. With this, fifty-three vegetation communities were classified and mapped based on dominant plant cover. These vegetation communities were subsequently organized into five classes and six sub-classes according to national standards (Grossman et al., 1998), with the exception of evergreen shrublands dominated by sagebrush; these communities were defined as having 10 percent or more shrub cover rather than the national standard of more than 25 percent shrub cover. This was done to provide consistency with defined habitat needs (Wisdom et al., 2000) and proposed management objectives for greater sage-grouse (sage-grouse).

Although the allotment historically had a sagebrush steppe plant community, plant communities in the Signal Butte Allotment have been modified over the years. In the 1960s and 1970s, areas of the allotment were sprayed to reduce sagebrush to improve the forage base for livestock. Projects completed in the 1970s and 1980s resulted in crested wheatgrass seedings in some areas of the allotment.

Since then, large areas of the allotment have burned in wildfire. Portions of some pastures burned two or three times during this period (Table 9, Map 3). The 2007 Murphy Complex Fire burned nearly all of the allotment, reducing the sagebrush (*Artemisia* spp.) to a few small, scattered patches, the largest of which is approximately 170 acres and includes the former House Creek gravel pit. Various drill and aerial seeding efforts have been done to rehabilitate areas burned by wildfire. As a result of these treatments, the allotment is currently dominated by herbaceous vegetation consisting of both native and non-native perennial grass species. In areas where native grasses dominate there tends to be an abundant and diverse forb component compared to areas of non-native perennial grass seeding, as shown in the 2010, 2012, and 2013 Sage-grouse Habitat Assessment Framework (HAF), and trend frequency data, and further described in the 2013 Interpreting Indicators of Rangeland Health (IIRH) field observations.

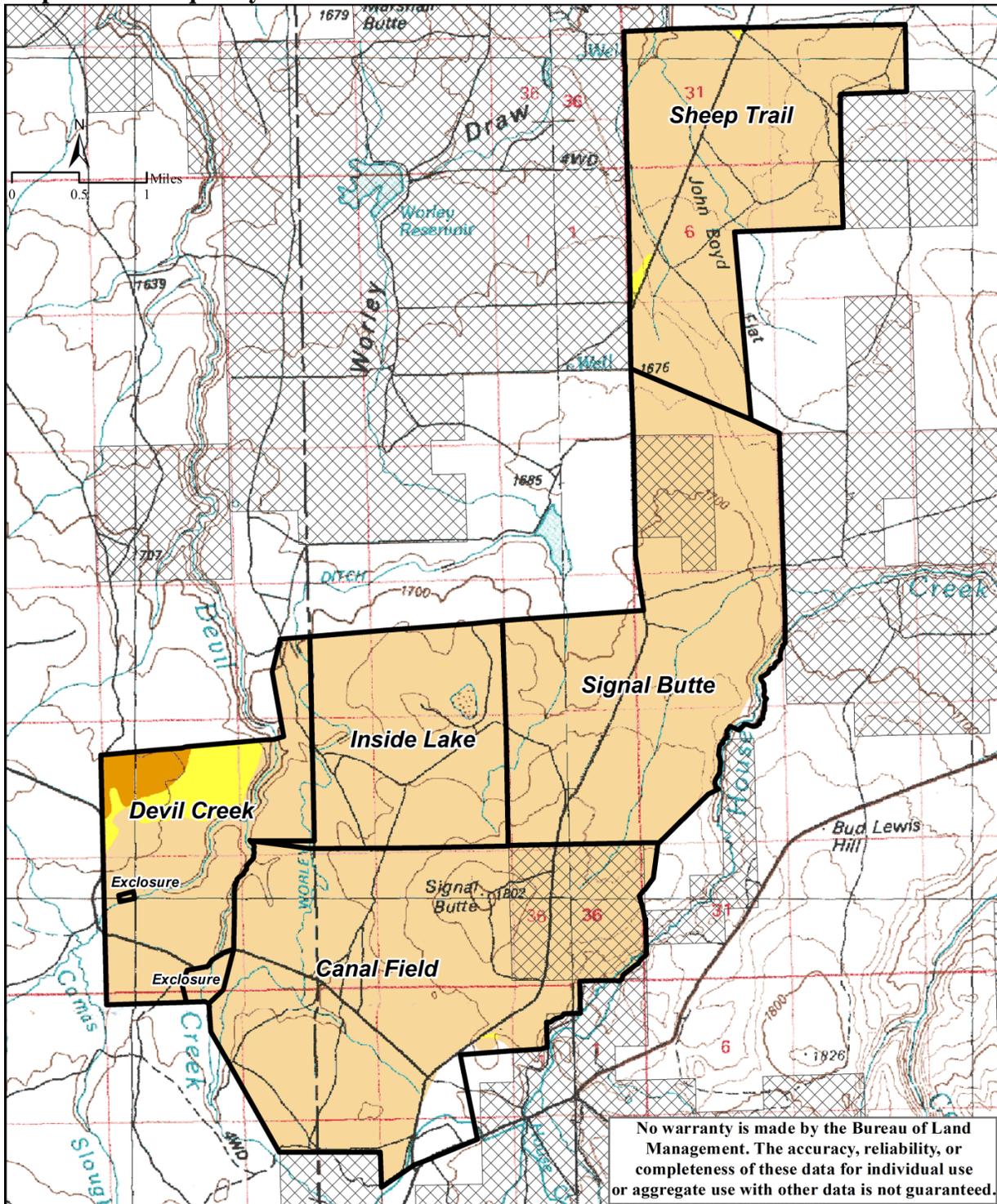
**Table 9: Fire Frequency by Pasture 1993 to 2012**

Pasture	Number of Times Burned from 1993 to 2012	Acres Of Pasture Burned	% of Pasture
Canal Field (3,023 ac)*	1	2,789	92
	2	2	<1
Devil Creek (1,516 ac)	1	1,128	74
	2	250	16
	3	132	9
Inside Lake (1,458 ac)	1	1,458	100
Sheep Trail (2,319 ac)	1	2,289	99
	2	25	1
Signal Butte (2,602 ac)**	1	2,596	100
	2	1	<1
Wildlife Exclosure (59 acres)	1	59	100

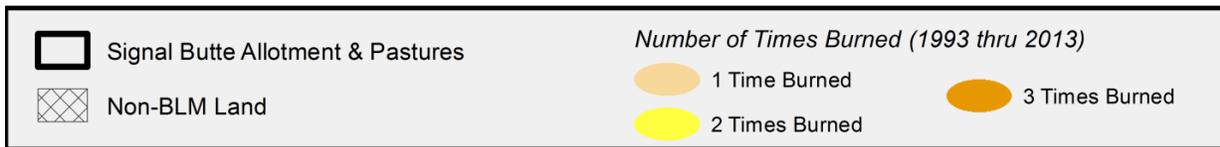
\* 171 acres in the Canal Field have not burned since 1993

\*\* 36 acres in the Signal Butte Pasture have not burned since 1993

**Map 3: Fire Frequency**



No warranty is made by the Bureau of Land Management. The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.



## **Wildfire History**

Fourteen wildfires occurred in the allotment from 1966 to the present, with the most recent significant fire being the 2007 Murphy Complex Fire. After 2000, some burned areas were drill- and/or aerially-seeded with grasses, forbs, and shrubs following fire under Emergency Stabilization and Rehabilitation (ESR) plans. There are no records of ESR treatments prior to 2000 but known ESR treatments are summarized with the fire history below. Acreages and percentages cited below are for all ownerships.

The 1966 Cedar Creek Fire burned 1 acre (<1%) of the Signal Butte Pasture. No post-fire ESR information is available for this fire.

The 1971 House Creek Fire burned 279 acres (8%) of the Canal Field Pasture. No post-fire ESR information is available for this fire.

The 1978 Cedar Mesa Fire burned 909 acres (39%) of the Sheep Trail Pasture and 472 acres (16%) of the Signal Butte Pasture. No post-fire ESR information is available for this fire.

The 1979 House Creek Fire burned 317 acres (11%) of the Signal Butte Pasture. No post-fire ESR information is available for this fire.

The 1980 Devils Creek 2 Fire burned 94 acres (3%) of the Canal Field Pasture, 887 acres (59%) of the Devil Creek Pasture, and 45 acres (3%) of the Inside Lake Pasture. No post-fire ESR information is available for this fire.

The 1981 Pigtail Butte Fire burned 863 acres (23%) of the Canal Field Pasture; 728 acres (31%) of the Sheep Trail Pasture; and 1,729 acres (59%) of the Signal Butte Pasture. No post-fire ESR information is available for this fire.

The 1984 John Boyd Fire burned 341 acres (15%) of the Sheep Trail allotment. No post-fire ESR information is available for this fire.

The 1985 House Creek Fire burned 902 acres (39%) of the Sheep Trail Pasture and 270 acres (9%) of the Signal Butte Pasture. No post-fire ESR information is available for this fire.

The 1995 Signal Butte Fire burned 155 acres (10%) of the Devil Creek Pasture. No post-fire ESR information is available for this fire.

The 2000 Grass Fire burned 22 acres (1%) of the Sheep Trail Pasture and 3 acres (<1%) of the Signal Butte Pasture. Most of the Grass Fire burned outside the Signal Butte Allotment. The burned area in the Signal Butte Pasture was aerially seeded with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) following the fire.

The 2000 Worley Draw Fire burned 353 acres (23%) of the Devil Creek Pasture and 2 acres (<1%) of the Inside Lake Pasture. The burned areas were aerially seeded; information on the seed mix is not available.

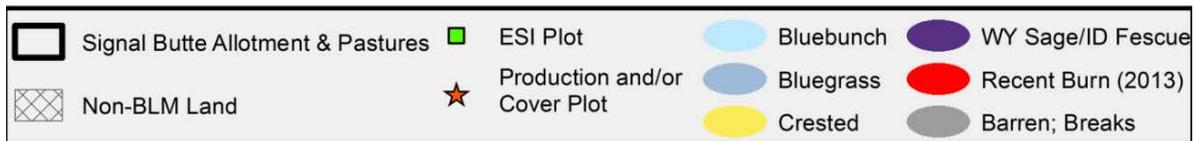
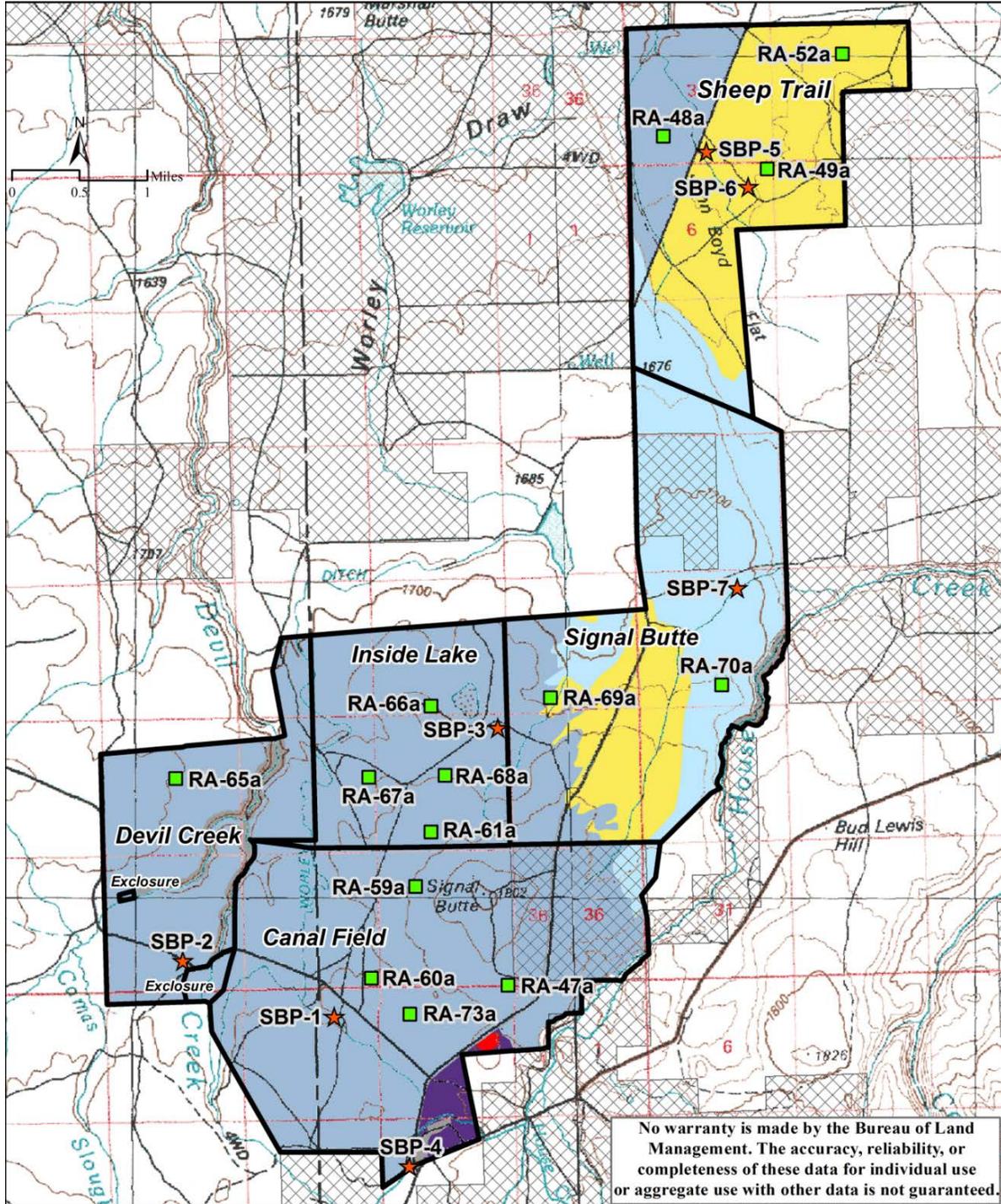
The 2007 Murphy Complex Fire burned almost the entire Signal Butte Allotment. This included 3,406 acres (92%) of the Canal Field Pasture; 1,218 acres (80%) of the Devil Creek Pasture; 1,458 acres (100%) of the Inside Lake Pasture; 2,319 acres (100%) of the Sheep Trail Pasture; and 2,611 acres (89%) of the Signal Butte Pasture. Bitterbrush (*Purshia tridentata*) was drill seeded on 1,900 acres of the Canal Field Pasture and a seed mix containing ‘Scar’ Snake River wheatgrass (*Elymus wawawaiensis*), Sandberg bluegrass (*Poa secunda*), squirreltail, ‘Ladak’ alfalfa (*Medicago sativa*), and western yarrow (*Achillea millefolium*) was drilled on 717 acres of the Inside Lake Pasture and 214 acres of the Signal Butte Pasture. Wyoming big sagebrush was aerial seeded in strips on 446 acres of the Canal Field Pasture, 394 acres of the Devil Creek Pasture, 562 acres of the Inside Lake Pasture, 875 acres of the Sheep Trail Pasture, and 1,554 acres of the Signal Butte Pasture. In addition, low sagebrush (*Artemisia arbuscula*) was aerial seeded in strips on 2,078 acres of the Canal Field Pasture; 706 acres of the Devil Creek Pasture; 739 acres of the Inside Lake Pasture; and 550 acres of the Signal Butte Pasture.

**Table 10: Vegetation Community in Acres and Percentage by Pasture**

Pasture	Bluebunch Wheatgrass	Bluegrass (Poa spp.)	Crested Wheatgrass	Wyoming Sagebrush/ Idaho Fescue	Recent Burn *	Other (i.e. Barren, Breaks)
Canal Field (3,024 ac)	16 (>1%)	2,817 (93%)	1 (>1%)	142 (5%)	9 (>1%)	39 (>1%)
Devil Creek (1,516 ac)	N/A	1,383 (91%)	N/A	N/A	N/A	133 (9%)
Inside Lake (1,458 ac)	N/A	1,458 (100%)	N/A	N/A	N/A	N/A
Sheep Trail (2,319 ac)	274 (12%)	2,029 (87%)	N/A	N/A	N/A	17 (>1%)
Signal Butte (2,602 ac)	1,338 (51%)	482 (19%)	717 (28%)	N/A	N/A	64 (3%)

\*Areas classified as Recent Burn are areas that have burned within the past two years and have not been reevaluated for vegetation community classification

**Map 4: Existing Vegetation Communities, Ecological Site Inventory (ESI) & Production and/or Cover Plots**



Fourteen Ecological Site Inventory (ESI) sites are located within the Signal Butte Allotment (Map 4). Production and cover data were collected on all of the ESI sites in 2006 except for RA-49A, which is in the Sheep Trail Field (Map 4). Production data from 2006 sites is summarized by pasture in Tables 11 and 12. Due to differences in sampling locations and methodology (e.g. number of transects per site and number of points per transect) among the 2002 Production data, 2006 ESI data and the 2012 Sage-grouse Habitat Assessment Framework (HAF) data, statistical tests cannot be used to analyze vegetative cover across years. However, the data can be used to describe general similarities or differences in vegetation between years or locations within the allotment.

**Table 11: Summary of 2006 Ecological Site Inventory Production Data (Total Dry Weight)**

Class	Species	Canal Field				Sheep Trail	
		2006-RA-47a	2006-RA-59a	2006-RA-60a	2006-RA-73a	2006-RA-48a	2006-RA-52a
Perennial Grasses	Bottlebrush squirreltail	0	4.6	1.7	0	4.8	55.9
	Crested wheatgrass	0	0	0	0	220.2	21.4
	Sandberg bluegrass	6.8	34	11	1	107.1	210.8
	Thurber's needlegrass	0	0	0	0	0	19
	Western wheatgrass	0	0	0	0	16.6	0
	Bluebunch wheatgrass	99.1	220.9	27	5.4	0	120.9
	Intermediate wheatgrass	0	255.3	0	0	0	295.2
	Basin wildrye	0	0	0	0	0	0
	Thickspike wheatgrass	0	0	0	0	0	0
	Idaho fescue	198.5	134.3	213.9	242.9	0	0
Annual Grasses	Cheatgrass	0	3.8	0	0	0	0
	Sixweeks fescue	0	7.5	0	0	0	0
Perennial Forbs	Longleaf phlox	0	0	0	0	17.2	6.6
	Indian Paintbrush	0	0	0	0	0	0
	Meadow deathcamas	0	0	0	0	0	0
	Alfalfa	0	0	0	0	5.8	0
	Lupine	0	1.9	16.5	4.7	17.2	31.5
Annual Forbs	Curvseed butterwort	0	0	0	0	0	0
	Yellow salsify	0	0	0	0	0	0
Shrubs	Yellow rabbitbrush	0	29.7	31.5	13.8	14	170.3
	Rubber rabbitbrush	0	0	0	0	0	0
	Antelope bitterbrush	0	0	0	11.8	0	0
	Low sagebrush	4.5	34.3	16.3	4.7	0	0
	Basin big sagebrush	0	33.1	0	0	0	0
	Wyoming big sagebrush	0	73	183.5	78.6	109.5	0
<b>TOTAL</b>		<b>308.9</b>	<b>832.4</b>	<b>501.4</b>	<b>362.9</b>	<b>512.4</b>	<b>931.6</b>

**Table 12: Summary of 2006 Ecological Site Inventory Production Data (Total Dry Weight)**

Class	Species	Inside Lake				Signal Butte		Devil Creek
		2006-RA-61a	2006-RA-66a	2006-RA-67a	2006-RA-68a	2006-RA-69a	2006-RA-70a	2006-RA-65a
Perennial Grasses	Bottlebrush squirreltail	0	0	2.7	12.5	0	5.6	0
	Crested wheatgrass	441.7	0	0	0	0	0	0
	Sandberg bluegrass	55.3	248.1	17.3	32	95.5	141	12
	Thurber's needlegrass	0	0	0	0	0	0	0
	Western wheatgrass	0	0	0	0	0	0	0
	Bluebunch wheatgrass	20.5	27.4	0	18.9	370.7	488.3	239
	Intermediate wheatgrass	0	0	0	0	0	0	0
	Basin wildrye	0	1.3	0	0	0	0	0
	Thickspike wheatgrass	0	0	0	0	0	0	9.8
	Idaho fescue	145	0	64.4	206.3	392.6	0	390.8
Annual Grasses	Cheatgrass	0	10	0	0	0	0	0
	Sixweeks fescue	0	0	0	0	0	0	0
Perennial Forbs	Longleaf phlox	0	2.5	0	1.4	0	0.9	0
	Indian Paintbrush	0	0	0	2.2	0	0	0
	Meadow deathcamas	4	0	0	0	0	0	0
	Lupine	21.2	78.8	0	179.9	0	31.3	0
Annual Forbs	Curvseed butterwort	0	0	0	0	0	0	0
	Yellow salsify	0	0	0	0	1.5	0	0
Shrubs	Yellow rabbitbrush	21.4	181.8	1.7	2.3	107.5	89.3	44.1
	Rubber rabbitbrush	7.5	0	0	0	0	0	0
	Low sagebrush	11.6	0	33.8	7.2	0	0	0
	Wyoming big sagebrush	28.7	431.8	0	0	0	0	0
<b>TOTAL</b>		<b>756.9</b>	<b>981.7</b>	<b>119.9</b>	<b>464.9</b>	<b>967.8</b>	<b>756.4</b>	<b>695.7</b>

Vegetative cover data was collected at the thirteen ESI sites (Tables 13 and 14) in 2006. Due to differences in sampling locations and methodology (e.g. number of transects per site and number of points per transect) 2006 ESI data and the 2012 Sage-grouse Habitat Assessment Framework (HAF) data, statistical tests cannot be used to analyze vegetative cover across years. However, the data can be used to describe general similarities or differences in perennial grasses between years or locations within the allotment.

**Table 13: Percent Vegetative Cover (Top Layer) from 2006 ESI data**

Vegetation Class	Species	Sheep Trail		Signal Butte	
		2006 ESI RA-48a	2006 ESI RA-52a	2006 ESI RA-69a	2006 ESI RA-70a
Perennial Grasses	Bluebunch wheatgrass	0%	11.3%	18.7%	27.3%
	Bottlebrush squirreltail	0%	1.3%	0.7%	2.7%
	Crested wheatgrass	24%	0.7%	0%	0%
	Great Basin wildrye	0%	0%	0.7%	0%
	Idaho fescue	0%	0%	16.7%	0%
	Intermediate wheatgrass	0%	22%	0%	0%
	Sandberg bluegrass	29.3%	40.7%	11.3%	10%
	Thickspike wheatgrass	0%	0%	0%	0%
	Western wheatgrass	2%	0%	0%	0%
Annual Grasses	Cheatgrass	0%	0.7%	0.7%	2%
	Six-weeks fescue	0%	0%	0%	0%
Perennial Forbs	Long-leaf phlox	0.7%	0%	0%	0.7%
	Lupine	0%	0.7%	0%	3.3%
	Meadow deathcamas	0%	0%	0%	0%
	Milkvetch	0%	0%	0%	0%
Annual Forbs	Blue-eyed Mary	0%	0%	0%	0%
	Bur buttercup	0%	0%	0%	0.7%
	Epilobium	0%	1.3%	0%	0.7%
	Desert madwort	0.7%	0%	0%	0%
Shrubs	Antelope bitterbrush	0%	0%	0%	0%
	Basin big sagebrush	0%	0%	0%	0%
	Black sagebrush	0%	0%	0%	1.3%
	Low sagebrush	0%	0%	0.7%	0%
	Mountain big sagebrush	0%	0%	0%	0%
	Rabbitbrush	4%	4%	11.3%	6.7%
	Snowberry	0%	0%	0%	0%
	Spiny hopsage	2.7%	0%	0%	0%
Wyoming big sagebrush	5.3%	0%	0%	0%	
<b>Vegetation TOTAL</b>		<b>68.7%</b>	<b>82%</b>	<b>60.8%</b>	<b>55.4%</b>
Other Cover	Bare Ground	10%	3.3%	4.7%	6%
	Biological Soil Crust	5.3%	0.7%	0.7%	1.3%
	Litter in contact with soil	6%	9.3%	17.3%	20.7%
	Litter standing	9.3%	4%	16.7%	16.7%
	Rock	0.7%	0%	0%	0%
<b>Grand TOTAL</b>		<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

**Table 14: Percent Vegetative Cover (Top Layer) from 2006 ESI data**

Vegetation Class	Species	Inside Lake			
		2006 ESI RA-61a	2006 ESI RA-66a	2006 ESI RA-67a	2006 ESI RA-68a
Perennial Grasses	Bluebunch wheatgrass	7.3%	2.1%	1.0%	1.3%
	Bottlebrush squirreltail	0%	1.4%	0%	2%
	Crested wheatgrass	18%	0%	0%	0%
	Great Basin wildrye	0%	0%	0%	0%
	Idaho fescue	8.7%	0%	14.0%	24%
	Intermediate wheatgrass	0%	0%	0%	0%
	Sandberg bluegrass	22%	27.8%	18.0%	7.3%
	Thickspike wheatgrass	0%	0%	0%	0%
Western wheatgrass	0%	0%	0%	0%	
Annual Grasses	Cheatgrass	0%	0%	0%	0%
	Six-weeks fescue	0.7%	0%	0%	0%
Perennial Forbs	Long-leaf phlox	0%	0%	2.0%	0.7%
	Lupine	1.3%	2.8%	0%	1.3%
	Meadow deathcamas	0.7%	0%	0%	0%
	Milkvetch	0%	0%	0%	0.7%
Annual Forbs	Blue-eyed Mary	0%	0%	0%	0%
	Bur buttercup	0%	0%	0%	0%
	Epilobium	0%	0%	0%	0%
	Desert madwort	0%	0%	0%	0%
Shrubs	Antelope bitterbrush	0%	0%	0%	0%
	Basin big sagebrush	0%	0%	0%	0%
	Black sagebrush	0%	0%	0%	0%
	Low sagebrush	6%	0%	18.0%	13.3%
	Mountain big sagebrush	0%	0%	0%	0.7%
	Rabbitbrush	3.3%	0.7%	1.0%	0.7%
	Snowberry	0%	0%	0%	0.7%
	Spiny hopsage	0%	0%	0%	0%
Wyoming big sagebrush	0.7%	25.0%	0%	0%	
<b>Vegetation TOTAL</b>		<b>68.7%</b>	<b>60.5%</b>	<b>54.0%</b>	<b>52.7%</b>
Other Cover	Bare Ground	6.7%	6.3%	20.0%	6.7%
	Biological Soil Crust	2.7%	6.9%	4.0%	2.7%
	Litter in contact with soil	19.3%	18.8%	16.0%	6.7%
	Litter standing	1.3%	7.6%	3.0%	8.7%
	Rock	1.3%	0%	3.0%	22.7%
<b>Grand TOTAL</b>		<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

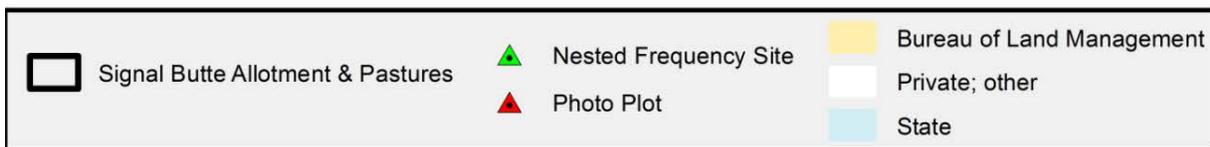
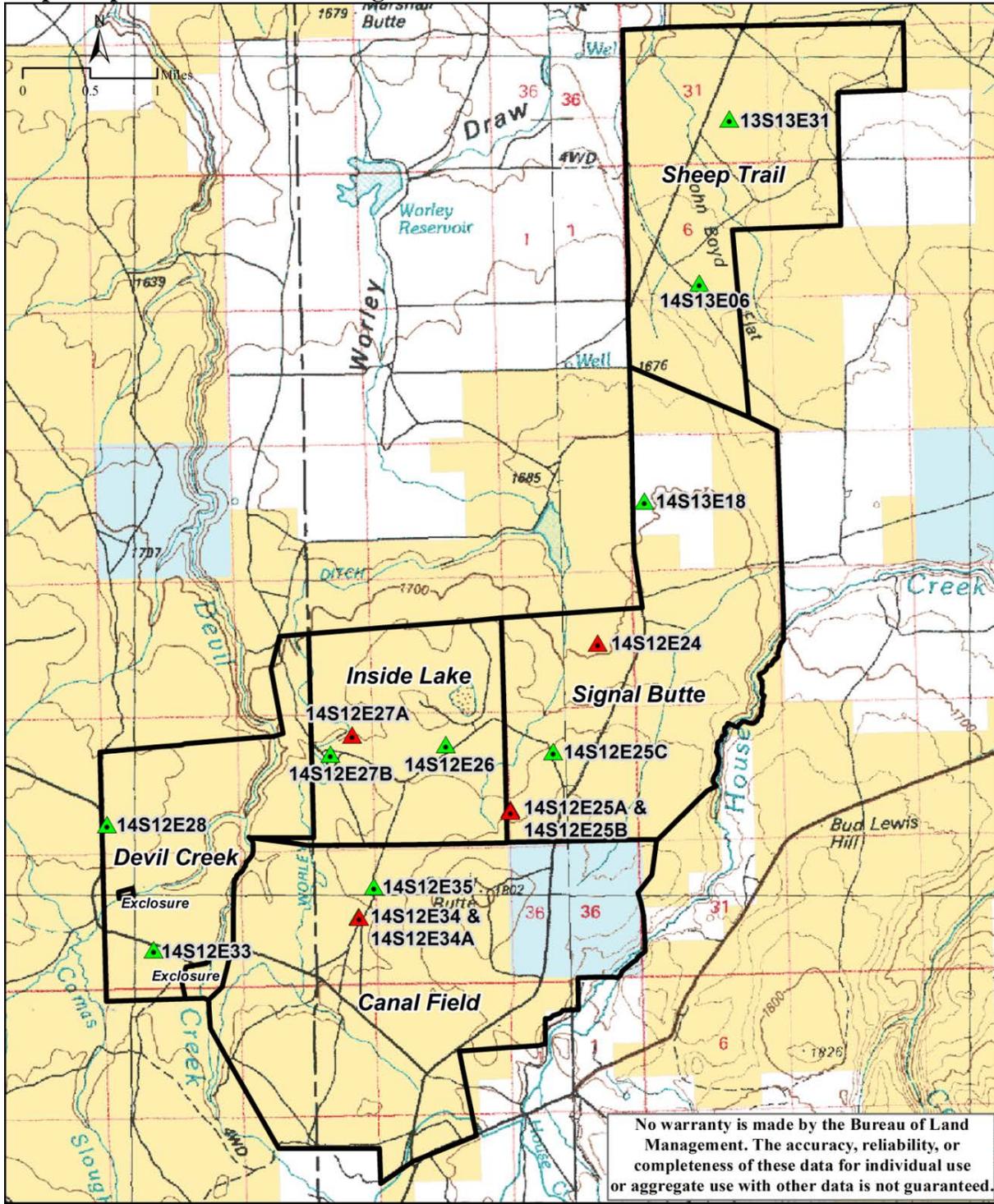
### **Upland Trend Monitoring**

Upland trend monitoring sites have been established in the Canal, Devil Creek, Inside Lake, Signal Butte and Sheep Trail Pastures of the Signal Butte Allotment (Map 5). Both Nested Frequency and Photo Plot protocols have been used to collect data at the sites (BLM, 1996). Nested frequency records the frequency of plant species at each site while vegetative plant cover is recorded within the photo plots. A total of eight long term trend sites have been established on public land within the allotment; an additional four photo plot sites were also established. One long term trend site was established on private land. Six of the eight long term trend sites burned in the 2007 Murphy Complex Fire and all six were aerially seeded with Wyoming big sagebrush. One site was drill seeded following the 2007 fire.

A short overview of upland trend monitoring is included below; nevertheless, the effects of fire and subsequent drill seedings on vegetation should be considered when comparisons of current trend data are made to the previously collected trend data. Essentially, the trend data following the fire is the new baseline for future comparisons for each site. The photo plot only site data are not included in the trend monitoring section; however, the information, as well as the data supporting the tables displaying summarized trend data can be viewed at the JFO.

Factors that limit the comparison of trend data over time include 1) data was not always collected at the same time of the year; 2) not all of the forbs were recorded by genus and species; 3) annual forbs were not always noted; 4) inconsistencies between persons reading the photo plots over the years; and 5) ground cover for shrubs and biological soil crusts were not always recorded when the plots were established.

**Map 5: Upland Trend Monitoring Plots**



**Canal Field Pasture**

The Canal Field Pasture has three Nested Frequency/Photo Plot upland trend sites that were read in 2012. Two sites are Nested Frequency/Photo Plot sites and one site is a Photo Plot only. Both sites burned in the 2007 Murphy Complex and were subsequently aurally seeded with Wyoming big sagebrush. Because the sites burned, comparison of the 2012 data to the 1989 data would not be appropriate as a basis to support conclusions of overall trend. The first reading following a fire essentially becomes the new baseline for trend data analysis; therefore, information from the 2012 trend reading is discussed below to show the general recovery and current baseline of the site.

***Trend Site 14S12E34:***

Site 14S12E34 (Photo 1 and 2) is located in a Shallow Claypan 12-16" low sagebrush ARAR8/FEID ecological site. The site was initially read in 1989 and the 3x3 photo plot in 1998.

**Photo 1: Overview of Trend Site 14S12E34 dated May 23, 1989**



**Photo 2: Overview of Trend Site 14S12E34 dated July 11, 2012**



The key species at the site are Idaho fescue and bluebunch wheatgrass. The number of occurrences for comparison between years is based on plot 1 within the nested frequency frame for Idaho fescue and plot 4 for bluebunch wheatgrass. The frequency of Idaho fescue has decreased from 34 occurrences in 1989 to 32 occurrences in 1998 to 24 occurrences in 2012 and bluebunch wheatgrass decreased from 13 occurrences in 1989 to 9 occurrences in 1998, then increased to 13 occurrences in 2012 (Table 15).

Western wheatgrass increased from 13 occurrences in 1989 to 14 occurrences in 1998 to 30 occurrences in 2012 based on plot 4. Cheatgrass was recorded as 0 occurrences in 1989, then decreased from 6 occurrences in 1998 to 4 occurrences in 2012 based on plot 4. Perennial and annual forbs increased from 137 occurrences in 1989 to 225 occurrences in 1998, and then decreased to 154 occurrences in 2012 based on plot 4. While the total forb occurrences have likely increased, this may also be due to the timing of data collection, precipitation and temperature. Nineteen species of forbs were recorded at the site.

Bare ground increased from 23.25 percent cover in 1989 to 23.5 percent cover in 1998, then decreased to 4.0 percent in 2012. Vegetation decreased from 14.25 percent cover in 1989 to 10.0 percent in 1998, and then increased to 16.75 percent in 2012. Biological crust increased from 0.0 percent in 1989 to 9.25 percent in 1998, then decreased to 6.75 percent in 2012. Litter decreased from 62.25 percent cover in 1989 to 56.75 percent in 1998, and then increased to 65.75 percent in 2012.

**Table 15: Canal Field Pasture Trend Site 14S12E34 Nested Frequency Data Summary**

Species or Vegetation Class	Plot	Occurrences		
		1989	1998	2012
Sandberg bluegrass	2	74	75	51
Squirreltail	4	1	3	0
Idaho Fescue	1	34	32	24
Western wheatgrass	4	13	14	30
Bluebunch wheatgrass	4	13	9	13
Cheatgrass	4	0	6	4
Rockcress	4	1	0	0
Larkspur	4	2	0	0
Milkvetch	4	20	NR	0
Longleaf phlox	4	57	49	13
Annual fescue	4	0	0	5
Agoseris	4	28	23	0
Lupine	4	2	20	7
Maiden blue eyed Mary	4	NC	56	66
Mourning milkvetch	4	0	10	0
Torrey's milkvetch*	4	0	4	0
Nodding chickweed	4	NC	NC	2
Curvseed butterwort	4	NC	0	3
Slender phlox	4	NC	NC	18
Tall annual willowherb	4	NC	NC	8
Shaggy fleabane	4	0	0	10
Yellow salsify	4	0	0	1
Spring draba	4	NC	NC	9
Onion	4	2	0	0
Strict forget-me-not	4	NC	NC	19
Unknown perennial forb	4	25	23	1
Cryptantha	4	NR	40	NR
Yellow rabbitbrush seedling	4	NR	NR	15
Yellow rabbitbrush	4	39	41	33
Rubber rabbitbrush	4	1	NR	1
Rubber rabbitbrush seedling	4	NR	NR	1
Wyoming big sagebrush	4	2	5	0
Wyoming big sagebrush seedling		0	0	2
Little sagebrush	4	49	32	3
Little sagebrush seedling	4	9	4	0

NR-Not recorded; NC-Annual species may have been present but not counted

\* This is mostly likely Buckwheat milvetch rather than Torrey's milkvetch, which occurs in black sage and calcareous soils

Cover data collected at the 3x3 photo plot at the site shows that from 1998 to 2012, Idaho fescue increased from 12.04 percent to 14.63 percent. No other species were recorded across years.

***Trend Site 14S12E35:***

Site 14S12E35 (Photo 3 and 4) is located in a Shallow Claypan 12-16" low sagebrush ARAR8/FEID ecological site. The site was initially read in 1989 and the 3x3 photo plot in 1997.

**Photo 3: Overview of Trend Site 14S12E35 dated May 23, 1989**



**Photo 4: Overview of Trend Site 14S12E35 dated July 11, 2012**



The key species at the site are Idaho fescue and bluebunch wheatgrass. The number of occurrences for comparison between years is based on plot 2 within the nested frequency frame for Idaho fescue and plot 4 for bluebunch wheatgrass. The frequency of Idaho fescue has decreased from 80 occurrences in 1989 to 57 occurrences in 1997, then increased to 62 occurrences in 2012 and bluebunch wheatgrass decreased from 26 occurrences in 1989 to 25 occurrences in 1997 and 2012. Sandberg bluegrass decreased from 21 occurrences in 1989 to 19 occurrences in 1997, then increased to 32 occurrences in 2012 (Table 16).

Squirreltail increased from 4 occurrences in 1989 to 8 occurrences in 1997, and then decreased to 3 occurrences in 2012 based on plot 4. Cheatgrass was recorded as 0 occurrences in 1989 and 1997, and then increased to 3 occurrences in 2012 based on plot 4. Perennial and annual forbs decreased from 123 occurrences in 1989 to 122 occurrences in 1997, and then increased to 181 occurrences in 2012 based on plot 4. Longleaf phlox increased from 63 occurrences in 1989 to 611 occurrences in 1997, and then decreased to 41 occurrences in 2012 based on plot 3. While the total forb occurrences have likely increased, this may also be due to the timing of data collection, precipitation and temperature. Twenty-one species of forbs were recorded at the site.

Bare ground was recorded as 31.0 percent cover in 1989 and 1997, and then decreased to 10.5 percent in 2012. Vegetation was recorded as 14.5 in 1989 and 1997, and then increased to 20.5 percent in 2012. Biological crust increased from 0.0 percent in 1989 and 1997 to 11.5 percent in 2012. Litter was recorded as 51.5 percent in 1989 and 1997, and then decreased to 50.0 percent in 2012.

**Table 16: Canal Field Pasture Trend Site 14S12E35 Nested Frequency Data Summary**

Species or Vegetation Class	Plot	Occurrences		
		1989	1997	2012
Sandberg bluegrass	1	21	19	32
Squirreltail	4	4	8	3
Idaho Fescue	2	80	57	62
Bluebunch wheatgrass	4	26	25	25
Cheatgrass	4	0	0	3
Spotted fritillary	4	2	0	0
Rockcress	4	0	2	0
Larkspur	4	24	18	0
Hooker's balsamroot	4	0	0	1
Milkvetch	4	9	0	0
Longleaf phlox	3	63	611	41
Tall tumbled mustard	4	NC	NC	3
Lupine	4	33	14	3
Maiden blue eyed Mary	4	NC	NC	59
Mourning milkvetch	4	0	17	0
Agoseris	4	33	28	17
Curvseed butterwort	4	NC	NC	4
Slender phlox	4	NC	NC	21
Tall annual willowherb	4	NC	NC	12
Yellow salsify	4	0	0	1
Spring draba	4	NC	NC	10
Onion	4	6	9	0
Strict forget-me-not	4	0	0	8
Unknown perennial forb	4	3	6	0
Nodding chickweed	4	NC	NC	29
Groundsmoke	4	NC	NC	12
Deathcamas	4	13	25	8
Desertparsley	4	0	3	0
Yellow rabbitbrush seedling	4	NR	NR	1
Yellow rabbitbrush	4	2	1	0
Rubber rabbitbrush	4	1	0	0
Wyoming big sagebrush	4	0	0	2
Little sagebrush	4	46	38	3

NR-Not recorded; NC-Annual species may have been present but not counted

Cover data collected at the 3x3 photo plot at the site shows that from 1997 to 2012, Idaho fescue increased from 1.75 percent to 4.55 percent, bluebunch wheatgrass increased from 4.41 percent to 21.7 percent and Sandberg bluegrass increased from 7.28 percent to 9.59. Forb species increased from 0.357 to 0.84.

**Devil Creek Pasture**

The Devil Creek Pasture has two Nested Frequency/Photo Plot upland trend sites that were read in 2012. Both sites burned in the 2007 Murphy Complex and were subsequently aerially seeded with Wyoming big sagebrush. Because the sites burned, comparison of the 2012 data to the 1989 data would not be appropriate as a basis to support conclusions of overall trend. The first reading following a fire essentially becomes the new baseline for trend data analysis; therefore, information from the 2012 trend reading is discussed below to show the general recovery and current baseline of the site.

***Trend Site 14S12E28:***

Site 14S12E28 (Photo 5 and 6) is located in a Loamy 12-16" Basin big sagebrush ARTRT/PSSP/FEID ecological site. The site was initially read in 1989 and the photo plot read for the first time in 1998.

**Photo 5: Overview of Trend Site 14S12E28 dated May 23, 1989**



**Photo 6: Overview of Trend Site 14S12E28 dated July 5, 2012**



The key species at the site are Idaho fescue and bluebunch wheatgrass. The number of occurrences for comparison between years is based on plot 2 within the nested frequency frame for Idaho fescue and plot 4 for bluebunch wheatgrass. The frequency of Idaho fescue has increased from 80 occurrences in 1989 to 84 occurrences in 1998, then decreased to 58 occurrences in 2012 and bluebunch wheatgrass decreased from 53 occurrences in 1989 to 47 occurrences in 1998, then increased to 49 occurrences in 2012. Sandberg bluegrass increased from 84 occurrences in 1989 to 98 occurrences in 1998, then decreased to 85 occurrences in 2012 (Table 17).

Squirreltail increased from 7 occurrences in 1989 to 30 occurrences in 1998, and then decreased to 0 occurrences in 2012 based on plot 4. Cheatgrass was recorded as 0 occurrences in 1989 and 1998, and then increased to 1 occurrence in 2012 based on plot 4. Perennial and annual forbs increased from 118 occurrences in 1989 to 154 occurrences in 1998, and then increased to 316 occurrences in 2012 based on plot 4. While the total forb occurrences have likely increased, this may also due to the timing of data collection, precipitation and temperature. Eighteen species of desirable forbs were recorded at the site.

Bare ground decreased from 39.75 percent cover in 1989 to 33.75 percent cover in 1998, then decreased to 17.0 percent in 2012. Vegetation increased from 12.0 percent cover in 1989 to 14.5 percent in 1998, and then increased to 22.75 percent in 2012. Biological crust increased from 0.0 percent in 1989 to 2.5 percent in 1998, then increased to 9.75 percent in 2012. Litter decreased from 44.5 percent cover in 1989 to 34.0 percent in 1998, and then increased to 42.0 percent in 2012.

**Table 17: Devil Creek Pasture Trend Site 14S12E28 Nested Frequency Data Summary**

Species or Vegetation Class	Plot	Occurrences		
		1989	1998	2012
Sandberg bluegrass	2	84	98	85
Squirreltail	4	7	30	0
Idaho Fescue	2	80	84	58
Bluebunch wheatgrass	4	53	47	49
Cheatgrass	4	0	0	1
Hooker's balsamroot	4	1	0	0
Clover	4	44	5	0
Idaho bluebells	4	0	0	35
Milkvetch	4	4	4	0
Longleaf phlox	4	42	22	44
Lupine	4	7	29	6
Maiden blue eyed Mary	4	NC	68	63
Mourning milkvetch	4	0	4	14
Onion	4	3	8	0
Agoseris	4	10	0	5
Curvseed butterwort	4	NC	NC	16
Sagebrush fleabane	4	2	2	0
Slender phlox	4	NC	NC	29
Tall annual willowherb	4	NC	NC	74
Yellow salsify	4	2	4	1
Spring draba	4	NC	NC	11
Shaggy fleabane	4	0	0	16
Nodding chickweed	4	NC	NC	18
Yellow rabbitbrush seedling	4	NR	NR	12
Yellow rabbitbrush	4	10	12	4

NR-Not recorded; NC-Annual species may have been present but not counted

Cover data collected at the 3x3 photo plot at the site shows that from 1998 to 2012, Idaho fescue decreased from 9.17 percent to 2.1 percent, bluebunch wheatgrass increased from 1.54 percent to 5.25 percent and Sandberg bluegrass decreased from 5.81 percent to 1.414.

***Trend Site 14S12E33:***

Site 14S12E33 (Photo 7 and 8) is located in a Shallow Claypan 12-16" low sagebrush ARAR8/FEID ecological site. The site was initially read in 1989 and the 3x3 plot read for the first time in 1996.

**Photo 7: Overview of Trend Site 14S12E33 dated May 23, 1989**



**Photo 8: Overview of Trend Site 14S12E33 dated July 5, 2012**



The key species at the site are Idaho fescue and bluebunch wheatgrass. The number of occurrences for comparison between years is based on plot 1 within the nested frequency frame for Idaho fescue and plot 4 for bluebunch wheatgrass. The frequency of Idaho fescue has decreased from 29 occurrences in 1989 to 24 occurrences in 1996, then decreased to 14 occurrences in 2012 and bluebunch wheatgrass decreased from 16 occurrences in 1989 to 9 occurrences in 1996, then increased to 14 occurrences in 2012. Sandberg bluegrass decreased from 32 occurrences in 1989 to 17 occurrences in 1996, then increased to 25 occurrences in 2012 based on plot 1 and western wheatgrass decreased from 53 occurrences in 1989 to 36 occurrences in 1996, then increased to 61 occurrences in 2012 based on plot 2 (Table 18).

Cheatgrass was recorded as 0 occurrences in 1989 and 1996, and then increased to 1 occurrence in 2012 based on plot 4. Perennial and annual forbs increased from 104 occurrences in 1989 to 112 occurrences in 1996, and then increased to 156 occurrences in 2012 based on plot 4. Hollyleaf clover decreased from 83 occurrences in 1989 to 68 occurrences in 1996, and then decreased to 0 occurrences in 2012 based on plot 2. While the total forb occurrences have likely increased, this may also due to the timing of data collection, precipitation and temperature. Sixteen species of desirable forbs were recorded at the site.

Bare ground increased from 21.5 percent cover in 1989 to 32.0 percent cover in 1996, then decreased to 16.5 percent in 2012. Vegetation decreased from 17.0 percent cover in 1989 to 10.75 percent in 1996, and then increased to 15.75 percent in 2012. Biological crust increased from 0.0 percent in 1989 and 1996, and then increased to 1.0 percent in 2012. Litter decreased from 61.5 percent cover in 1989 to 57.25 percent in 1996, and then increased to 66.0 percent in 2012.

**Table 18: Devil Creek Pasture Trend Site 14S12E33 Nested Frequency Data Summary**

Species or Vegetation Class	Plot	Occurrences		
		1989	1996	2012
Sandberg bluegrass	1	32	17	25
Western wheatgrass	2	53	36	61
Idaho Fescue	1	29	24	14
Bluebunch wheatgrass	4	16	9	14
Basin wildrye	4	1	1	0
Squirreltail	4	0	1	2
Cheatgrass	4	0	0	1
Unknown perennial forb	4	18	NR	NR
Larkspur	4	2	0	0
Hollyleaf clover	2	83	68	0
Idaho bluebells	4	0	0	57
Milkvetch	4	24	37	1
Longleaf phlox	4	13	20	48
Foothill arnica	4	0	8	0
Maiden blue eyed Mary	4	NC	NC	19
Agoseris	4	20	11	1

Species or Vegetation Class	Plot	Occurrences		
		1989	1996	2012
Slender phlox	4	NC	NC	8
Tall annual willowherb	4	0	13	10
Yellow salsify	4	5	0	0
Onion	4	0	1	0
Aster	4	22	1	0
Shaggy fleabane	4	0	21	7
Nodding chickweed	4	0	0	5
Yellow rabbitbrush seedling	4	NR	5	9
Yellow rabbitbrush	4	47	39	22
Low sage brush seedlings	4	18	7	0
Low sage brush	4	66	56	0
Big sagebrush	4	10	5	1
Big sagebrush seedling	4	NR	2	2

NR-Not recorded; NC-Annual species may have been present but not counted

Cover data collected at the 3x3 photo plot at the site shows that from 1996 to 2012, Idaho fescue decreased from 12.88 percent to 6.93 percent and Sandberg bluegrass decreased from 5.39 percent to 2.1 percent. Forb species increased from 0.14 percent to 0.7 percent.

### **Inside Lake Pasture**

The Inside Lake Pasture has three Nested Frequency/Photo Plot upland trend sites that were read in 2012. Two sites are Nested Frequency/Photo Plot sites and one site is a Photo Plot only. Both sites burned in the 2007 Murphy Complex and were subsequently aerially seeded with Wyoming big sagebrush. Because the sites burned, comparison of the 2012 data to the 1989 data would not be appropriate as a basis to support conclusions of overall trend. The first reading following a fire essentially becomes the new baseline for trend data analysis; therefore, information from the 2012 trend reading is discussed below to show the general recovery and current baseline of the site.

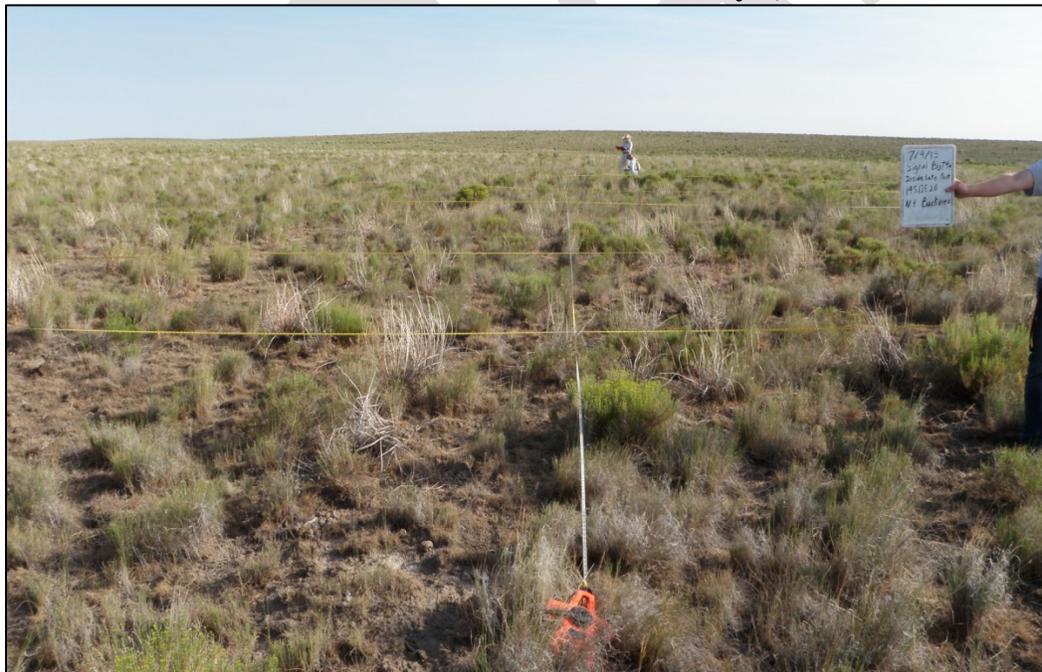
### **Trend Site 14S12E26:**

Site 14S12E26 (Photos 9 and 10) is located in a Shallow Claypan 12-16" low sagebrush ARAR8/FEID ecological site. The site was initially read in 1989 and the 3x3 plot read for the first time in 1997.

**Photo 9: Overview of Trend Site 14S12E26 dated May 23, 1989**



**Photo 10: Overview of Trend Site 14S12E26 dated July 5, 2012**



The key species at the site is bluebunch wheatgrass. The number of occurrences for comparison between years is based on plot 3 within the nested frequency frame for bluebunch wheatgrass.

The frequency of bluebunch wheatgrass decreased from 46 occurrences in 1989 to 44 occurrences in 1997, then increased to 62 occurrences in 2012 (Table 19).

Sandberg bluegrass increased from 77 occurrences in 1989 to 81 occurrences in 1997 to 87 occurrences in 2012 based on plot 2. Cheatgrass was recorded as 0 occurrences in 1989 and 1997, and then increased to 23 occurrences in 2012 based on plot 4. Perennial and annual forbs decreased from 116 occurrences in 1989 to 114 occurrences in 1997, and then increased to 314 occurrences in 2012 based on plot 4. Longleaf phlox increased from 44 occurrences in 1989 to 56 occurrences in 1997, and then decreased to 53 occurrences in 2012 based on plot 2. While the total forb occurrences have likely increased, this may also be due to the timing of data collection, precipitation and temperature. Twenty-three species of forbs were recorded at the site.

Bare ground decreased from 42.0 percent cover in 1989 to 27.75 percent in 1997, and then increased to 23.25 percent in 2012. Vegetation increased from 8.25 percent cover in 1989 to 13.25 percent in 1998, and then increased to 14.0 percent in 2012. Biological crust increased from 0.0 percent in 1989 and 1997, and then increased to 10.0 percent in 2012. Litter increased from 49.255 percent cover in 1989 to 58.75 percent in 1997, and then decreased to 42.0 percent in 2012.

**Table 19: Inside Lake Pasture Trend Site 14S12E26 Nested Frequency Data Summary**

Species or Vegetation Class	Plot	Occurrences		
		1989	2004	2013
Sandberg bluegrass	2	77	81	87
Bluebunch wheatgrass	3	46	44	62
Squirreltail	4	2	4	1
Cheatgrass	4	0	0	23
Lupine	3	59	35	34
Larkspur	4	0	1	0
Spring draba	4	0	0	7
Desert madwort	4	0	0	33
Tall annual willowherb	4	0	0	17
Longleaf phlox	2	44	56	53
Spiny phlox	4	16	12	9
Sagebrush phlox	4	NR	NR	37
Maiden blue eyed Mary	4	NC	NC	78
Milkvetch	4	9	11	4
Paintbrush	4	0	2	0
Agoseris	4	25	38	21
Slender phlox	4	NC	NC	64
Curvseed butterwort	4	NC	NC	46
Mountain tansymustard	4	NC	NC	1
Nodding chickweed	4	NC	NC	1
Yellow salsify	4	0	1	1

Species or Vegetation Class	Plot	Occurrences		
		1989	2004	2013
Onion	4	3	7	0
Aster	4	2	0	0
Shaggy fleabane	4	0	0	1
Fernleaf biscuitroot	4	0	2	2
Pussytoes	4	0	1	0
Deathcamas	4	2	2	2
Desert biscuitroot	4	0	2	2
Yellow rabbitbrush seedling	4	NR	1	1
Yellow rabbitbrush	4	26	27	29
Low sage brush seedlings	4	NR	1	0
Low sage brush	4	44	17	0
Basin big sagebrush	4	NR	1	0

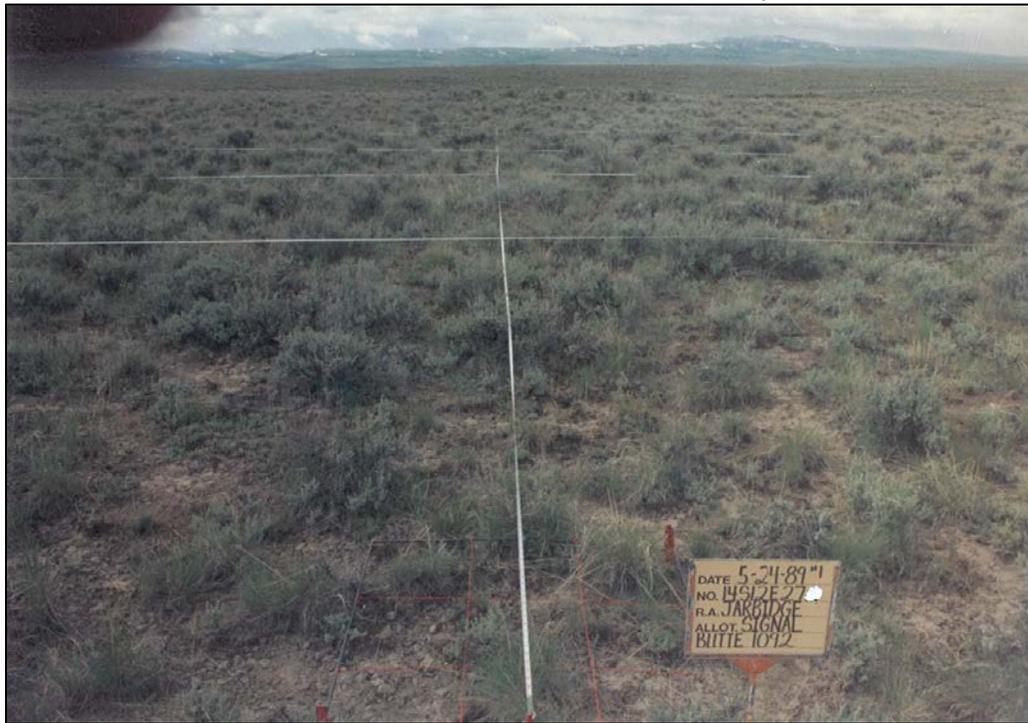
NR-Not recorded; NC-Annual species may have been present but not counted

Cover data collected at the 3x3 photo plot at the site shows that from 1997 to 2013, bluebunch wheatgrass increased from 5.67 percent to 24.5 percent and Sandberg bluegrass increased from 6.58 percent to 8.05. Longleaf phlox increased from 0.7 percent to 3.36 percent.

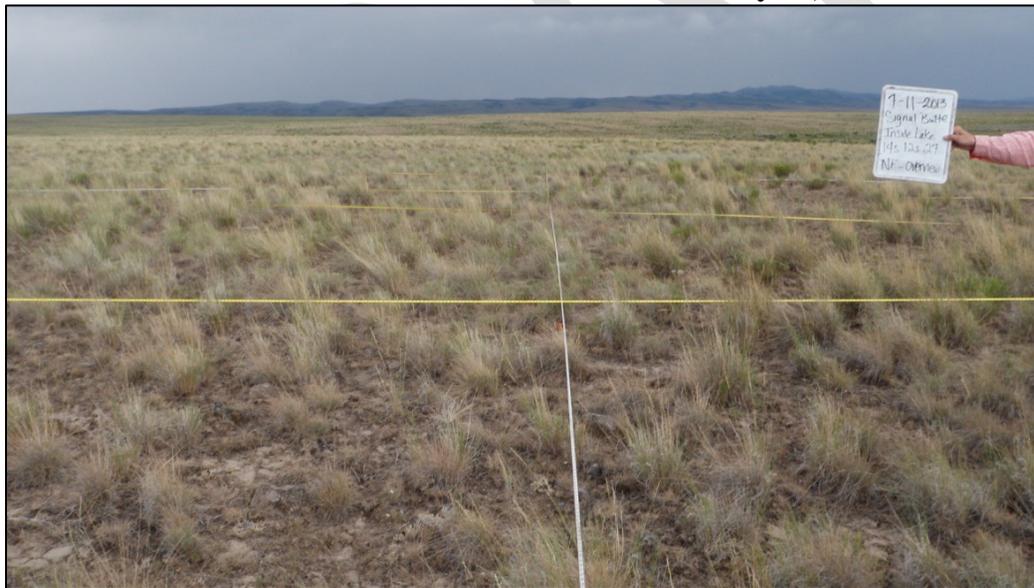
***Trend Site 14S12E27B:***

Site 14S12E27B (Photos 11 and 12) is located in a Shallow Claypan 12-16" low sagebrush ARAR8/FEID ecological site. The site was established and nested frequency was read in 1989 and had the photo plot read for the first time in 1993.

**Photo 11: Overview of Trend Site 14S12E27B dated May 24, 1989**



**Photo 12: Overview of Trend Site 14S12E27B dated July 11, 2013**



The key species at the site are bluebunch wheatgrass and Sandberg bluegrass. The number of occurrences for comparison between years is based on plot 4 within the nested frequency frame for bluebunch wheatgrass and plot 2 for Sandberg bluegrass. The frequency of bluebunch wheatgrass has decreased from 45 occurrences in 1989 to 34 occurrences in 1996, then decreased to 33 occurrences in 2012 and Sandberg bluegrass increased from 61 occurrences in 1989 to 81 occurrences in 1996, then decreased to 82 occurrences in 2012 (Table 20).

Idaho fescue increased from 17 occurrences in 1989 to 34 occurrences in 1996 to 38 occurrences in 2012 based on plot 4. Cheatgrass was recorded as 0 occurrences in 1989 and 1996, and then increased to 10 occurrences in 2012 based on plot 4. Perennial and annual forbs decreased from 73 occurrences in 1989 to 55 occurrences in 1996, and then increased to 286 occurrences in 2012 based on plot 4. Longleaf phlox decreased from 62 occurrences in 1989 to 40 occurrences in 1996, and then increased to 40 occurrences in 2012 based on plot 2. While the total forb occurrences have likely increased, this may also be due to the timing of data collection, precipitation and temperature. Twenty species of forbs were recorded at the site.

Bare ground decreased from 54.0 percent cover in 1989 to 41.5 percent in 1996, and then decreased to 26.75 percent in 2012. Vegetation decreased from 10.25 percent cover in 1989 to 9.5 percent in 1996, and then increased to 14.75 percent in 2012. Biological crust increased from 0.0 percent in 1989 and 1996 to 13.5 percent in 2012. Litter increased from 34.5 percent cover in 1989 to 46.5 percent in 1996, and then decreased to 40.5 percent in 2012.

**Table 20: Inside Lake Pasture Trend Site 14S12E27B Nested Frequency Data Summary**

Species or Vegetation Class	Plot	Occurrences		
		1989	1996	2013
Sandberg bluegrass	2	61	85	82
Bluebunch wheatgrass	2	45	34	33
Squirreltail	4	4	12	4
Idaho fescue	4	17	34	1
Thurber's needlegrass	4	NR	NR	37*
Cheatgrass	4	0	0	10
Hooker's balsamroot	4	2	4	4
Hawksbeard	4	3	3	0
Lupine	4	2	2	3
Twin arnica	4	0	1	0
Spring draba	4	NC	NC	7
Desert madwort	4	NC	NC	3
Tall annual willowherb	4	NC	NC	26
Longleaf phlox	2	62	40	48
Spiny phlox	4	6	6	3
Sagebrush phlox	4	NR	NR	43
Maiden blue eyed Mary	4	NC	NC	92
Milkvetch	4	30	21	20
Agoseris	4	17	2	27
Lambstongue ragwort	4	0	0	2
Slender phlox	4	NC	NC	42
Curvseed butterwort	4	NC	NC	54
Yellow salsify	4	0	0	1
Aster	4	11	14	9
Pussytoes	4	1	0	0

Species or Vegetation Class	Plot	Occurrences		
		1989	1996	2013
Deathcamas	4	1	2	1
Desert biscuitroot	4	0	0	3
Yellow rabbitbrush seedling	4	0	3	1
Yellow rabbitbrush	4	6	6	3
Low sage brush seedlings	4	35	2	0
Low sage brush	4	78	86	0

NR-Not recorded; NC-Annual species may have been present but not counted

\*After IDT review, it was determined that the Thurber's needlegrass occurrences recorded at the site were likely misidentified and should have been recorded as Idaho fescue because Thurber's needlegrass was not included in the seed mix used following the 2007 Murphy Complex Fire

Cover data collected at the 3x3 photo plot at the site shows that from 1996 to 2013, Idaho fescue decreased from 17.5 percent to 3.01 percent and Sandberg bluegrass increased from 1.68 percent to 2.87.

### **Sheep Trail Pasture**

The Sheep Trail Pasture has two Nested Frequency/ Photo Plot upland trend sites that were read in 2013.

### **Trend Site 13S13E31:**

Site 13S13E31 (Photos 13 and 14) is located in a Loamy 10-13" Wyoming big sagebrush ARTRW8/PSSP6 ecological site. The site was initially read in 1989 and the photo plot read for the first time in 1996. The site burned in the 2007 Murphy Complex and was subsequently aerially seeded with Wyoming big sagebrush. Because the sites burned, comparison of the 2012 data to the 1989 data would not be appropriate as a basis to support conclusions of overall trend. The first reading following a fire essentially becomes the new baseline for trend data analysis; therefore, information from the 2012 trend reading is discussed below to show the general recovery and current baseline of the site.

**Photo 13: Overview of Trend Site 13S13E31 dated May 22, 1989**



**Photo 14: Overview of Trend Site 13S13E31 dated May 23, 2013**



The key species at the site are bluebunch wheatgrass and Sandberg bluegrass. The number of occurrences for comparison between years is based on plot 4 within the nested frequency frame for bluebunch wheatgrass and plot 1 for Sandberg bluegrass. The frequency of bluebunch wheatgrass has increased from 40 occurrences in 1989 to 47 occurrences in 1996, then increased

to 62 occurrences in 2013 and Sandberg bluegrass decreased from 51 occurrences in 1989 to 47 occurrences in 1996, then increased to 62 occurrences in 2013. Squirreltail decreased from 22 occurrences in 1989 to 18 occurrences in 1996, then to 9 occurrences in 2013 based on plot 4 and Thurber's wheatgrass increased from 15 occurrences in 1989 to 24 occurrences in 1996, then decreased to 3 occurrences in 2013 based on plot 4 (Table 21).

Cheatgrass was recorded as 0 occurrences in 1989, then increased to 4 occurrences in 1996 and then to 20 occurrences in 2013 based on plot 4. Perennial and annual forbs increased from 65 occurrences in 1989 to 126 occurrences in 1996, and then increased to 137 occurrences in 2013 based on plot 4. Longleaf phlox decreased from 74 occurrences in 1989 to 62 occurrences in 1996 but was not recorded in 2013, based on plot 2. While the total forb occurrences have likely increased, this may also be due to the timing of data collection, precipitation and temperature. Sixteen species of desirable forbs were recorded at the site.

Bare ground decreased from 33.0 percent cover in 1989 to 31.5 percent cover in 1996, then decreased to 28.25 percent in 2013. Vegetation decreased from 23.5 percent cover in 1989 to 8.75 percent in 1996, and then increased to 10.75 percent in 2013. Biological crust increased from 0.0 percent in 1989 and 1996 to 9.50 percent in 2013. Litter increased from 43.5 percent cover in 1989 to 59.75 percent in 1996, and then decreased to 57.25 percent in 2013.

**Table 21: Sheep Trail Pasture Trend Site 14S12E31 Nested Frequency Data Summary**

Species or Vegetation Class	Plot	Occurrences		
		1989	1996	2013
Sandberg bluegrass	1	51	24	56
Bluebunch wheatgrass	4	40	47	62
Squirreltail	4	22	18	9
Basin wildrye	4	36	11	0
Thurber's needlegrass	4	15	24	3
Western wheatgrass	4	2	5	0
Crested wheatgrass	4	6	39	11
Kentucky bluegrass	4	2	0	0
Field brome	4	0	0	2
Cheatgrass	4	0	4	20
Thickspike wheatgrass	4	0	0	17
Intermediate wheatgrass	4	0	0	19*
Hawksbeard	4	3	4	0
Lupine	4	1	0	2
Clasping pepperweed	4	NR	NR	1
Tall annual willowherb	4	NR	NR	5
Fleabane	4	1	0	0
Longleaf phlox	2	74	62	NR
Sagebrush phlox	2	NR	NR	24
Thistle	4	1	2	0
Common dandelion	4	1	4	0

Species or Vegetation Class	Plot	Occurrences		
		1989	1996	2013
Maiden blue eyed Mary	4	NC	NC	51
Milkvetch	4	3	4	3
Agoseris	4	18	21	10
Tall tumbled mustard	4	NC	NC	3
Slender phlox	4	NC	NC	38
Curvseed butterwort	4	NC	NC	16
Yellow salsify	4	15	0	0
Oblongleaf bluebells	4	2	0	0
Onion	4	11	4	0
Rockcross	4	0	87	0
Deathcamas	4	6	0	4
Unknown perennial forb	4	3	0	0
Rubber rabbitbrush	4	0	0	8
Rubber rabbitbrush seedling	4	0	0	1
Yellow rabbitbrush seedling	4	0	0	3
Yellow rabbitbrush	4	0	0	7
Low sage brush	4	0	4	0

NR-Not recorded; NC-Annual species may have been present but not counted

\*After IDT review, it was determined that the intermediate wheatgrass occurrences recorded at the site were likely misidentified and should have been recorded as thickspike wheatgrass because intermediate wheatgrass was not included in the seed mix used following the 2007 Murphy Complex Fire

Cover data collected at the 3x3 photo plot at the site shows that from 1996 to 2013, bluebunch wheatgrass decreased from 5.11 percent to 4.06 percent and Sandberg bluegrass increased from 4.69 percent to 5.46 percent. Longleaf phlox decreased from 1.47 percent to 0.28 percent.

***Trend Site 14S13E06:***

Site 14S13E06 (Photos 15 and 16) is located in a Loamy 10-13" Wyoming big sagebrush ARTRW8/PSSP6 ecological site. The site was initially read in 1989 and the photo plot read for the first time in 1996.

**Photo 15: Overview of Trend Site 14S13E06 dated May 23, 1989**



**Photo 16: Overview of Trend Site 14S13E06 dated July 11, 2013**



The key species at the site are crested wheatgrass and Sandberg bluegrass. The number of occurrences for comparison between years is based on plot 1 within the nested frequency frame for crested wheatgrass and plot 2 for Sandberg bluegrass. The frequency of crested wheatgrass has decreased from 27 occurrences in 1989 to 14 occurrences in 1996, then increased to 23 occurrences in 2013 and Sandberg bluegrass increased from 47 occurrences in 1989 to 96 occurrences in 1996, then increased to 100 occurrences in 2013 (Table 22).

Cheatgrass not recorded at this site in 1989, 1996 or 2013. Perennial and annual forbs increased from 27 occurrences in 1989 to 44 occurrences in 1996, and then increased to 334 occurrences in 2013 based on plot 4. Longleaf phlox increased from 46 occurrences in 1989 to 67 occurrences in 1996, and then decreased to 33 occurrences in 2013, based on plot 3. Lupine decreased from 49 occurrences in 1989 to 39 occurrences in 1996, then decreased to 3 occurrences in 2013, based on plot 3. While the total forb occurrences have likely increased, this may also due to the timing of data collection, precipitation and temperature. Fifteen species of desirable forbs were recorded at the site.

Bare ground decreased from 50.25 percent cover in 1989 to 30.0 percent cover in 1996, then decreased to 16.0 percent in 2013. Vegetation decreased from 19.25 percent cover in 1989 to 14.0 percent in 1996, and then increased to 21.0 percent in 2013. Biological crust increased from 0.0 percent in 1989 and 1996 to 6.0 percent in 2013. Litter increased from 30.25 percent cover in 1989 to 55.50 percent in 1996, and then decreased to 55.0 in 2013.

**Table 22: Sheep Trail Pasture Trend Site 14S12E06 Nested Frequency Data Summary**

Species or Vegetation Class	Plot	Occurrences		
		1989	1996	2013
Sandberg bluegrass	2	47	96	100
Bluebunch wheatgrass	4	0	1	5
Basin wildrye	4	1	0	0
Squirreltail	4	0	1	0
Crested wheatgrass	1	27	14	23
Lupine	3	49	39	3
Tall annual willowherb	4	NC	26	5
Fleabane	4	0	3	0
Longleaf phlox	3	46	67	33
Sagebrush phlox	4	NR	NR	74
Desertparsley	4	17	2	6
Alfalfa	4	2	0	0
Maiden blue eyed Mary	4	NC	NC	72
Milkvetch	4	0	3	1
Agoseris	4	2	0	2
Slender phlox	4	NC	0	56
Curvseed butterwort	4	NC	NC	62
Yellow salsify	4	0	6	7
Onion	4	6	4	22

Species or Vegetation Class	Plot	Occurrences		
		1989	1996	2013
Deathcamas	4	0	0	1
Clasping pepperweed	4	0	4	0
Spring draba	4	NC	NC	88
Wyoming big sagebrush	4	1	0	0

NR-Not recorded; NC-Annual species may have been present but not counted

Cover data collected at the 3x3 photo plot at the site shows that from 1996 to 2013, crested wheatgrass decreased from 21.14 percent to 15.05 percent and Sandberg bluegrass increased from 2.03 percent to 6.65. Longleaf phlox increased from 0.091 percent to 0.35 percent.

### **Signal Butte Pasture**

The Signal Butte Pasture has two Nested Frequency/ Photo Plot sites that were read in 2013; one site is located on private land within the allotment boundary.

### ***Trend Site 14S13E18 (Private land):***

Site *14S13E18* (Photos 17 and 18) is located in a Loamy 13-16" Basin big sagebrush ARTRT/PSSP6 ecological site. The site was initially read in 1989 and the photo plot read for the first time in 1998. The site burned in the 2007 Murphy Complex and because the site burned, comparison of the 2012 data to the 1989 data would not be appropriate as a basis to support conclusions of overall trend. The first reading following a fire essentially becomes the new baseline for trend data analysis; therefore, information from the 2012 trend reading is discussed below to show the general recovery and current baseline of the site.

**Photo 17: Overview of Trend Site 14S13E18 dated May 23, 1989**



**Photo 18: Overview of Trend Site 14S13E18 dated July 23, 2013**



The key species at the site are bluebunch wheatgrass. The number of occurrences for comparison between years is based on plot 2 within the nested frequency frame for bluebunch wheatgrass. The frequency of bluebunch wheatgrass increased from 49 occurrences in 1989 to 58 occurrences in 1998, then decreased to 67 occurrences in 2013 (Table 23).

Sandberg bluegrass increased from 27 occurrences in 1989 to 33 occurrences in 1998, then increased to 38 occurrences in 2013 based on plot 1 and squirreltail decreased from 21 occurrences in 1989 to 16 occurrences in 1998, then decreased to 8 occurrences in 2013 based on plot 4. Cheatgrass was recorded as 0 occurrences in 1989, then increased to 32 occurrences in 1998, then decreased to 8 occurrences in 2013 based on plot 4. Perennial and annual forbs decreased from 181 occurrences in 1989 to 143 occurrences in 1998, then increased to 267 occurrences in 2013 based on plot 4. Longleaf phlox decreased from 88 occurrences in 1989 to 63 occurrences in 1998 to 5 occurrences in 2013 based on plot 2. While the total forb occurrences have likely increased, this may also be due to the timing of data collection, precipitation and temperature. Nineteen species of forbs were recorded at the site.

Bare ground decreased from 55.0 percent cover in 1989 to 29.0 percent in 1998, and then decreased to 26.5 percent in 2013. Vegetation increased from 14.5 percent cover in 1989 to 8.0 percent in 1998, and then increased to 14.75 percent in 2013. Biological crust increased from 0.0 percent in 1989 to 0.75 percent in 1998, then increased to 3.0 percent in 2013. Litter increased from 30.25 percent cover in 1989 to 44.0 percent in 1998, and then increased to 52.0 percent in 2013.

**Table 23: Signal Butte Pasture Trend Site 14S13E18 Nested Frequency Data Summary**

Species or Vegetation Class	Plot	Occurrences		
		1989	1998	2013
Sandberg bluegrass	1	27	33	38
Bluebunch wheatgrass	2	49	58	67
Squirreltail	4	21	16	8
Basin wildrye	4	5	5	3
Cheatgrass	4	0	32	8
Lupine	4	48	44	3
Hawksbeard	4	6	7	5
Tall annual willowherb	4	NC	NC	1
Longleaf phlox	2	88	63	5
Sagebrush phlox	4	NR	NR	46
Spiny phlox	4	5	7	NR
Desertparsley	4	41	38	18
Maiden blue eyed Mary	4	NC	NC	10
Milkvetch	4	6	0	0
Agoseris	4	42	16	17
Slender phlox	4	NC	NC	33
Curvseed butterwort	4	NC	71	75
Onion	4	13	14	12

Species or Vegetation Class	Plot	Occurrences		
		1989	1998	2013
Spring draba	4	NC	NC	43
Mountain tansymustard	4	NC	NC	1
Nodding chickweed	4	NC	NC	73
Larkspur	4	11	9	0
Low pussytoes	4	3	3	0
Lava aster	4	2	2	1
Deathcamas	4	4	3	4
Rubber rabbitbrush	4	NR	NR	32
Rubber rabbitbrush seedling	4	NR	NR	2
Yellow rabbitbrush	4	40	51	NR
Yellow rabbitbrush seedling	4	NR	2	NR
Low sagebrush	4	NR	2	0
Low sagebrush seedling	4	NR	1	0
Wyoming big sagebrush seedling	4	NR	2	0
Wyoming big sagebrush	4	7	6	0

NR-Not recorded; NC-Annual species may have been present but not counted

Cover data collected at the 3x3 photo plot at the site shows that from 1998 to 2013, bluebunch wheatgrass increased from 16.1 percent to 17.5 percent and Sandberg bluegrass decreased from 10.5 percent to 7.49. Total forbs increased from 1.68 percent to 2.66 percent.

***Trend Site 14S12E25C:***

Site 14S12E25C (Photos 19 and 20) is located in a Shallow Claypan 12-16" low sagebrush ARAR8/FEID ecological site. The site was initially read in 1989 and the photo plot read for the first time in 1996.

**Photo 19: Overview of Trend Site 14S13E25C dated May 24, 1989**



**Photo 20: Overview of Trend Site 14S13E25C dated July 29, 2013**



The key species at the site are bluebunch wheatgrass and Idaho fescue. The number of occurrences for comparison between years is based on plot 3 within the nested frequency frame

for bluebunch wheatgrass and plot 4 for Idaho fescue. The frequency of bluebunch wheatgrass has decreased from 50 occurrences in 1989 to 46 occurrences in 1996, then increased to 72 occurrences in 2013 and Idaho fescue increased from 54 occurrences in 1989 to 69 occurrences in 1996, then decreased to 60 occurrences in 2013. Sandberg bluegrass decreased from 79 occurrences in 1989 to 60 occurrences in 1996, then increased to 95 occurrences in 2013 based on plot 2 (Table 24).

Cheatgrass was recorded as 0 occurrences in 1989 and 1996, and then increased to 4 occurrences in 2013 based on plot 4. Perennial and annual forbs decreased from 181 occurrences in 1989 to 108 occurrences in 1996, and then increased to 342 occurrences in 2013 based on plot 4. Longleaf phlox decreased from 66 occurrences in 1989 to 54 occurrences in 1996, then decreased to 21 occurrences in 2013 based on plot 2 and lupine decreased from 49 occurrences in 1989 to 9 occurrences in 1996, then increased to 13 occurrences in 2013 based on plot 3. While the total forb occurrences have likely increased, this may also due to the timing of data collection, precipitation and temperature. Twenty-three species of desirable forbs were recorded at the site.

Bare ground increased from 18.0 percent cover in 1989 to 20.0 percent cover in 1996, then decreased to 5.0 percent in 2013. Vegetation increased from 19.0 percent cover in 1989 to 20.0 percent in 1996, and then increased to 22.75 percent in 2013. Biological crust increased from 0.0 percent in 1989 and 1996 to 12.75 percent in 2013. Litter decreased from 62.0 percent cover in 1989 to 59.0 percent in 1996, and then decreased to 57.0 percent in 2013.

**Table 24: Signal Butte Pasture Trend Site 14S12E25C Nested Frequency Data Summary**

Species or Vegetation Class	Plot	Occurrences		
		1989	1996	2013
Sandberg bluegrass	2	79	60	95
Bluebunch wheatgrass	3	50	46	72
Idaho fescue	4	54	69	60
Squirreltail	4	2	0	0
Crested wheatgrass	4	9	9	14
Cheatgrass	4	0	0	4
Unknown perennial forb	4	13	1	39
Lupine	3	49	9	13
Tall tumble mustard	4	NC	NC	4
Tall annual willowherb	4	NC	NC	8
Longleaf phlox	2	66	54	21
Sagebrush phlox	4	NR	NR	32
Nineleaf biscuitroot	4	31	0	21
Desert biscuitroot	4	0	0	2
Desertparsley	4	3	14	0
Desert madwort	4	NC	NC	8
Maiden blue eyed Mary	4	NC	NC	92
Milkvetch	4	1	2	0

Species or Vegetation Class	Plot	Occurrences		
		1989	1996	2013
Agoseris	4	63	37	58
Slender phlox	4	NC	NC	20
Curvseed butterwort	4	NC	NC	18
Onion	4	41	31	9
Aster	4	1	0	0
Lambstongue ragwort	4	0	0	16
Yellow salsify	4	0	0	1
Sego lily	4	0	0	1
Nodding chickweed	4	NC	NC	20
Spring draba	4	NC	NC	15
Larkspur	4	26	10	0
Foothill arnica	4	0	13	0
Alfalfa	4	2	0	0
Yellow rabbitbrush	4	1	1	1
Yellow rabbitbrush seedling	4	NR	16	NR
Low sagebrush	4	2	6	0
Low sagebrush seedling	4	1	1	0
Wyoming big sagebrush	4	1	1	0

NR=Not recorded; NC-Annual species may have been present but not counted

Cover data collected at the 3x3 photo plot at the site shows that from 1996 to 2013, bluebunch wheatgrass decreased from 11.55 percent to 5.04 percent, crested wheatgrass decreased from 3.36 percent to 1.89 percent and Sandberg bluegrass decreased from 4.27 percent to 1.47 percent. Longleaf phlox remained static at 0.77 percent.

### **Noxious Weeds**

The State of Idaho has listed 65 plant species as noxious weeds. Four noxious weed species are known to occur within the Signal Butte Allotment and include Canada thistle (*Cirsium arvense*), diffuse knapweed (*Centaurea diffusa*), rush skeletonweed (*Chondrilla juncea*) and Scotch thistle (*Onopordum acanthium*).

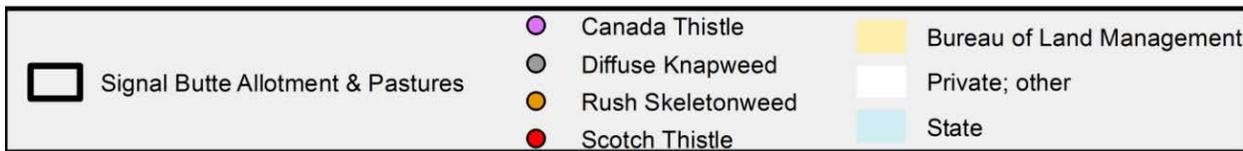
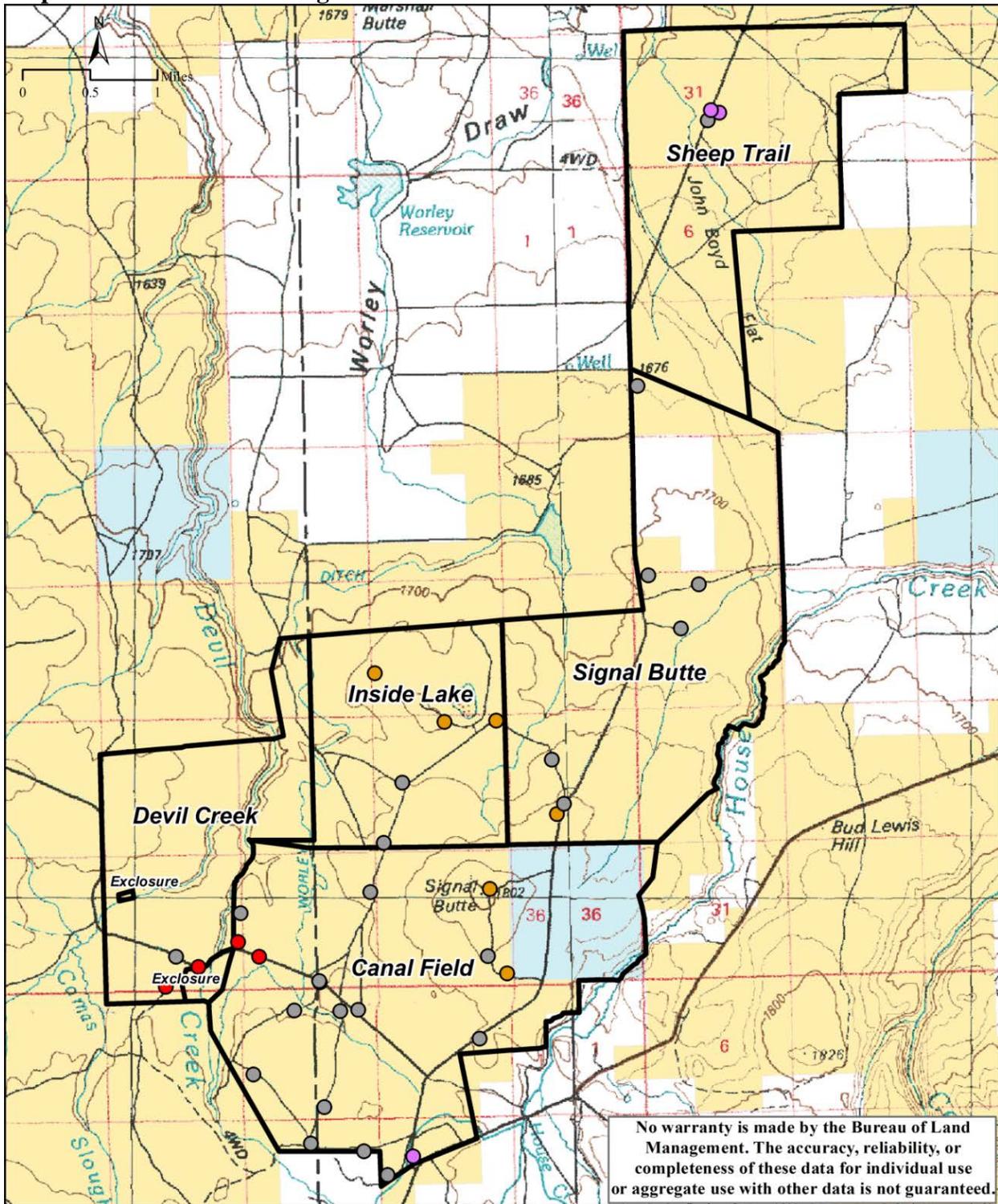
Map 6 illustrates the documented occurrences with the Signal Butte Allotment, which were chemically treated in 2008. Treatment goals are to reduce noxious weeds to a point where they will not have a significant economic or environmental impact and/or to eradicate them completely. The BLM also works to prevent the establishment of new species and infestations in areas where they presently do not occur.

Many of the known noxious weed infestations are found and treated through the Twin Falls District (TFD) Emergency Stabilization and Rehabilitation (ESR) program. Approved ESR plans allow three year funding for weed control and play a vital part in the reestablishment of naturally recovering vegetation, as well as in the successful establishment of newly seeded areas. Weed personnel grid the burned areas and treat noxious weed occurrences in order to allow for reduced

competition during reestablishment of desired vegetation. Crews also treat road corridors throughout the field office which helps prevent the spread of weeds from vehicles that may be transporting weed seeds to new areas. Control methods used within the TFD for the treatment of noxious weeds include biological, mechanical, and chemical.

DRAFT

**Map 6: Noxious Weed Management**



## IDAHO RANGELAND HEALTH STANDARDS ASSESSMENT

There are eight standards for rangeland health that apply to BLM lands in the state of Idaho. Not all of the Standards apply to the Signal Butte Allotment due to variances in the land type and geographical area. Of the eight Idaho Standards for Rangeland Health, the following seven standards are applicable to the Signal Butte Allotment. Table 24 lists the standard applicable by pasture.

- **Standard 1** – Watersheds provide for the proper infiltration, retention, and release of water appropriate to soil type, hydrologic cycling, and energy flow.
- **Standard 2** – Riparian-wetland areas are in properly functioning condition appropriate to soil type, climate, geology, and landform to provide for proper nutrient cycling, hydrologic cycling, and energy flow
- **Standard 3** – Stream channels and floodplains are properly functioning relative to the geomorphology (e.g. gradient, size, shape, roughness, confinement, and sinuosity) and climate to provide for proper nutrient cycling, hydrologic cycling, and energy flow.
- **Standard 4** – 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.
- **Standard 5** – 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 the hydrologic cycle.
- **Standard 7** – Surface and ground water on public lands comply with the Idaho Water Quality Standards.
- **Standard 8** – Habitats are suitable to maintain viable populations of threatened and endangered, sensitive, and other special status species.

*Standard 6 does not apply to the Signal Butte Allotment*

**Table 25: Standards Applicable by Pasture**

Standard	Pastures
1	All Pastures
2	Devil Creek, Canal Field, Signal Butte
3	Devil Creek, Canal Field, Signal Butte
4	Devil Creek, Canal Field
5	Inside Lake, Sheep Trail, Signal Butte
6	Not applicable
7	Devil Creek, Canal Field, Signal Butte
8	All Pastures

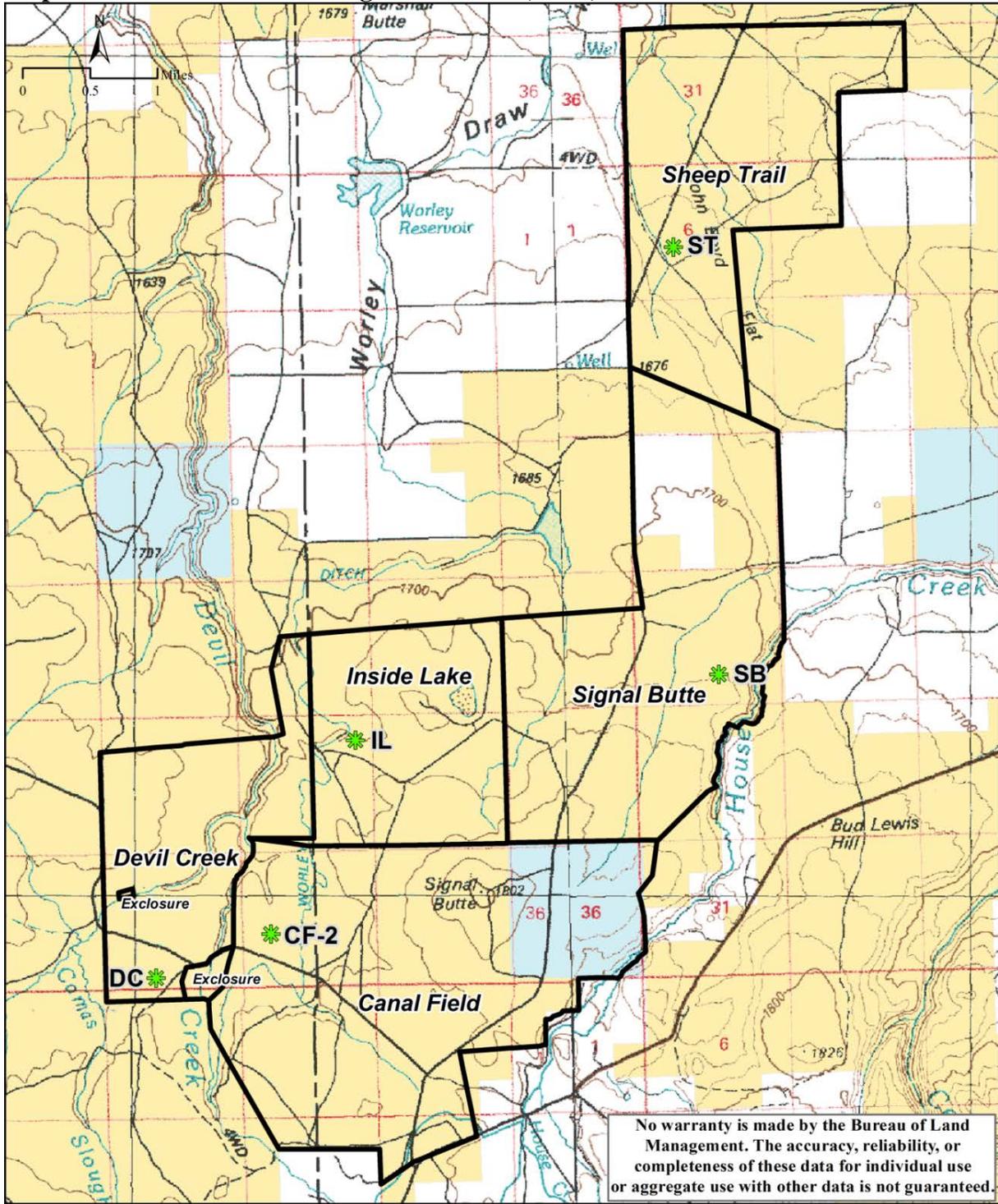
An interdisciplinary team (IDT) conducted IIRH field evaluations at five sites representative of the Signal Butte Allotment during July, 2013. Each pasture contained one IIRH site. The sites were located in areas of both native and seeded non-native plant species. Map 7 shows the location of the evaluation sites. The sites at which IIRH evaluations were conducted were also HAF sites.

HAF sites were generated through a GIS process (Appendix A). Key utilization sites were selected in representative areas based on the presence of key forage species, distance from livestock water, and accessibility of the area to livestock grazing. When the IDT conducted IIRH field evaluations, the HAF sites were visited first. If the HAF site(s) was not representative of the vegetation community, an ESI site was then selected (if available) within that vegetation community. If no ESI site was available, a key utilization site was used. When the IDT determined that none of the pre-determined sites were representative of the vegetation community, a new location was selected that was representative of the vegetation community.

Seventeen indicators of rangeland health (Table 25) were used to evaluate three rangeland health attributes (Table 26): Soil and Site Stability, Hydrologic Function, and Biotic Integrity (Pellant et al., 2005). The IIRH evaluation sheet was completed at each site, photographs were taken, and a list of plant species observed was recorded. In addition, general field notes were recorded for the allotment that included such items as presence of noxious weeds, wildlife sign, recreation impacts, and presence or condition of range infrastructure.

Cover transects to determine vegetative cover were recorded at four sites in following the line point intercept method as described in the sage-grouse HAF (BLM 2010) protocol. Because forbs are important to sage-grouse, the line point intercept method was augmented using Daubenmire frames. Forb species were recorded in 7.9 inch by 19.7 inch (20 cm by 50 cm) Daubenmire frame placed at each point along the line intercept. This resulted in more comprehensive data on forb species diversity present than could be obtained by the line point intercept alone.

**Map 7: Idaho Indicators of Rangeland Health (IIRH) Sites**



In addition to evaluating rangeland health indicators at each IIRH site, the IDT also examined other areas to ensure evaluation sites were representative of the vegetation communities throughout the pasture. Data collected at the evaluation sites were compared to the Natural Resource Conservation Service’s (NRCS) ESD reference sheet for the soil types and potential vegetation communities in the Signal Butte Allotment. IIRH sites within the Devil Creek, Canal Field, and the Signal Butte Pasture occurred in the Shallow Clay pan 12-16” low sagebrush (now known as little sagebrush)/Idaho fescue ecological site. The site in the Inside Lake Pasture occurred in the Loamy 11-13” basin big sagebrush/bluebunch wheatgrass ecological site, and the site in the Sheep Trail Pasture occurred in the Loamy 10-13” Wyoming big sagebrush/bluebunch wheatgrass ecological site. The ESD reference sheets describe the expected condition of the ecological site in state 1, phase A of the reference state.

The Shallow Clay pan 12-16” low sagebrush/Idaho fescue (R025XY010ID) plant community should have little sagebrush in the overstory with bluebunch wheatgrass and Idaho fescue dominating the understory. Sandberg bluegrass, squirreltail (*Elymus elymoides*), Nevada bluegrass (*Poa nevadensis*), thick spike wheatgrass (*Elymus lancelets*), Thurber’s needlegrass, arrowleaf balsamroot (*Balsamorhiza sagittata*), Hooker’s balsamroot (*B. hookeri*) and longleaf phlox (*Phlox longifolia*) should be sub-dominant species. The natural fire frequency should be 80-100 years.

The Loamy 11-13” basin big sagebrush/bluebunch wheatgrass (R025XY043ID) plant community should have basin big sagebrush in the overstory with bluebunch wheatgrass dominating the understory. Sandberg bluegrass, Thurber’s needlegrass, squirreltail, arrowleaf balsamroot, Tapertip hawksbeard (*Crepis acuminata*) should be sub-dominant species. Other significant species in the plant community can include antelope bitterbrush (*Purshia tridentata*) and basin wildrye (*Leymus cinereus*). The natural fire frequency should be 20-50 years.

The Loamy 10-13” Wyoming big sagebrush/bluebunch wheatgrass (R025XY019ID) plant community should have Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) in the overstory with bluebunch wheatgrass dominating the understory. Thurber’s needlegrass, Sandberg bluegrass, squirreltail and arrowleaf balsamroot should be sub-dominant species. Other significant species in the plant community may include Indian ricegrass (*Achnatherum hymenoides*), foxtail wheatgrass (*Pseudelymus saxicola*), Idaho fescue, longleaf phlox, spiny phlox (*Phlox hoodii*), and yellow rabbitbrush (*Chrysothamnus viscidiflorus*). The natural fire frequency should be 50-70 years.

**Table 26: Summary of 17 Rangeland Health Indicators**

Indicators	Attributes S = Soil & Site Stability H = Hydrologic Function B = Biotic Integrity	Degree of Departure from Ecological Site Description and/or Ecological Reference Area(s)				
		Extreme	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
1. Rills	S, H					CF_2, DC, IL, ST, SB
2. Water-flow Patterns	S, H					CF_2, DC, IL, ST, SB
3. Pedestals and/or terracettes	S, H					CF_2, DC, IL, ST, SB
4. Bare ground	S, H					CF_2, DC, IL, ST, SB

Indicators	Attributes S = Soil & Site Stability H = Hydrologic Function B = Biotic Integrity	Degree of Departure from Ecological Site Description and/or Ecological Reference Area(s)				
		Extreme	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
5. Gullies	S, H					CF_2, DC, IL, ST, SB
6. Wind-scoured, blowouts, and/or deposition areas	S					CF_2, DC, IL, ST, SB
7. Litter movement	S					CF_2, DC, IL, ST, SB
8. Soil surface resistance to erosion	S, H, B					CF_2, DC, IL, ST, SB
9. Soil surface loss or degradation	S, H, B					CF_2, DC, IL, ST, SB
10. Plant community composition and distribution relative to infiltration	H					CF_2, DC, IL, ST, SB
11. Compaction layer	S, H, B				CF_2	DC, IL, ST, SB
12. Functional/structural groups	B					CF_2, DC, IL, ST, SB
13. Plant mortality/decadence	B					CF_2, DC, IL, ST, SB
14. Litter amount	H, B		IL, ST	CF_2, SB	DC	
15. Annual production	B					CF_2, DC, IL, ST, SB
16. Invasive plants	B				CF_2, IL, SB	DC, ST
17. Reproductive capability of perennial plants	B					CF_2, DC, IL, ST, SB

CF\_2: Canal Field Pasture DC: Devil Creek Pasture IL: Inside Lake Pasture ST: Sheep Trail Pasture SB: Signal Butte Pasture

The ratings of the 17 indicators do not result in a single rating of rangeland health for a site. The 17 indicators are related to three components of rangeland health known as attributes (soil and site stability, hydrologic function, and biotic integrity). The second column of Table 26 identifies which indicators are related to each of the three attributes. The IDT arrived at attribute departure ratings by considering the preponderance of evidence of departure for the group of indicators related to each attribute. Indicators showing departure from reference conditions may be weighted more heavily, based upon the effect of the departure on ecological function of the site being evaluated. The degree of departure ratings for each of the three attributes of rangeland health are shown in Table 27 by pasture for the Signal Butte Allotment.

**Table 27: Rangeland Health Attribute Rating by Site**

Rangeland Health Attribute	Degree of Departure				
	Extreme to Total	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
Soil and Site Stability					CF_2, DC, IL, ST, SB
Hydrologic Function					CF_2, DC, IL, ST, SB
Biotic Integrity					CF_2, DC, IL, ST, SB

CF\_2: Canal Field Pasture DC: Devil Creek Pasture IL: Inside Lake Pasture ST: Sheep Trail Pasture  
SB: Signal Butte Pasture

## **Standard 1 (Watersheds)**

*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.*

### **Rangeland Health Assessment**

IIRH sites CF\_2, DC, and SB were evaluated using the ESD (R025XY010ID) reference sheet for the Shallow Claypan 12-16" low sagebrush/Idaho fescue ecological site (USDA NRCS, 2013a). The reference sheet for this ESD indicates bare ground should range from 40% to 50%, litter cover should be low and at a shallow depth, and soil stability test values should range from 3 to 5 (Scale of 1 to 6; Pellant et al., 2005). The IL IIRH site was evaluated using the ESD (R025XY043ID) reference sheet for the Loamy 11-13" basin big sagebrush/bluebunch wheatgrass ecological site (USDA NRCS, 2013a). The ST IIRH site was evaluated using the ESD (R025XY019ID) reference sheet for the Loamy 10-13" Wyoming big sagebrush/bluebunch wheatgrass ecological site (USDA NRCS, 2013a). The reference sheet for these ESDs indicate that bare ground should range from 30% to 40%, litter cover should range from 5% to 10%, and soil stability test values should range from 4 to 6 (Scale of 1 to 6; Pellant et al., 2005).

Multiple soil series exist within the Signal Butte Allotment and are typically silt loams. Topography over the majority of the allotment is gently rolling with some flats, except for Devil Creek and House Creek. Both these drainages have associated draws and canyons. Elevation generally increases from north to south.

The Soil Survey Geographic (SSURGO) Database (NRCS 2012) shows that 76% of the allotment has a moderate wind erosion factor and <1% of the allotment has a severe wind erosion factor. Twenty-three percent of the allotment has a non-erosive wind erosion factor. The soils on 77% of the allotment have a medium water erosion factor and the remaining 23% has a high water erosion factor.

The ESD for the shallow claypan 12-16 states the soil stability test should be between 3 and 5. The ESD also indicates rills and flow patterns may be present. Pedestals and terracettes can be common where flow patterns are present and surface soils have high clay content. The ESD indicates ground cover should be between 30 – 60 percent. However, the ESD does not provide a range of values for bare ground, basal vegetation, microbiotic crusts, plant basal cover, or surface fragments (rock and gravel).

### **Canal Field Pasture**

IIRH site CF\_2 (Photo 21) is located in a mixed vegetation community in a Shallow Claypan 12-16" ARAR8/FEID ESD. Idaho fescue is the dominant deep-rooted grass species at 41.5 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 3.5 percent cover (Table 30). Bluebunch wheatgrass is also present at 4.0 percent cover. Yellow rabbitbrush is the dominant shrub species at 3.0 percent cover.

The site is of relatively flat topography with a south aspect. The soil stability test (Pellant et al., 2005) completed at the site resulted in a soil stability value of 4.2 (values should range from 3 to

5), indicating moderate to high resistance to erosion. Biological crusts comprised 2.5 percent cover and bare ground was 10.0 percent cover.

The indicator for compaction layer was rated as a slight to moderate departure from the reference condition due to the presence of a weak, non-restrictive compaction layer. The indicator for litter amount was rated as a moderate departure from the reference condition due to an increase in the amount of litter (53.5 percent cover) found at the site.

All other indicators related to the Soil and Site Stability and Hydrologic Function attributes were rated as a none to slight departure from the reference condition. Therefore, the overall Soil and Site Stability and Hydrologic Function attributes were each rated as none to slight departure.

**Photo 21: Soil Profile in the Canal Field Pasture (IIRH Site CF\_2) - July 31, 2013**



### **Devil Creek Pasture**

IIRH site DC (Photo 22) is located in a native vegetation community in a Shallow Claypan 12-16" ARAR8/FEID ESD. Idaho fescue and western wheatgrass are the co-dominant deep-rooted grass species 10 percent cover each and Sandberg bluegrass is the dominant shallow-rooted grass species at 8.0 percent cover (Table 30). Bluebunch wheatgrass and squirreltail are also present at 2.0 percent cover each. Yellow rabbitbrush is the dominant shrub species at 2.0 percent cover.

The site is of relatively flat topography with a southwest aspect. No soil stability test was completed at this site; however, the soil test completed in the Canal Field Pasture (which is the same ESD) resulted in a soil stability value of 4.2 (values should range from 3 to 5), indicating moderate to high resistance to erosion. Biological crusts comprised 0 percent cover and bare ground was 36.0 percent cover.

The indicator for litter amount was rated as a slight to moderate departure from the reference condition due to a slight increase in the amount of litter (14 percent cover) found at the site.

All other indicators related to the Soil and Site Stability and Hydrologic Function attributes were rated none to slight departure from the reference condition. Therefore, the overall Soil and Site Stability and Hydrologic Function attributes were each rated as a none to slight departure.

**Photo 22: Soil Profile in the Devil Creek Pasture (IIRH Site DC) - July 30, 2013**



**Inside Lake Pasture**

IIRH site IL (Photo 23) is located in a mixed vegetation community in a Loamy 11-13” ARTRT/PSSPS ESD and is located approximately 250 yards from the Worley Ditch and a pond that comprise the primary stock water source in the pasture. Bluebunch wheatgrass and Idaho fescue are the co-dominant deep-rooted grass species at 12 percent and 13 percent cover respectively and Sandberg bluegrass is the dominant shallow-rooted grass species 8 percent cover. Wyoming big sagebrush is the dominant shrub species at 4 percent cover.

The site is of relatively flat topography, gently rolling with a north aspect. No soil stability test was completed at this site; however, Photo 23 shows an overview of the soil profile. Biological crusts comprised 4 percent cover and bare ground was 14.0 percent cover.

The indicator for litter amount was rated as a moderate to extreme departure from the reference condition due to an increase in the amount of litter (62 percent cover) found at the site.

All other indicators related to the Soil and Site Stability and Hydrologic Function attributes were rated none to slight departure from the reference condition. Therefore, the overall Soil and Site Stability and Hydrologic Function attributes were each rated as a none to slight departure.

**Photo 23: Soil Profile in the Inside Lake Pasture - July 31, 2013**



### **Sheep Trail Pasture**

IIRH site ST (Photo 24) is located in a seeded vegetation community in a Loamy 10-13" ARTRW8/PSSPS ESD. Crested wheatgrass is the dominant deep-rooted grass species at 28.5 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 14.0 percent cover. Rubber rabbitbrush (*Ericameria nauseosa*) is the dominant shrub species at 0.5 percent cover.

The site is located in a basin with a generally north/northeast aspect. No soil stability test was completed at this site; however, Photo 24 shows an overview of the soil profile. Biological crusts comprised 0.5 percent cover and bare ground was 12.0 percent cover.

The indicator for litter amount was rated as a moderate to extreme departure from the reference condition due to an increase in the amount of litter (63 percent cover) found at the site.

All other indicators related to the Soil and Site Stability and Hydrologic Function attributes were rated none to slight departure from the reference condition. Therefore, the overall Soil and Site Stability and Hydrologic Function attributes were each rated as a none to slight departure.

**Photo 24: Soil Profile in the Sheep Trail Pasture - July 24, 2013**



**Signal Butte Pasture**

IIRH site SB (Photo 25) is located in a seeded vegetation community in a Shallow Claypan 12-16" ARAR8/FEID ESD. Bluebunch wheatgrass is the dominant deep-rooted grass species at 39 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 12.5 percent cover. Yellow rabbitbrush is the dominant shrub species at 3.5 percent cover.

The site is located in a basin with a generally north/northeast aspect. The soil stability test (Pellant et al., 2005) completed at the site resulted in a soil stability value of 4.7 (values should range from 3 to 5), indicating a high resistance to erosion. Biological crusts comprised 8.5 percent cover and bare ground was 16.5 percent cover.

The indicator for litter amount was rated as a moderate departure from the reference condition due to an increase in the amount of litter (34.5 percent cover) found at the site.

All other indicators related to the Soil and Site Stability and Hydrologic Function attributes were rated none to slight departure from the reference condition. Therefore, the overall Soil and Site Stability and Hydrologic Function attributes were each rated as a none to slight departure.

**Photo 25: Soil Profile in the Signal Butte Pasture - July 30, 2013**



### **Evaluation of Standard 1**

The pastures within the Signal Butte Allotment have been modified due to vegetation treatments and more recently, wildfire. Portions of some pastures have burned numerous times in the past 10-20 years. The 2007 Murphy Complex Fire burned nearly all of the allotment, reducing the shrub component, specifically sagebrush, to a few small, scattered patches. Various drill and aerial seeding efforts have taken place to rehabilitate areas burned by wildfire. As a result of these treatments, the allotment is currently dominated by herbaceous vegetation consisting of both native and non-native perennial grass species.

Wyoming big sagebrush has been aerielly seeded within the pastures; however, repeated fire has generally eliminated any mature sagebrush and seedlings that may have been present. The lack of shrub cover is apparent in all of the plant communities in the pastures. Shrubs function to catch snow and thereby increase infiltration and sagebrush roots can redistribute small amounts (less than 0.3 inches) of water in the soil profile up to 1.5 meters in depth (Ryel et al., 2003).

During the 2013 IIRH evaluation, a weak compaction layer was observed at IIRH site CF\_2; however, numerous roots of perennial bunch grasses were observed in the soil test pit extending through the compaction layer, indicating that the compaction layer was not restrictive to root penetration or water infiltration. No compaction layers were noted in the other pastures.

Litter was noted to be slightly higher than described in the ESD at all five IIRH sites evaluated and resulted in the Litter Amount indicator being rated between a slight to moderate to a moderate to extreme departure from the reference condition. However, the IDT determined the

litter is providing cover for site protection and replenishing nutrients and does not appear to be negatively affecting ecological processes.

The soil stability tests completed at two of the five sites results were 4.2 and 4.7 (soil stability range should be 3 to 5), indicating a moderate to high resistance to erosion; in addition, the topography within the pastures is relatively flat. No rills, terracettes, water flow patterns, wind-scoured/blowouts/deposition areas or litter movement were observed in any of the pastures.

Overall, the Soil and Site Stability and Hydrologic Function attributes were rated as a none to slight departure from the reference condition for the Devil Creek, Canal Field, Inside Lake, Signal Butte and Sheep Trail Pastures.

***Evaluation Finding – Canal Field, Devil Creek, Inside Lake, Signal Butte and Sheep Trail Pastures are:***

- Meeting the Standard
- Not meeting the Standard, but making significant progress towards meeting
- Not meeting the Standard

***Rationale for Evaluation Finding***

There is a component of biotic crust and litter present and both provide protection to the soil surface from erosion; in addition, the topography is relatively flat, reducing the risk for accelerated soil erosion. The soil stability test results ranging between 4.2 and 4.7, which also indicates a moderate to high resistance to erosion. No rills, terracettes, water flow patterns, wind-scoured/blowouts/deposition areas or litter movement were observed in any of the pastures.

Deep-rooted perennial bunchgrasses and shallow-rooted grasses are present within the plant communities and are abundant as expected, in part due to rehabilitation/reseeding efforts (Table 30). Perennial forbs and shrubs were generally absent from the seeded plant communities; however, perennial grasses appeared vigorous and were producing seed heads at all sites, suggesting that the absence of shrub cover is not negatively affecting infiltration to the point of reducing plant vigor or reproductive capability. Deep-rooted perennial bunchgrasses can help support nutrient cycling and energy flow due to their above and below ground structure. Shallow-rooted grasses generally have a shorter active growth period, smaller root systems and relatively lower potential to capture and store carbon below ground.

Litter was noted to be slightly higher than described in the ESD at all five IIRH sites evaluated and resulted in the Litter Amount indicator being rated between a slight to moderate to a moderate to extreme departure from the reference condition. However, the IDT determined the litter is providing cover for site protection and replenishing nutrients and does not appear to be negatively affecting ecological processes.

The combination of the lack of rills, gullies, flow patterns, etc., the presence of stable soils and the perennial species present, which provide adequate cover, all allow the vegetative communities within the pastures to function to maintain life form diversity, production, native animal habitat, nutrient cycling, energy flow and the hydrologic cycle. Therefore, Devil Creek,

Canal Field, Inside Lake, Signal Butte and Sheep Trail Pastures of the Signal Butte Allotment are meeting Standard 1.

**Standard 2 (Riparian Areas & Wetlands)**

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

There are 2.8 miles of perennial stream within the Signal Butte Allotment. These perennial stream miles occur on House Creek (0.9 mile) in the Signal Butte Pasture. Another 0.3 mile of House Creek is present in the Canal Field on state land. Devil Creek (1.9 miles) is present in the Devil Creek and Canal Field pastures, including the wildlife enclosure. There also are 2.1 miles of intermittent stream that occur on Camas Slough (1.4 miles) and Devil Creek (0.7 miles) in the Devil Creek Pasture. A twenty acre playa is present in the Inside Lake Pasture. The playa in the Inside Lake Pasture fills infrequently, is ephemeral and has no outlet. Except for the identified sections of House Creek and Devil Creek, all of the other streams within the allotment are ephemeral. Ephemeral streams only contain surface water in direct response to precipitation and are above the water table throughout the year (USDI-BLM TR 1737-15: BLM 1998). Devil Creek is listed in the National Hydrography Dataset (USGS 2014) as being perennial within the allotment, but is intermittent due to water diversion and withdrawal occurring upstream of the allotment. During the growing season, Devil Creek is diverted for the purpose of private land irrigation. Outside of the growing season, Devil Creek is diverted into House Creek which flows into Cedar Creek (Roseworth) Reservoir. Due to the water withdrawals upstream of the allotment, Devil Creek typically only contains water during a short period during spring run-off. Streamflow from House Creek is also utilized for irrigation upstream of the allotment which reduces the flow occurring during the irrigation season.

Water is occasionally available to livestock in the Devil Creek Pasture from Devil Creek, otherwise water is provided through a pipeline and troughs. A separate pipeline system supplies water to livestock in the north end of the Signal Butte Pasture and Sheep Trail Pasture. In the Signal Butte Pasture, livestock have access to water at a water gap on House Creek, in addition to a water trough and man-made ponds. Livestock access to water in House Creek is limited to a fenced water gap, otherwise all access is prevented by topography (rock bluffs). In the Inside Lake and Canal Field Pastures, livestock are watered from man-made ponds and from the Worley Ditch, a man-made canal.

Riparian condition assessments using the approved BLM protocol (USDI-BLM TR 1737-15: BLM 1998) were conducted on Devil Creek in 2006 and on House Creek in 1997 and 2004 to determine the functional condition of these streams (Table 28). These broad-scale condition assessments use hydrology, vegetation, and erosion/deposition attributes and processes to qualitatively assess the condition of riparian areas. The determinations from the assessments include ratings of proper functioning condition (PFC), functioning at risk with an upward trend (FAR-UP), functioning at risk with no apparent trend (FAR-NA), functioning at risk with a downward trend (FAR-DN), and non-functioning (NF).

**Table 28: Riparian Condition Assessment Ratings by Stream, Pasture, Reach and Year**

Stream Name	Stream Reach Number	Pastures	Stream Reach Name	1997 Rating	2004 Rating	2006 Rating
Devil Creek	32.4-34.7	Devil Creek	DC-1	N/A	N/A	FAR-NA
Devil Creek	34.7-35.0	Canal Field	DC-2	N/A	N/A	FAR-NA
House Creek	3.4-3.6	Signal Butte	HC-1	PFC	PFC	Not rated
House Creek	3.6-4.4	Signal Butte	HC-2	FAR	FAR-UP	Not Rated

DC-1 includes both perennial and intermittent stream reaches and the wildlife enclosure.

In 2013, the BLM revisited the 2006 PFC reaches for Devil Creek and the 2004 reaches for House Creek to assess whether or not conditions had changed from the previous assessment ratings. Photographs were taken at the same locations as the previous PFC assessments. The 2013 photos were used to determine if the previous PFC ratings were consistent with the riparian conditions observed in 2013. None of the 2006 or 2004 PFC ratings were changed for any of the four PFC rated reaches within the allotment.

**Allotment Summary for Standard 2 (Riparian Areas and Wetlands)**

The riparian condition of Devil Creek and House Creek were assessed most recently in 2006 and 2004 respectively, using the PFC protocol (BLM 1998). The PFC assessments for the Devil Creek reaches included consideration of the altered flow regime. The 2006 FAR-NA ratings for the Devil Creek reaches indicate the wetland obligate vegetation has declined due to altered flow regimes or other factors and more drought tolerant wetland facultative species persist or have increased in these reaches of the stream. The House Creek ratings of FAR-UP and PFC indicate the riparian condition is either improving or at PFC.

**Evaluation of Standard 2**

**Devil Creek Stream Reaches 32.4-34.7 and 34.7-35.0**

The 2006 PFC assessments for the two reaches of Devil Creek within the Signal Butte Allotment rated each reach as At-Risk. Both reaches were dominated by herbaceous vegetation with a low amount of woody vegetation observed in reach 34.7 to 35.0. The herbaceous vegetation throughout the reaches was primarily comprised of species that can tolerate dry conditions such as mountain rush (*Juncus arcticus* var. *littoralis*) and Kentucky bluegrass (*Poa pratensis*). Kentucky bluegrass does not have the deep root masses of other perennial hydric herbaceous species (i.e., sedges, rushes) and may not withstand high stream flow events. Four of the six applicable PFC assessment vegetation indicators were marked “no” for reach 32.4 to 34.7 whereas, all applicable vegetation indicators were marked “yes” for reach 34.7 to 35.0 (Table 29).

**Table 29: Devil Creek (DC) and House Creek (HC) vegetation indicators from PFC assessments by stream reach and year**

Vegetation Indicators	Stream Reach Name and Year Assessed					
	DC-1 (2006)	DC-2 (2006)	HC-1 (1997)	HC-1 (2004)	HC-2 (1997)	HC-2 (2004)
There is a diverse age class distribution of riparian-wetland vegetation (recruitment for maintenance and recovery)	Yes	Yes	Yes	Yes	No	Yes
There is a diverse composition of riparian-wetland vegetation (for maintenance/recovery)	Yes	Yes	Yes	Yes	Yes	Yes
Species present indicate maintenance of riparian-wetland soil moisture characteristics	No	Yes	Yes	Yes	Yes	Yes
Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high-stream flow events	No	Yes	Yes	Yes	Yes	Yes
Riparian plants exhibit high vigor	No	Yes	Yes	Yes	No	Yes
Adequate riparian-wetland vegetative cover is present to protect banks and dissipate energy during high flows	No	Yes	Yes	Yes	No	No
Plant communities in the riparian area are an adequate source of coarse and/or large woody material (for maintenance/recovery)	N/A	N/A	N/A	No	N/A	No

The 2006 PFC assessment for reach 32.4 to 34.7 (DC-1) found the streambank vegetation was dominated by upland plants with root masses not capable of withstanding high flows. There were also fewer sedges observed in the reach than would be expected for an herbaceous dominated system (Photos 26 and 27). Above average Spring and annual precipitation during 2006 may have contributed to high vigor of riparian plants initially but the flow alterations in Devil Creek during the summer likely contributed to low vigor by September when the PFC assessments were conducted.

Reach 34.7 to 35.0 had a marginally adequate amount of riparian-wetland vegetation to protect banks and dissipate energy. The streambank vegetation was dominated by plants with root masses capable of withstanding high flows, though woody species were low in composition. Both PFC assessments for Devil Creek indicate willows are present, but only occur in isolated areas.

**Photo 26: Devil Creek Stream Reach 32.4-34.7 (DC-1) - Downstream from the wildlife enclosure, June, 2013**



**Photo 27: Devil Creek Stream Reach 32.4-34.7 (DC-1), Downstream from the wildlife enclosure, September, 2006**



**House Creek Reaches 3.4-3.6 and 3.6-4.4**

PFC Assessments (BLM 1998) were conducted for House Creek in 1997 and 2004 (Table 29). Photographs were taken during 2006 and 2013 at the same locations as the 2004 PFC assessments to determine if the stream conditions were consistent with the conditions observed in 2004. None of the 2004 PFC ratings for House Creek were changed.

The 2004 PFC assessment determined that House Creek reach 3.4-3.6 (HC-1) was at PFC. Negligible livestock sign was observed within this reach in 2013 and the livestock utilization level was indeterminate. Streambank vegetation throughout this reach is dominated by yellow willow (*Salix lutea*) and Pacific willow (*Salix lucida*). In the 1997 and 2004 PFC assessments, riparian vegetation was not an adequate source of large woody material based on stem size. The occurrence of willow (Photos 28 and 29), indicate that deep rooted riparian vegetation along this reach is adequate to stabilize stream banks, provide shade to reduce water temperatures, and filter sediment. Noxious weeds were not noted during the 1997 and 2004 PFC assessments, or during the 2013 site visits.

**Photo 28: July, 2001 House Creek Photo Point (Reach 3.4-3.6; T14SR13E Sec19)**



**Photo 29: June, 2013 House Creek Photo Point (Reach 3.4-3.6; T14SR13ESec19)**



The 2004 assessment determined and 2013 field visits confirmed, House Creek reach 3.6-4.4 was FAR with an upward trend. In 2013, livestock sign was only observed within this reach near the upstream end of the allotment boundary. Similar to the House Creek reach 3.4-3.6, vegetation along the stream is dominated by willows. Riparian condition indicators from the 2004 PFC assessment form were marked “no” for adequate riparian-wetland vegetative cover and adequate source of coarse and/or large woody material (Table 29). The assessment noted several bare areas along the streambank and a lack of large woody material based on stem size. The riparian zone in this reach of House Creek is naturally a willow dominated system so lacks trees which would produce large woody debris.

***Evaluation Finding – Inside Lake and Sheep Trail Pastures are:***

Standard Doesn't Apply

Riparian areas and wetlands are not present in the Inside Lake and Sheep Trail Pastures; therefore, Standard 2 does not apply to this pasture of the allotment.

***Evaluation Finding – Devil Creek Reaches 32.4-34.7 (Devil Creek Pasture) and 34.7-35.0 (Canal Field Pasture) are:***

Meeting the Standard

Not meeting the Standard, but making significant progress towards meeting

Not meeting the Standard

***Rationale for Evaluation Finding***

Throughout the two reaches of Devil Creek within the allotment, the structural diversity of riparian species is reduced from what is expected due to the lack of woody riparian species. Some woody species are present, but are primarily limited to small isolated areas. Vegetation along the two reaches of Devil Creek consist of primarily herbaceous species lacking sufficient root depth to stabilize streambanks during high flows. Devil Creek reaches 32.4 to 34.7 and 34.7 to 35.0 are both FAR with no apparent trend and are not meeting Standard 2.

***Evaluation Finding - House Creek Reach 3.4-3.6 (Signal Butte Pasture) is:***

- Meeting the Standard
- Not meeting the Standard, but making significant progress towards meeting
- Not meeting the Standard

***Rationale for Evaluation Finding***

Based on the 2006 assessment and 2013 riparian photos and observations, House Creek reach 3.4-3.6 is in proper functioning condition. Riparian vegetation along this reach is sufficient to stabilize stream banks, filter sediment, provide shade, and dissipate the stream's energy. The species composition along the reach is diverse, contains multiple age classes of willow and perennial herbaceous species, and noxious weeds are not increasing. House Creek reach 3.4-3.6 is meeting Standard 2.

***Evaluation Finding - House Creek Reach 3.6-4.4 (Signal Butte Pasture) is:***

- Meeting the Standard
- Not meeting the Standard, but making significant progress towards meeting
- Not meeting the Standard

***Rationale for Evaluation Finding***

The most recent assessment rated House Creek reach 3.6-4.4 as FAR with an upward trend. The 2004 assessment noted too many unvegetated areas were present along the streambank within this reach. The reach was visited in 2013 and areas of unvegetated streambank were still present, but the remaining bare areas are small and are revegetating. With the exception of the few remaining unvegetated areas along the bank, riparian vegetation is stabilizing streambanks, filtering sediment during high flows, shading the stream, and dissipating energy. The species composition along the reach is diverse, contains multiple age classes, and noxious weeds are not increasing. House Creek reach 3.6-4.4 is not meeting the standard, but this reach is making significant progress towards meeting the standard.

**Standard 3 (Stream Channel/Floodplain)**

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

**Allotment Summary for Standard 3 (Stream Channel & Floodplain):**

There are 3.1 miles of perennial stream within the Signal Butte Allotment. These perennial stream miles occur on House Creek (0.9 miles) in the Signal Butte Pasture and on Devil Creek (1.9 miles) in the Devil Creek and Canal Field Pasture, including the wildlife enclosure. Another

0.3 miles of House Creek is present in the Canal Field on state land. There are 2.1 miles of intermittent stream that occur on Camas Slough (1.4 miles) and Devil Creek (0.7 miles) in the Devil Creek Pasture. Because stream channels and floodplains are present, Standard 3 applies to these three pastures of the allotment. Additional information on the water resources within the allotment is provided under Standard 2.

***Devil Creek***

The September, 2006 PFC assessment for the two reaches of Devil Creek within the allotment rated the reaches as FAR (Table 10). In 2013, the BLM revisited these reaches to assess whether or not conditions had changed and determined that the previous assessment results were representative of current conditions within these reaches. The 2013 photos were used to determine if the 2006 PFC ratings were consistent with the riparian conditions observed in 2013. None of the 2006 PFC ratings were changed for the PFC rated reaches of Devil Creek.

Four of the eight applicable responses were “No” to the hydrology and erosion/deposition indicators from the riparian condition assessment for the two reaches of Devil Creek (Table 30). The stream channel was noted as being overly wide in some locations along the reach in the Devil Creek and Canal Field Pastures. Eroding streambanks and channel braiding were observed and indicate the water and sediment supply are not in balance with the landscape. Devil Creek reaches 23.4-34.7 and 34.7-35.0 are not meeting Standard 3.

**Table 30: Hydrology and Erosion/Deposition Indicators from Riparian Condition Assessments in the Signal Butte Allotment by Stream Reach and Year**

Hydrology and Erosion/Deposition Indicators	Stream Reach Name and Year Assessed					
	DC-1 (2006)	DC-2 (2006)	HC-1 (1997)	HC-1 (2004)	HC-2 (1997)	HC-2 (2004)
Floodplain above bank-full inundated in "relatively frequently" events (1-3 years)	Yes	Yes	Yes	Yes	Yes	Yes
Active/stable beaver dams, where present	N/A	N/A	No	No	No	No
Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)	No	No	Yes	Yes	Yes	Yes
Riparian zone is widening or has achieved potential extent	No	No	Yes	Yes	Yes	Yes
Upland watershed is not contributing to riparian-wetland degradation	Yes	Yes	Yes	Yes	Yes	No
Floodplain and channel characteristics (i.e. rocks, overflow channels, coarse and/or large woody debris) are adequate to dissipate energy	Yes	Yes	Yes	Yes	Yes	Yes
Point bars are revegetating with riparian-wetland vegetation	N/A	N/A	Yes	Yes	Yes	Yes
Lateral stream movement is associated with natural sinuosity	No	No	Yes	Yes	Yes	Yes
System is vertically stable	Yes	Yes	Yes	Yes	Yes	Yes
Stream in in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion and deposition)	No	No	No	Yes	No	Yes

### **House Creek**

The 2004 PFC assessment determined, and 2013 field visits confirmed, House Creek reach 3.4-3.6 was in proper functioning condition. There were no actively maintained beaver dams or evidence of recent beaver activity during 2004 and 2013. All other hydrology and erosion/deposition indicators in the PFC assessment were marked “yes” (Table 30). The stream reach was in balance with water and sediment supply. Stream attributes (e.g., sinuosity, width/depth ratio, etc.) are in balance with the landscape, and floodplain and channel characteristics are adequate to dissipate stream energy. House Creek reach 3.4-3.6 is meeting the standard.

House Creek reach 3.6-4.4 was rated FAR with an upward trend in 2004. There were no actively maintained beaver dams or evidence of recent beaver activity during 2004 and 2013. The upland watershed is contributing to riparian-wetland degradation from livestock trails leading to the stream which are contributing sediment. Livestock trails were still present in 2013. Although not extensive, the trails were continuing to contribute sediment to the stream. The stream reach was in balance with water and sediment supply. Stream attributes (e.g., sinuosity, width/depth ratio, etc.) are in balance with the landscape, and floodplain and channel characteristics are adequate to dissipate stream energy. House Creek reach 3.6-4.4 is not meeting the standard.

### ***Evaluation Finding – Devil Creek Reaches 32.4-34.7 (Devil Creek Pasture) and 34.7-35.0 (Canal Field Pasture) are:***

- Meeting the Standard
- Not meeting the Standard, but making significant progress towards meeting
- Not meeting the Standard

### ***Rationale for Evaluation Finding***

The two reaches of Devil Creek were rated At Risk in 2006 (Table 30). Bank stability along some portions of these stream reaches appeared to be lower than the expected in 2013. The reduced bank stability is a function of streambank vegetation consisting of species, such as Kentucky bluegrass, which are poor stabilizers on streambanks. The stream was also noted as being overly wide in some locations. Cut banks and channel braiding were also observed and indicate the water and sediment supply are not in balance with the landscape. The two reaches of Devil Creek within the Devil Creek and Canal Field pastures are not meeting Standard 3.

### ***Evaluation Finding – House Creek Reach 3.4-3.6 (Signal Butte Pasture) is:***

- Meeting the Standard
- Not meeting the Standard, but making significant progress towards meeting
- Not meeting the Standard

### ***Rationale for Evaluation Finding***

House Creek reach 3.4-3.6 was rated as properly functioning during the 1997 and 2004 assessments. Field visits and photos from 2013 confirmed these conditions still exist. Stream attributes (sinuosity, width/depth ratio, etc.) are in balance with the landscape. Streambank stability is appropriate, and the stream channel and floodplain are filtering sediment, dissipating energy and storing water. House Creek reach 3.4-3.6 is meeting Standard 3.

**Evaluation Finding – House Creek Reach 3.6-4.4 (Signal Butte Pasture) is:**

- Meeting the Standard
- Not meeting the Standard, but making significant progress towards meeting
- Not meeting the Standard

**Rationale for Evaluation Finding**

House Creek Reach 3.6-4.4 was rated as Functioning At Risk with an upward trend during the 2004 assessment (Table 30). The 2013 field visits and photos confirmed these conditions still exist. Stream attributes (sinuosity, width/depth ratio, etc.) are in balance with the landscape. Streambank stability is appropriate for the stream type, and the stream channel and floodplain are filtering sediment, dissipating energy and storing water. House Creek reach 3.6-4.4 is not meeting Standard 3 but is making significant towards meeting the standard.

**Standard 4 (Native Plant Communities)**

*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*

**Rangeland Health Assessment**

Historically, this allotment was dominated by sagebrush steppe vegetation. However, vegetation treatments to reduce shrub cover and enhance herbaceous forage, as well as past wildfire, have resulted in dominance of some areas by native and non-native grass communities. Some areas within the predominantly native vegetation communities within the allotment have been seeded; however, native vegetation dominates overall as shown by cover data collected and aerial sagebrush seedings occurred following fire over the last 20 years.

The Devil Creek and Canal Field Pastures of the Signal Butte Allotment are being evaluated under Standard 4 because the majority of the Devil Creek Pasture (91%) and the Canal Field Pasture (93%) is dominated by native plant communities (Tables 30 and 31).

Interpreting Indicators of Rangeland Health evaluations were conducted at two locations within the allotment, both of which are HAF sites. Vegetative cover data was collected in 2010 and 2012 and is summarized in Table 31. Additional cover data was collected at other HAF sites throughout the pastures and is summarized in Table 32. Vegetative cover data was collected at multiple layers (Cooperative Extension Service et al., 1999); however, Tables 31 and 32 displays only the top cover layer to allow comparison of cover data to ESD reference sheet values.

Both IIRH sites evaluated are located within a Claypan 12-16” low sagebrush/Idaho fescue ecological site R025XY010ID (USDA NRCS, 2013a).

**Table 31: IIRH Data – Percent Vegetative Cover (Top Layer Only)**

Vegetation Class	Species	Devil Creek Pasture IIRH site DC (2013)	Canal Field Pasture IIRH site CF_2 (2013)
Perennial Grasses	Bluebunch wheatgrass	2.0%	4.0%
	Squirreltail	2.0%	0%
	Crested wheatgrass	0%	0%
	Idaho fescue	10.0%	41.5%

Vegetation Class	Species	Devil Creek Pasture IIRH site DC (2013)	Canal Field Pasture IIRH site CF_2 (2013)
	Sandberg bluegrass	8.0%	3.5%
	Western wheatgrass	10.0%	6.0%
Annual Grasses	Cheatgrass	2.0%	0%
	Six-weeks fescue	0%	0%
Perennial Forbs	Longleaf phlox	4.0%	0%
	Mourning milkvetch	2.0%	0%
	Tall annual willowherb	2.0%	0%
Annual Forbs	Curvseed butterwort	2.0%	0%
	Maiden blue-eyed Mary	2.0%	0%
	Western stickseed	2.0%	0%
Shrubs	Yellow rabbitbrush	2.0%	3.0%
	Wyoming big sagebrush	0.0%	0.0%
Vegetation Total		60.5%	58.0%
Other Cover	Bare Ground	36.0%	10.0%
	Biological Soil Crust	0%	2.5%
	Litter in Contact with Soil	14.0%	14.0%
	Litter Standing	0%	14.5%
	Persistent Litter	0%	0%
	Rock or Gravel	0%	1.0%
Grand Total		100.0%	100.0%

**Table 32: HAF Data - Percent Vegetative Cover (Top Layer Only)**

Vegetation Class	Species	Devil Creek Pasture HAF site DC_2 (2012)	Canal Field Pasture HAF site CF (2012)
Perennial Grasses	Bluebunch wheatgrass	8.0%	0%
	Squirreltail	0.5%	1.5%
	Crested wheatgrass	0%	0.5%
	Idaho fescue	31.5%	25.0%
	Sandberg bluegrass	10.0%	3.5%
	Thurber's needlegrass	0%	0.5%
	Western wheatgrass	2.0%	1.5%
Annual Grasses	Cheatgrass	0.5%	0.5%
	Six-weeks fescue	0.5%	0.5%
Perennial Forbs	Longleaf phlox	0.5%	0%
	Mourning milkvetch	0%	0%
	Shaggy fleabane	1.0%	0%
	Tall annual willowherb	0.5%	0%
Annual Forbs	Curvseed butterwort	0.0%	0%
	Maiden blue-eyed Mary	0.0%	0%
	Western stickseed	0.0%	0%
Shrubs	Yellow rabbitbrush	4.0%	10.0%
	Rubber rabbitbrush	0.0%	0.5%
	Antelope bitterbrush	0.0%	9.0%
	Black sagebrush	0.0%	0.5%
	Low sagebrush	0.0%	0.5%
	Wyoming big sagebrush	0.0%	6.5%

Vegetation Class	Species	Devil Creek Pasture HAF site DC_2 (2012)	Canal Field Pasture HAF site CF (2012)
Vegetation Total		59.0%	60.5%
Other Cover	Bare Ground	13.0%	10.0%
	Biological Soil Crust	4.5%	6.0%
	Litter in Contact with Soil	16.5%	14.0%
	Litter Standing	3.0%	3.5%
	Persistent Litter	0.5%	1.0%
	Rock or Gravel	3.5%	5.0%
<b>Grand Total</b>		<b>100.0%</b>	<b>100.0%</b>

### Canal Field Pasture

IIRH site CF\_2 (Photo 30) is located in a mixed vegetation community in a Shallow Claypan 12-16" ARAR8/FEID ESD. Idaho fescue is the dominant deep-rooted grass species at 41.5 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 3.5 percent cover (Table 31). Bluebunch wheatgrass is also present at 4.0 percent cover. Yellow rabbitbrush is the dominant shrub species at 3.0 percent cover.

The site is of relatively flat topography with a south aspect. The soil stability test (Pellant et al., 2005) completed at the site resulted in a soil stability value of 4.2 (values should range from 3 to 5), indicating moderate to high resistance to erosion. Biological crusts comprised 2.5 percent cover and bare ground was 10.0 percent cover.

The indicator for litter amount was rated as a moderate departure from the reference condition due to a moderate increase in the amount of litter (53.5%) found at the site.

Sagebrush was noted as scattered but not abundant near site CF\_2. No perennial or annual forb species were found in the cover transect. However, the 2013 IIRH field notes list ten desirable perennial forbs, two desirable annual forbs and one undesirable non-native annual forb. The notes indicate that all functional/structural groups, including forbs, were present.

Cheatgrass was recorded as 0 percent cover within the transect, but was noted as being "present in small amounts along the two-track road near the site." In addition, the 2013 IIRH field notes indicate that curvseed butterwort and Scotch thistle were also present along the road. The indicator for Invasive Plants was rated as a slight to moderate departure from reference condition.

All other indicators related to Biotic Integrity were rated none to slight departure from the reference condition; therefore, the overall Biotic Integrity attribute was rated as a none to slight departure.

**Photo 30: Canal Field Pasture (IIRH Site CF\_2) – July 31, 2013**



### **Devil Creek Pasture**

IIRH site DC (Photo 31) is located in a native vegetation community in a Shallow Claypan 12-16” ARAR8/FEID ESD. Idaho fescue and western wheatgrass are the co-dominant deep-rooted grass species 10 percent cover each and Sandberg bluegrass is the dominant shallow-rooted grass species at 8.0 percent cover (Table 31). Bluebunch wheatgrass and squirreltail are also present at 2.0 percent cover each. Yellow rabbitbrush is the dominant shrub species at 2.0 percent cover.

The site is of relatively flat topography with a southwest aspect. No soil stability test was completed at this site; however, the soil test completed in the Canal Field Pasture (which is the same ESD) resulted in a soil stability value of 4.2 (values should range from 3 to 5), indicating moderate to high resistance to erosion. Biological crusts comprised 0 percent cover and bare ground was 36.0 percent cover.

The indicator for litter amount was rated as a slight to moderate departure from the reference condition due to a slight increase in the amount of litter (14 percent cover) found at the site.

All other indicators related to Biotic Integrity were rated none to slight departure from the reference condition; therefore, the overall Biotic Integrity attribute was rated as a none to slight departure.

**Photo 31: Devil Creek Pasture (IRRH Site DC) - July 30, 2013**



#### **Evaluation of Standard 4 – Canal Field and Devil Creek Pastures**

The pastures have been modified due to vegetation treatments and more recently, wildfire. Portions of some pastures have burned numerous times in the past 10-20 years. The 2007 Murphy Complex Fire burned nearly all of the allotment, reducing the shrub component, specifically sagebrush, to a few small, scattered patches. Various drill and aerial seeding efforts have taken place to rehabilitate areas burned by wildfire. As a result of these treatments, the allotment is currently dominated by herbaceous vegetation consisting of both native and non-native perennial grass species.

The cover data collected in 2010 and 2012 in the pastures and used in the IIRH evaluation (Table 31 and 32) reflects a diversity of the desirable vegetation within areas that have affected by wildfire. Deep-rooted perennial bunchgrasses are the dominant functional/structural groups, occurring as between 24.0 – 51.5 percent of the vegetative cover. Shallow rooted grasses occur as between 3.5 – 10.0 percent cover, desirable perennial and annual forbs occur as between 0. – 12.0 percent cover and cheatgrass as between 0.0 – 2.0 percent cover.

The shrub component, based on rabbitbrush, ranges from 2.0 – 10.5 percent cover; however, at the CF site, antelope bitterbrush was recorded as 9.0 percent cover and sagebrush spp. was recorded as 7.5 percent cover. The lack of shrub cover is visually apparent in the Canal Field and Devil Creek Pastures. An IDT HAF data review indicated that although there is a lack of a mature sagebrush component, seedlings are present (Klott, 2016).

The litter amount indicator was rated as a slight to moderate departure at IIRH site DC (22 percent cover) and as moderate at IIRH site CF\_2 (53.5 percent cover).

At the IIRH site CF\_2, cheatgrass was recorded as 0 percent cover within the transect, but was noted as being “present in small amounts along the two-track road near the site.” In addition, the 2013 IIRH field notes indicate that curvseed butterwort and Scotch thistle were also present along the road. The indicator for Invasive Plants was rated as a slight to moderate departure from reference condition.

All the other attribute ratings were none to slight; therefore, the overall rating for the Biotic Integrity attribute was rated as a none to slight departure from the reference condition for the Canal Field and Devil Creek Pastures.

***Evaluation Finding – Canal Field and Devil Creek Pastures is:***

- Meeting the Standard
- Not meeting the Standard, but making significant progress towards meeting
- Not meeting the Standard

***Rationale for Evaluation Finding***

Deep-rooted perennial bunchgrasses within the native plant communities are the dominant functional/structural group in some areas of the pastures and can help support nutrient cycling and energy flow due to their above and below ground structure. Deep-rooted grasses generally have a longer active growth period, larger root systems for stabilizing soils and facilitating soil moisture percolation and relatively higher potential to capture and store carbon below ground. The perennial species present within the pastures are appropriately productive and are capable of reproduction and recruitment of new seedlings.

The cover data collected in 2010 and 2012 shows variability of the desirable perennial and annual forbs present, which range from 0.0 – 12.0 percent cover. The IIRH field notes indicate that between nine and eighteen species were documented as occurring at the two IIRH sites evaluated. The forb component does not comprise the dominant functional/structural group as described in the ESD; however, there is diversity within the species present.

Although Wyoming big sagebrush was not recorded as being present at the sites evaluated, additional HAF data collected (Table 32) shows there is a small component present. The lack of shrub cover is visually apparent; however, IDT notes describe that seedlings are present and recovering, albeit slowly. Shrubs function to catch snow and thereby increase infiltration and sagebrush roots can redistribute small amounts (less than 0.3 inches) of water in the soil profile up to 1.5 meters in depth (Ryel et al., 2003). The limited amount of shrubs can influence the ecological structural and functional groups to some degree. Hydrologically, the amount of deep rooted perennial grass partially compensates for reduced shrubs with respect of holding snow on site and allowing infiltration. Water infiltration and retention was functioning appropriately as evidenced by plant growth and reproduction.

The litter amount indicator was rated as a slight to moderate departure at IIRH site DC (22 percent cover) and as moderate at IIRH site CF\_2 (53.5 percent cover). However, the IDT determined the litter amount is providing cover for site protection and replenishment of nutrients

and does not appear to be negatively affecting ecological processes, as shown by adequate soil moisture, as well as plant growth/annual production matching what is expected at each site.

Cheatgrass, curvseed butterwort and Scotch thistle were observed as being but mainly in disturbed areas and/or along the road. Invasive species can become a threat to biotic integrity following large scale disturbances such as wildfire; however, adequate desirable perennial species are present within the seeded plant communities to hinder further spread of invasive or noxious plant species.

Although there is diversity and abundance of native deep-rooted perennial bunchgrasses present, due to the variability of percent cover of perennial forbs and shrubs, specifically sagebrush species, portions of the native plant communities within the pastures are not functioning to maintain or promote native animal habitat for sagebrush dependent species or native plant populations. Therefore, the Canal Field and Devil Creek Pastures are not meeting Standard 4 but are making significant progress towards meeting the standard.

#### **Standard 5 (Seedings)**

*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 the hydrologic cycle.*

#### **Rangeland Health Assessment**

Plant communities in the Inside Lake, Sheep Trail and Signal Butte Pastures have been modified and are therefore being evaluated under Standard 5. Vegetation treatments were implemented in the 1960s and 70s, and wildfire has affected the allotment; most recently, the 2007 Murphy Complex Fire. Portions of the burned areas were subsequently drill and/or aerially seeded.

Although only a small percentage of these three pastures are currently mapped as a seeding because more acres within each pasture has been seeded than are depicted on the vegetation community map. This discrepancy is a result of the vegetation map being based on cover data, rather than production. However, there remain small areas of native vegetation that were never seeded. In addition, aerial seedings of sagebrush have occurred over much of the allotment but have not reached the density or maturity to function as sagebrush steppe.

Interpreting Indicators of Rangeland Health evaluations were conducted at three locations within the allotment, all of which were HAF sites. Vegetative cover data was collected in 2012 and 2013 and is summarized in Table 33. Vegetative cover data was collected at multiple layers (Cooperative Extension Service et al., 1999); however, Table 33 displays only the top cover layer to allow comparison of cover data to ESD reference sheet values.

**Table 33: IIRH and HAF Data – Percent Vegetative Cover (Top Layer Only)**

Vegetation Class	Species*	Inside Lake Pasture IIRH site IL (2013)	Sheep Trail Pasture IIRH site ST (2012)	Signal Butte Pasture IIRH site SB (2012)
Perennial Grasses	Bluebunch Wheatgrass	12%	0.0%	39.0%
	Bottlebrush Squirreltail	0%	0.0%	0.5%
	Crested Wheatgrass	0%	28.5%	0.0%
	Idaho Fescue	13%	0.0%	0.0%
	Sandberg Bluegrass	8%	14.0%	12.5%
	Thurber's Needlegrass	0%	2.0%	0.0%
Annual Grasses	Cheatgrass	1%	0.0%	0.0%
Perennial Forbs	Spiny Phlox	0%	0.5%	0.0%
	Longleaf Phlox	1%	4.0%	0.0%
	Lupine	0%	2.5%	1.0%
	Pale Agoseris	0%	0.5%	0.0%
Shrubs	Rubber Rabbitbrush	1%	0.5%	0.0%
	Wyoming Big Sagebrush	4%	0.0%	0.0%
	Yellow Rabbitbrush	3%	0.0%	3.5%
Vegetation Total		59.0%	52.5%	56.5%
Other Cover	Bare Ground	14%	12.0%	16.5%
	Biological Soil Crust	4%	0.5%	8.5%
	Litter in Contact with Soil	30%	18.0%	6.0%
	Litter Standing	1%	15.5%	11.5%
	Persistent Litter	1%	0.0%	0.0%
	Rock or Gravel	7%	1.5%	1.0%
Grand Total		100.0%	100.0%	100.0%

***Inside Lake Pasture***

IIRH site IL (Photo 32) is located in a mixed vegetation community in a Loamy 11-13" ARTRT/PSSPS ESD and is located approximately 250 yards from the Worley Ditch and a pond that comprise the primary stock water source in the pasture. Bluebunch wheatgrass and Idaho fescue are the co-dominant deep-rooted grass species at 12 and 13 percent cover, respectively and Sandberg bluegrass is the dominant shallow-rooted grass species 8 percent cover. Wyoming big sagebrush is the dominant shrub species at 4 percent cover (Table 33).

The site is of relatively flat topography, gently rolling with a north aspect. No soil stability test was completed at this site; however, Photo 23 shows an overview of the soil profile. Biological crusts comprised 4 percent cover and bare ground was 14.0 percent cover.

The indicator for litter amount was rated as a moderate to extreme departure from the reference condition due to an increase in the amount of litter (62 percent cover) found at the site.

Cheatgrass was recorded as 1 percent cover and the IIRH field notes indicate that cheatgrass and Scotch thistle were observed but as “few and scattered”; therefore, the indicator for invasive plants was rated slight to moderate departure from the reference condition.

All other indicators related to Biotic Integrity other than Litter Amount and Invasive Plants were rated as a none to slight departure from the reference condition; therefore, the overall Biotic Integrity attribute was rated as a none to slight departure.

**Photo 32: Inside Lake Pasture (IIRH Site IL) – July 31, 2013**



### **Sheep Trail Pasture**

IIRH site ST (Photo 33) is located in a seeded vegetation community in a Loamy 10-13” ARTRW8/PSSPS ESD. Crested wheatgrass is the dominant deep-rooted grass species at 28.5 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 14.0 percent cover. Rubber rabbitbrush (*Ericameria nauseosa*) is the dominant shrub species at 0.5 percent cover (Table 33).

The site is located in a basin with a generally north/northeast aspect. No soil stability test was completed at this site. Biological crusts comprised 0.5 percent cover and bare ground was 12.0 percent cover.

The indicator for litter amount was rated as a moderate to extreme departure from the reference condition due to an increase in the amount of litter (63 percent cover) found at the site.

All other indicators related to Biotic Integrity other than Litter Amount were rated as a none to slight departure from the reference condition; therefore, the overall Biotic Integrity attribute was rated as a none to slight departure.

**Photo 33: Sheep Trail Pasture (IIRH Site ST) - July 24, 2013**



### **Signal Butte Pasture**

IIRH site SB (Photo 34) is located in a seeded vegetation community in a Shallow Claypan 12-16" ARAR8/FEID ESD. Bluebunch wheatgrass is the dominant deep-rooted grass species at 39 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 12.5 percent cover. Yellow rabbitbrush is the dominant shrub species at 3.5 percent cover (Table 33).

The site is located in a basin with a generally north/northeast aspect. The soil stability test (Pellant et al., 2005) completed at the site resulted in a soil stability value of 4.7 (values should range from 3 to 5), indicating a high resistance to erosion. Biological crusts comprised 8.5 percent cover and bare ground was 16.5 percent cover.

The indicator for litter amount was rated as a moderate departure from the reference condition due to an increase in the amount of litter (34.5 percent cover) found at the site.

Cheatgrass and bur buttercup were not recorded when the 2012 cover data was collected but both species were observed "in small disturbed areas" and one Scotch thistle was also observed. The indicator for invasive plants was rated as a slight to moderate departure from the reference condition.

All other indicators related to Biotic Integrity other than Litter Amount were rated as a none to slight departure from the reference condition; therefore, the overall Biotic Integrity attribute was rated as a none to slight departure.

**Photo 34: Signal Butte Pasture (IIRH Site SB) - July 30, 2013**



**Evaluation of Standard 5 – Inside Lake, Signal Butte and Sheep Trail Pastures:**

The pastures have been modified due to vegetation treatments and more recently, wildfire. Portions of some pastures have burned numerous times in the past 10-20 years. The 2007 Murphy Complex Fire burned nearly all of the allotment, reducing the shrub component, specifically sagebrush, to a few small, scattered patches. Various drill and aerial seeding efforts have taken place to rehabilitate areas burned by wildfire. As a result of these treatments, the allotment is currently dominated by herbaceous vegetation consisting of both native and non-native perennial grass species.

The cover data collected in 2010 and 2012 in the pastures and used in the IIRH evaluation (Table 33) reflects a diversity of the desirable vegetation within areas that have affected by wildfire. Deep-rooted perennial bunchgrasses are the dominant functional/structural groups, occurring as between 25.0 – 39.5 percent of the vegetative cover. Shallow rooted grasses occur as between 8.0 – 14.0 percent cover, desirable perennial and annual forbs occur as between 1.0 – 7.5 percent cover and cheatgrass as between 0.0 – 1.0 percent cover.

The shrub component ranges from 0.5 – 8.0 percent cover and the lack of shrub cover is visually apparent in the areas of the pastures. IDT notes indicate that sagebrush is found as “a few plants and scattered” and there is a rabbitbrush component present.

The litter amount indicator was rated as a moderate departure from reference condition at IIRH site SB (34.5 percent cover, all layers) and as a moderate to extreme departure at IIRH site IL (62 percent cover, all layers) and IIRH site ST (63 percent cover, all layers).

At the IIRH site IL and SB, cheatgrass was recorded as 1.0 and 0.0 percent cover within the transect, but was noted as being “scattered “and “found in small disturbed areas.” In addition, the 2013 IIRH field notes indicate that Scotch thistle was also present but “patchy.” The indicator for Invasive Plants was rated as a slight to moderate departure from reference condition for both sites.

All the other attribute ratings were none to slight; therefore, the overall rating for the Biotic Integrity attribute was rated as a none to slight departure from the reference condition Inside Lake, Sheep Trail and Signal Butte Pastures.

***Evaluation Finding – Inside Lake, Signal Butte and Sheep Trail Pastures is:***

- Meeting the Standard
- Not meeting the Standard, but making significant progress towards meeting
- Not meeting the Standard

***Rationale for Evaluation Finding***

Diversity of perennial species within the seeded areas Inside Lake, Signal Butte and Sheep Trail Pastures is as expected for areas that the vegetation has been manipulated through treatments and have burned and been seeded. Deep-rooted perennial grasses are the dominant functional structural group within the seeded areas. Perennial species are productive and able to produce seed. The cover data indicates that abundance and diversity of perennial grass species varies slightly across the seeded plant communities of the pastures but the species present within the pastures are appropriately productive and are capable of reproduction. Shrubs were mainly absent from the seeded plant communities, due to wildfire, and perennial forbs were present in trace amounts.

The litter amount indicator rating deviated from the reference condition found in the ESD. The presence of seeded species can result in higher biomass production, resulting in more litter than is described in the ESD reference sheet, especially in seedings. However, litter is providing cover for site protection and replenishment of nutrients and does not appear to be negatively affecting ecological processes, as shown by adequate soil moisture, as well as plant growth/annual production matching what is expected at each site.

Although sagebrush cover was not recorded at every site, the plant species list for each site indicated it was present along with at least on rabbitbrush species. Shrubs function to catch snow and thereby increase infiltration and sagebrush roots can redistribute even small amounts (less than 0.3 inches) of water in the soil profile up to 1.5 meters in depth (Ryel et al., 2003). The limited amount of shrubs can influence the ecological structural and functional groups to some degree. Hydrologically, the amount of deep-rooted perennial grass partially compensates for reduced shrubs with respect of holding snow on site and allowing infiltration. Water infiltration and retention does not appear to have been ecologically reduced as evidenced by plant growth and reproduction.

Cheatgrass was noted to present in disturbed areas and a few Scotch thistle plants were noted in the 2013 IIRH field notes. Invasive species such as cheatgrass can become a threat to biotic integrity following large scale disturbances such as wildfire; however, adequate desirable

perennial species are present within the seeded plant communities to hinder further spread of invasive or noxious plant species.

Wyoming big sagebrush was observed at the sites although rehabilitation efforts have been undertaken to reseed Wyoming big sagebrush following wildfire through aerial seedings. The lack of shrub cover is visually apparent in areas of the pastures. Shrubs function to catch snow and thereby increase infiltration and sagebrush roots can redistribute small amounts (less than 0.3 inches) of water in the soil profile up to 1.5 meters in depth (Ryel et al., 2003). The limited amount of shrubs can influence the ecological structural and functional groups to some degree. Hydrologically, the amount of deep rooted perennial grass partially compensates for reduced shrubs with respect of holding snow on site and allowing infiltration. Water infiltration and retention was functioning as evidenced by plant growth and reproduction.

The combination of the presence of large statured, deep rooted perennial bunchgrasses and shallow rooted, perennial grasses, along with a component of shrubs and perennial forb species and the limited presence of cheatgrass, all allow the seeded vegetation communities within the pastures to function to maintain life form diversity, production, native animal habitat, nutrient cycling, energy flow, and the hydrologic cycle. With the exception of recurring fire, current management is expected to provide for maintenance of seeded and native vegetation, native animal habitat, and ecological processes (nutrient cycling, hydrologic cycling, and energy flow) within the seeded plant communities. Therefore, the Inside Lake, Sheep Trail and Signal Butte Pastures in the Signal Butte Allotment are meeting Standard 5.

#### **Standard 6 (Exotic Plant Communities, Other than Seedings)**

*Exotic plant communities, other than seedings, will meet minimum requirements of soil stability and maintenance of existing native and seeded plants. These communities will be rehabilitated to perennial communities when feasible cost effective methods are developed.*

X Standard Doesn't Apply

The plant communities with the Signal Butte Allotment are dominated by native and seeded non-native species; therefore, Standard 6 does not apply to the allotment.

#### **Standard 7 (Water Quality)**

*Surface and ground water on public lands comply with the Idaho Water Quality Standards.*

#### **Allotment Summary for Standard 7 (Water Quality)**

A description of the water resources within the allotment is provided above under Standard 2. Water resources are present in the Signal Butte, Devil Creek, and Canal Field pastures of the allotment. Therefore, Standard 7 applies to the Signal Butte Allotment.

#### **Evaluation of Standard 7**

##### **Devil Creek**

A portion of Devil Creek (0.7 mile), downstream of the confluence of Camas Slough within the Devil Creek Pasture allotment, is listed by Idaho Department of Environmental Quality (IDEQ)

as not supporting the designated beneficial use of cold water aquatic life due to elevated water temperature (IDEQ 2014). The listed stream reach is in IDEQ Assessment Unit (AU) ID17040213SK002\_03. The AU was removed from the 303(d) list (Category 5 Stream) after the Environmental Protection Agency's (EPA's) approval of the Salmon Falls Sub-basin Assessment and Total Maximum Daily Loads (TMDL) (IDEQ 2008). The stream is currently listed in the IDEQ 2012 Integrated Report as a Category 4A stream (i.e., streams which have an EPA approved TMDL).

The remaining portion of Devil Creek within the allotment occurs with AU ID17040213SK002\_02 which has not been assessed by IDEQ for compliance with Idaho water quality standards. The portions of Devil Creek within this AU are listed as a Category 3 stream (i.e., waters with insufficient data (or no data) to determine if beneficial uses are being attained). The AU is listed in the 2102 Integrated Report as a "Zero Flow" AU (IDEQ 2014); Appendix C). Until IDEQ assesses the water quality within the AU, no further evaluation of water quality can be completed for the remaining portions of Devil Creek within the allotment.

### **House Creek**

There is approximately 1.2 miles of House Creek within the Signal Butte pasture (0.9 mile) and Canal Field pasture (0.3 mile) in the allotment that are within IDEQ AU ID170402013SK005\_03. The designated beneficial uses for the AU include cold water aquatic life and secondary contact recreation. The AU is listed as not supporting the cold water aquatic life beneficial use due to total phosphorus, sedimentation/siltation, and elevated water temperature (IDEQ 2014). The AU is fully supporting the secondary contact recreation beneficial use. The AU was removed from the 303(d) list (Category 5 Stream) after the EPA's approval of the Salmon Falls Sub-basin Assessment and TMDL (IDEQ 2008). The stream is currently listed in the IDEQ 2012 Integrated Report as a Category 4A stream (i.e., streams which have an EPA approved TMDL).

### ***Evaluation Finding – Inside Lake and Sheep Trail Pastures are:***

Standard Doesn't Apply

Riparian zones and wetlands are not present in the Sheep Trail Pasture. The playa in the Inside Lake Pasture fills infrequently and has no outlet. Due to limited water availability the playa is typically not used by livestock as a primary water source. The IDEQ does not have a specific protocol for monitoring or assessing intermittent (dewatered or ephemeral) waters.

### ***Evaluation Finding – Devil Creek, Signal Butte and Canal Field Pastures are:***

Meeting the Standard

Not meeting the Standard, but making significant progress towards meeting

Not meeting the Standard

### ***Rationale for Evaluation Finding***

Standard 7 is not being met in the Devil Creek, Signal Butte, and Canal Field Pastures of the Signal Butte Allotment based on IDEQ beneficial use support status and water quality impairment information (IDEQ 2014). The Devil Creek AU (ID17040213SK002\_02) is listed by

IDEQ as not supporting the designated beneficial use of cold water aquatic life due to elevated water temperature. The House Creek AU (ID17040213SK005\_03) is listed by IDEQ as not supporting the designated beneficial use of cold water aquatic life due to total phosphorous, sediment/siltation, and elevated water temperature. Therefore, the Signal Butte Allotment is not meeting Standard 7. Water temperatures are likely influenced by flow alterations and diversions for private land irrigation in both Devil Creek and House Creek. Livestock can access Devil Creek and House Creek within the Signal Butte Allotment and may be contributing to the water quality impairment of total phosphorous, sediment/siltation, and elevated water temperature. . However, at this time, it is unknown whether current livestock grazing management practices are a significant contributing factor.

### **Standard 8 (Threatened, Endangered and BLM Sensitive Plants and Animals)**

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

### **Rangeland Health Assessment**

#### **Plants**

There are no known BLM sensitive plants within the allotment. In the Jarbidge Field Office special status plants are generally associated with distinct soil types that occur on scattered portions of the field office. None of these soil types occur within the allotment based on SSURGO soil data (NRCS, 2012). Potential habitat occurs for one sensitive plant species, slickspot peppergrass (*Lepidium papilliferum*; Proposed Endangered, BLM sensitive species). Approximately 1,328 acres have been surveyed for slickspot peppergrass; slickspots were noted but slickspot peppergrass plants have not been found in these or previous surveys. Systematic inventories for other special status plants have not been conducted in the allotment. No special status plant species have been recorded during other monitoring efforts (e.g., slickspot peppergrass inventories, IIRH field visits, sage-grouse habitat assessments, fire rehabilitation monitoring, etc.).

Slickspot peppergrass grows in the semiarid sagebrush-steppe ecosystem of southwestern Idaho. Interspersed within this habitat type, slickspot peppergrass can be found in visually distinct microsites known as slickspots (mini playas or natric sites) that act as small water basins and where the sodium and clay content is higher than adjacent, unoccupied habitat (Moseley, 1994).

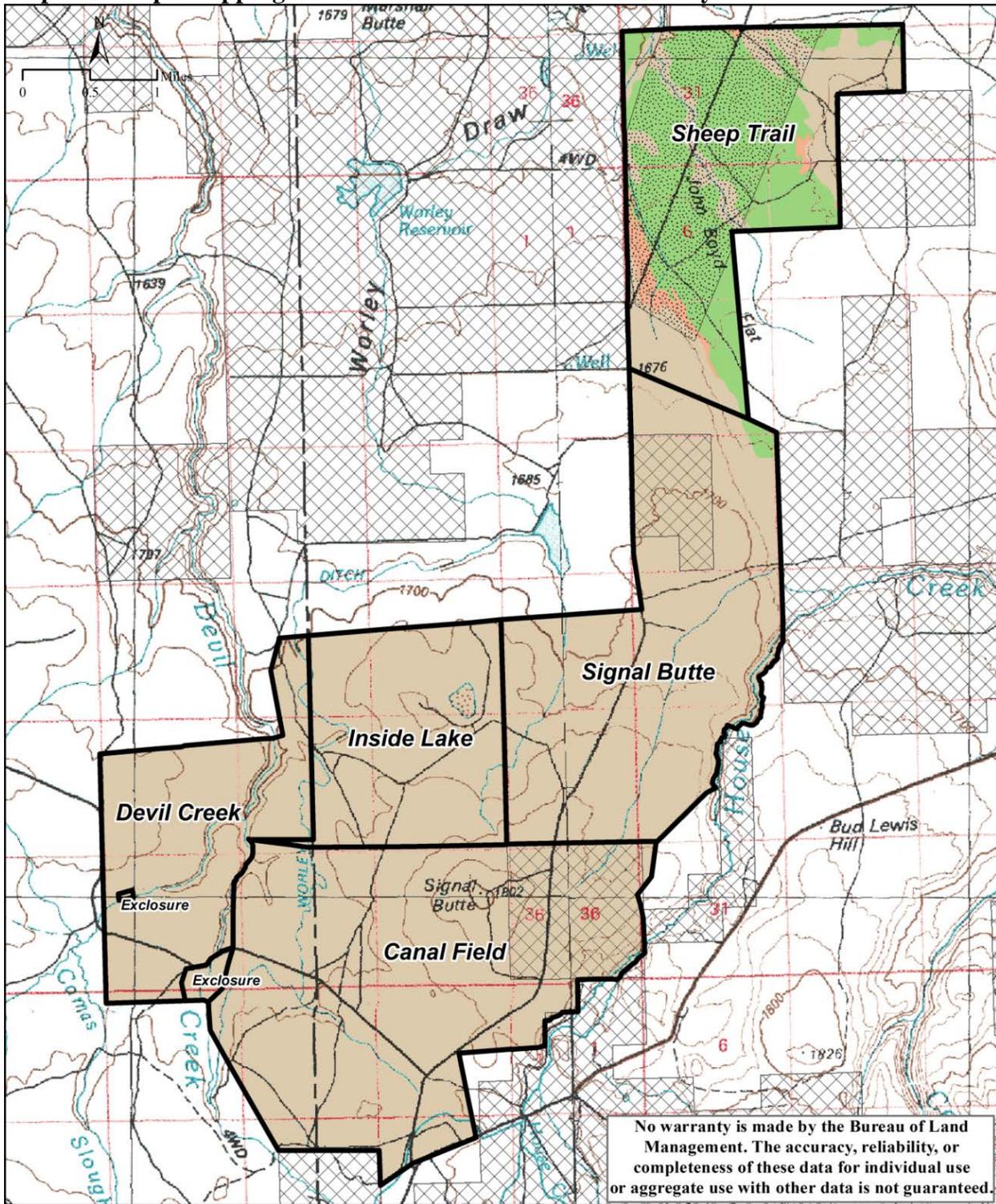
The Signal Butte Allotment contains 1,594 acres (15% of allotment) of potential slickspot peppergrass habitat (Map 8). A GIS model was developed to help focus inventory and clearance efforts to areas that would have a higher probability of finding slickspot peppergrass plants (BLM, 2012). This model used updated soils data, vegetation community data, fire frequency, slope, and elevation to further refine potential habitat and to categorize it into groups (high, medium, and low) that identify the potential for finding the species. The allotment contains 1,486 acres of high potential, 107 acres of medium potential, and 9,374 acres of non-habitat for slickspot peppergrass (Table 34). The nearest known occupied habitat for slickspot peppergrass is 12 miles to the west, on the west side of Clover Creek.

**Table 34: Slickspot Peppergrass Potential Habitat (Acres)**

<b>Pasture</b>	<b>High</b>	<b>Medium</b>	<b>Low</b>	<b>Non-habitat</b>
Canal Field	0	0	0	2,962
Devil Creek	0	0	0	1,509
Inside Lake	0	0	0	1,493
Sheep Trail	1,454	107	0	753
Signal Butte	32	0	0	2,598
Wildlife Enclosure	0	0	0	59

DRAFT

**Map 8: Slickspot Peppergrass Potential Habitat and Area Surveyed**



## Animals

Presence of various sensitive wildlife species are based upon primarily incidental observations by BLM personnel and data entered into the Idaho Natural Heritage Center database by other individuals. Species found on the Signal Butte Allotment are discussed below.

### **Redband Trout** (*Oncorhynchus mykiss gairdnerii*; BLM sensitive species)

Redband trout are found in House Creek which is located along the eastern side of the Signal Butte Pasture. Approximately 1.0 mile of House Creek is present along the eastern boundary of the Signal Butte Pasture. Redband trout do not occur in any other stream within the allotment. No recent fisheries surveys have occurred in the allotment, but redband trout likely inhabit House Creek within the allotment when water temperatures are suitable. Fish habitat surveys have not been conducted within the allotment.

### **Greater Sage-Grouse** (*Centrocercus urophasianus*; BLM sensitive species)

Sage-grouse require sagebrush and other shrub habitat to fulfill seasonal habitat needs (Connelly et al., 2000; Holloran et al., 2005). Sage-grouse are dependent on sagebrush ecosystems and require extensive stands of sagebrush with a diverse and vigorous herbaceous understory.

Sage-grouse display and breed on leks (i.e., display grounds with sparse vegetation cover) between March and May. After breeding hens disperse into nesting areas around the leks. Sage-grouse typically return to the same lek and nest areas year after year. Hens seek out nest sites that are concealed from predators, especially avian predators (Conover et al., 2010) by a combination of shrub (usually sagebrush) and grass cover. When chicks hatch the hen and her chicks feed on insects and forbs and slowly move towards wetter areas like wet meadows or streams and springs where forbs are still green and growing. A diverse forb component and an abundance of forbs are necessary to support a variety of insects which are critical to the growth of young sage-grouse (Knick and Connelly, 2011). In the summer as forbs dry up sage-grouse switch from eating forbs and sagebrush to almost exclusively sagebrush through the winter. Sage-grouse may either migrate to different seasonal habitats or may remain in a single general area throughout the year.

In 2010, BLM developed the Sage-Grouse HAF to assess seasonal sage-grouse habitats at multiple scales (Stiver et al., 2010). Habitat suitability requirements were based on the following guidelines which were published in 2000 and describe desired conditions for sage-grouse habitats during nesting and early brood rearing, late brood rearing, and winter:

- Nesting and early brood rearing habitat should support 15-25% canopy cover of sagebrush, perennial herbaceous cover should average at least 7” in height with at least 10% canopy cover for grasses and at least 5% for forbs and a diversity of forb species during spring (Connelly et al., 2000).
- Late brood rearing habitat should support 10-25% canopy cover of sagebrush. Riparian areas or wet meadows in the general area improve habitat for sage-grouse (Connelly et al., 2000).
- Winter habitat should have 10-30% canopy cover of sagebrush with at least 10-14” exposed above the snow (Connelly et al., 2000).

The Murphy Complex Fires in 2007 essentially eliminated all sagebrush in the allotment; the only remaining area with sagebrush is 143 acres in size and is located in the southern portion of the Canal Field Pasture (less than 5% of pasture). Sage-grouse have been observed in the adjoining allotments year round. Sage-grouse habitat extends south of the Allotment into the Cedar Creek, House Creek, and Little House Creek Allotments (Map 9).

The Signal Butte Allotment contains 3 occupied, 3 undetermined (due to a lack of recent surveys), and 1 unoccupied sage-grouse leks. Within five miles there are 12 occupied, 12 undetermined, and 3 unoccupied sage-grouse leks (Map 9). Lek 2O-136 was not known to occur until 2005 and lek 2T-201 was not known to occur until 2007. Sage-grouse attendance at occupied leks within five miles of the allotment is shown in Table 35. Leks are considered occupied if there has been documented sage-grouse activity within the past five years.

**Table 35: Sage-grouse Attendance at Occupied Leks within Five Miles of the Signal Butte Allotment, 2000-2014**

Lek	Location	Survey Year <sup>1</sup>														
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14
2T-155	Canal Field Pasture	6	0	1	--	--	--	--	--*	0	0	--	2	0	--	0
2T-098	Canal Field Pasture	11	0	2	2	0	4	2	0*	2	8	6	13	15	19	19
2T-157	Signal Butte Pasture	18	16	8	--	15	13	14	10*	9	7	5	5	8	--	2
2T-133a	1.3 miles	--	--	--	--	--	--	--	--	--	--	--	--	18	16	28
2T-133	1.6 miles E	10	5	4	3	13	0	14	13	8	7	6	10	10	4	0
2O-136	2.1 miles SW						8	--	29*	26	12	15	15	--	--	--
2T-210	2.1 miles N															18
2O-111	2.2 miles W	20	--	--	8	8	7	19	--*	0	19	19	14	11	2	2
2T-201	2.3 miles S								30*	--	7	--	--	--	--	32
2T-168	4.2 miles NE	16	--	--	--	--	--	--	--	--	--	--	--	--	--	4
2T-170	4.8 miles NW	9	2	--	--	--	16	17	24*	16	6	4	0	0	0	0
2T-162	5.0 miles N	18	5	8	--	--	18	8	11*	12	14	5	8	3	10	6

<sup>1</sup>Where the table is blank the lek had not yet been identified; in years marked by dashes (--) the lek was not surveyed. An asterisk indicates area around lek burned in a wildfire that year (\*).

*Nesting and Early Brood Rearing Habitat*

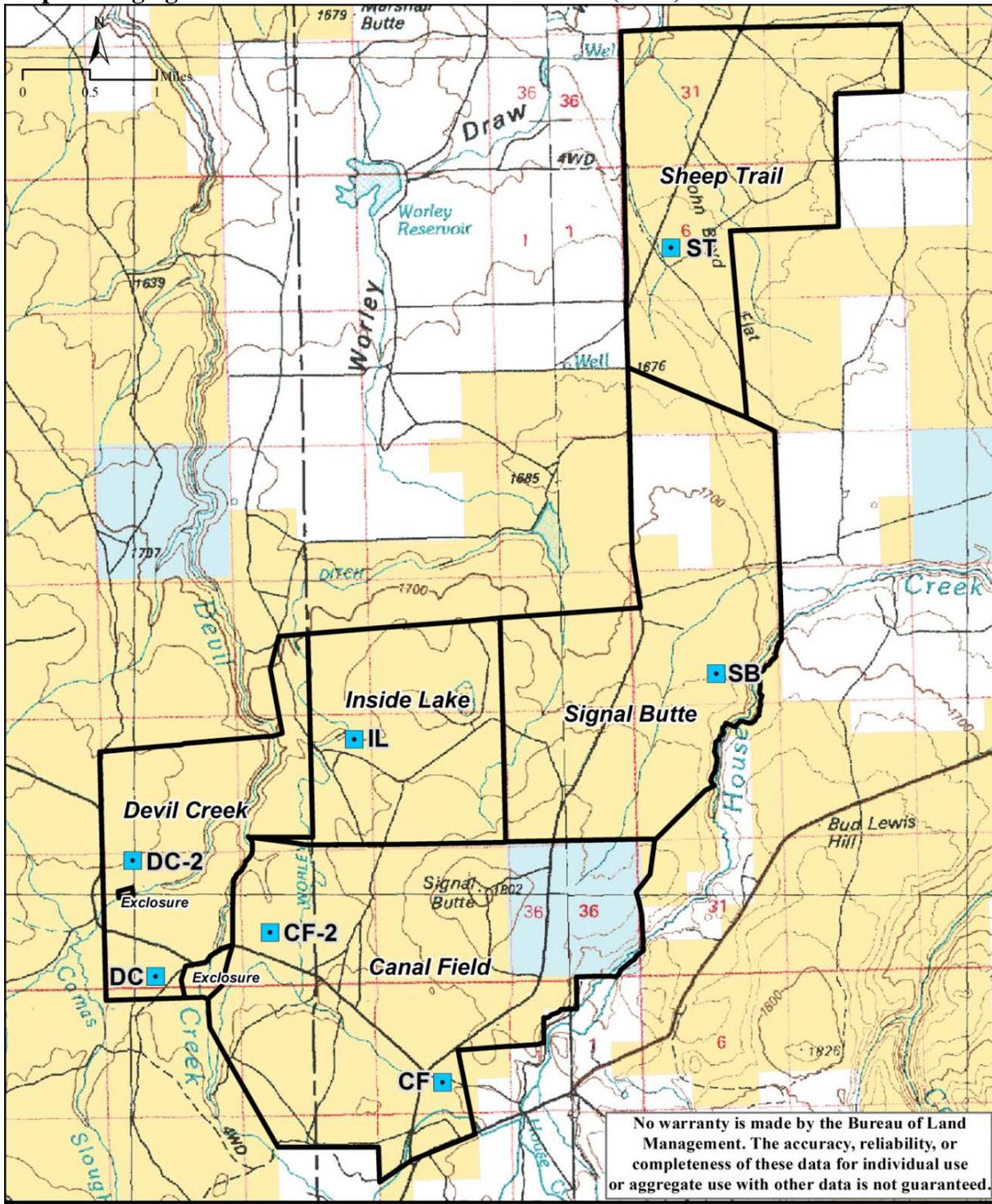
The current conditions of sage-grouse seasonal habitats were assessed following protocols outlined in the Sage-grouse Habitat Assessment Framework (Stiver et al., 2010). Sage-grouse habitat suitability assessments were conducted in 2010 at HAF site **DC**- Devil Creek Pasture and in 2012 at HAF sites **CF** and **CF\_2**- Canal Field Pasture, **DC\_2**- Devil Creek Pasture, **ST**- Sheep

Trail Pasture, and **SB**- Signal Butte Pasture. In 2013 an assessment was conducted at HAF site **IL**- Inside Lake Pasture. Locations of sage-grouse habitat assessment sites (HAF sites) are shown on Map 10.

DRAFT



**Map 10: Sage-grouse Habitat Assessment Framework (HAF) Sites**



No warranty is made by the Bureau of Land Management. The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.



Sage-grouse droppings were observed during the assessments at Devil Creek (site 2) and during the IIRH field visit to the Inside Lake Pasture; however, no sign was observed at the remaining sites. Sage-grouse habitat suitability assessments are not necessarily an indication of rangeland health; they are merely indicators of habitat suitability. However, vegetation, litter, bare ground and data collected as part of the habitat suitability assessments may be used to inform and interpret other rangeland health information and observations. Sage-grouse habitat suitability assessments are shown in Table 36.

**Table 36: Sage-grouse Habitat Assessment Worksheet for Nesting and Early Brood Rearing Habitat (Arid Site)**

Habitat Indicator	Suitable Habitat	Marginal Habitat	Unsuitable Habitat
	15 – 25%	10 - < 15% or > 25%	< 10%
Average Sagebrush Canopy Cover	CF (10% yellow rabbitbrush, 9% antelope bitterbrush, 7% sagebrush)		CF_2 (0%), DC (0%), DC_2 (0%), IL (4% sagebrush, 7% rabbitbrush), ST (0%), SB (0%)
	12 - 30"	10 -11" or >30"	< 10"
Average Sagebrush Height	CF (30"), IL (24")		CF_2 (0"), DC (0"), DC_2 (0"), ST (0"), SB (0")
	Spreading	Mix of spreading and columnar	Columnar
Sagebrush Growth Form	IL	CF	CF_2, DC, ST, SB
	≥ 7"	5 - < 7"	< 5"
Average Grass Height	CF_2 (8"), DC (14"), DC_2 (7"), IL (8"), SB (9")	CF (6.9"), ST (5.7")	
	≥ 10%	5 - < 10%	< 5%
Average Perennial Grass Canopy Cover	CF (44%), CF_2 (61%), DC (32%), DC_2 (53%), IL (36%), ST (46%), SB (58%)		
	≥ 5%	3 - < 5%	< 3%
Average Forb Canopy Cover	DC (10%), ST (8%)	SB (4%)	CF (2%), CF_2 (0%), DC_2 (2.5%), IL (1%)
	Forbs common with at least a few preferred species common	Forbs common, but only 1 or 2 preferred species present	Forbs rare to sparsely present
Preferred Forb Abundance and Diversity	CF, DC, IL, ST, SB	DC_2	CF_2
Overall Site Evaluation	CF		CF_2, DC, DC_2, IL, ST, SB
Pasture Evaluation			Canal Field, Devil Creek, Inside Lake, Sheep Trail, Signal Butte

Two HAF sites are located in the Canal Field Pasture. HAF site CF is in the southern portion of the pasture mapped as a Wyoming sagebrush/ Idaho fescue vegetation community (5% of pasture). This is the only area mapped as sagebrush in the entire allotment that did not burn in the Murphy Complex Fire of 2007. The other site, HAF site CF\_2 is mapped as a Sandberg bluegrass community which is the majority of the pasture. Attributes at HAF site CF were rated suitable for all habitat indicators except for sagebrush growth form and grass height (marginal) and average forb canopy cover (unsuitable). Although average forb canopy cover was unsuitable, the site was rated suitable for preferred forb abundance and diversity with 13 species of forbs

observed. The most common species included longleaf phlox and Hollyleaf clover (*Trifolium gymnocarpon*) both sage-grouse preferred forbs. Indicators at HAF site CF\_2 were all rated unsuitable except for grass height and cover (suitable). Forbs were rare to sparsely present at the site, with only 8 forb species observed. The Canal Field Pasture is unsuitable as habitat for sage-grouse since sagebrush is absent in the majority of the pasture.

Two HAF sites are located in the Devil Creek Pasture. Both HAF site DC and DC\_2 are mapped as a Sandberg bluegrass vegetation community which is the majority of the pasture. The pasture has burned and does not contain areas mapped as sagebrush. HAF site DC was rated unsuitable due to a lack of sagebrush; however, grass height and canopy cover, average forb canopy cover, and preferred forb abundance and diversity were all rated suitable. Twenty forb species were noted with the most common forbs being longleaf phlox, pale agoseris (*Agoseris glauca*), Hollyleaf clover, tall annual willowherb (*Epilobium brachycarpum*), and mourning milkvetch (*Astragalus atratus*) all sage-grouse preferred forbs. HAF site DC\_2 was also rated unsuitable due to a lack of sagebrush; however grass height and cover was rated suitable. Seven forb species were observed with longleaf phlox, shaggy fleabane (*Erigeron pumilus*), sagebrush phlox (*Phlox aculeata*), and lupine (*Lupinus* spp.) being the most common. Without sagebrush the Devil Creek Pasture is unsuitable for sage-grouse.

One HAF site is located in the Inside Lake Pasture. The entire pasture is mapped as a Sandberg bluegrass vegetation community. Shrub cover was rated unsuitable (4% sagebrush, 6% rabbitbrush). All other habitat indicators were rated suitable except for average forb canopy cover (unsuitable). Seven species of forbs were observed with the most common being longleaf phlox, sagebrush phlox, lambstongue ragwort (*Senecio integerrimus*), pale agoseris, and lupine. Without adequate sagebrush cover the Inside Lake Pasture is unsuitable for sage-grouse.

One HAF site is located in the Sheep Trail Pasture. HAF site ST is located in the central portion of the pasture mapped as a crested wheatgrass vegetation community. Sagebrush was not observed at the site. All other habitat indicators were rated suitable except for grass height (marginal). Eight species of forbs were observed with the most common being longleaf phlox, lupine, spiny phlox. The Sheep Trail Pasture is unsuitable for sage-grouse.

The Signal Butte Pasture contains one HAF site. HAF site SB is located in an area mapped as a bluebunch vegetation community. HAF site SB was rated unsuitable due to a lack of sagebrush; however, all other habitat indicators were rated suitable except for average forb canopy cover (marginal). Eleven species of forbs were observed with the most common being longleaf phlox, lupine, lava aster (*Ionactis alpina*), morning milkvetch, and spiny phlox. The Signal Butte Pasture is unsuitable for sage-grouse.

A list of plants species observed at each site, including preferred sage-grouse forbs is included in Appendix B.

The allotment has been reseeded to sagebrush and sagebrush seedlings were observed at low densities during the assessments at all sites except for the Sheep Trail Pasture. The low density and small size of sagebrush makes the allotment currently unsuitable for sage-grouse but sagebrush is increasing. Recovery of the sagebrush community needed for sage-grouse is

expected to take one (Wambolt and Payne, 1986) to several (Baker, 2006; Baker, 2011) decades assuming the absence of additional fire.

#### *Late Brood Rearing Habitat*

Without sagebrush cover the allotment is generally unsuitable as late brood rearing habitat. However, the allotment does contain areas that contain water later in the summer that are expected to have a higher abundance of preferred sage-grouse forbs. These areas include the southern portion of Devil Creek where the canyon is open and not very steep, the Worley Ditch, and the canal through the southern portion of the Canal Field Pasture. Wetland vegetation is associated with Devil Creek and Camas Slough drainages. A few artificial wetlands are associated with man-made ponds and canals. With the restoration of sagebrush adjacent to these areas they could become suitable as late brood rearing habitat for sage-grouse. Wet meadows outside the allotment on adjacent private land along House Creek provide late brood rearing habitat for sage-grouse in the area.

#### *Winter Habitat*

The general lack of sagebrush in the Devil Creek, Inside Lake, Sheep Trail, and Signal Butte Pastures makes these pastures unsuitable for wintering sage-grouse. The only area that contains sagebrush of sufficient size and density above the snow to provide habitat for wintering sage-grouse is in the southern portion of the Canal Field Pasture. This area of sagebrush is small (143 acres) and is the only area containing relatively tall sagebrush in the entire allotment. Therefore, the Canal Field Pasture is also unsuitable as winter habitat.

#### **Ferruginous Hawk (*Buteo regalis*; BLM sensitive species)**

Ferruginous hawks typically inhabit flat and rolling terrain in grasslands and shrub steppe regions (Bechard and Schmutz, 1995). They primarily nest in trees or less frequently on cliffs, rock outcrops or on the ground at the crest of ridges. Although ferruginous hawks exhibit flexibility in nest site selection, they prefer elevated nest sites and rarely nest on level ground (Bechard and Schmutz, 1995). Ferruginous hawks may have more than one nest site within their nesting territory that they may use in different years (Bechard and Schmutz, 1995). Locally, ferruginous hawks that nest on the ground are rarely successful. Both the male and female share in the nest selection, egg incubation and young rearing, though the male does most of the hunting. One clutch of 2-4 eggs is laid in spring and parents care for the young until several weeks after fledging (Bechard and Schmutz, 1995).

Ferruginous hawks prey primarily on mammals. Prey species include ground squirrel (*Urocitellus* spp.), black-tailed jackrabbit (*Lepus californicus*), mountain cottontail (*Sylvilagus nuttalli*), and gopher (*Thomomys talpoides*). Fledgling birds, reptiles and insects constitute a small percent of the diet (Bechard and Schmutz, 1995).

Management of shrub steppe and grassland habitats that provide healthy native shrub and bunchgrass communities and a natural range of habitat variation would be expected to provide suitable habitat for ferruginous hawks.

There are 3 ferruginous hawk nests in western junipers (*Juniperus occidentalis*) in the allotment (Table 37). At this time 1 active nest is present in the Signal Butte Pasture (F14). A second nest

is located in the pasture but it has not been surveyed since 2008 (F44). One nest is located in the Canal Field Pasture but the nest tree has been destroyed by wildfire and has not been used since 2007 (F04).

**Table 37: Ferruginous Hawk Nest Data**

Nest	Survey Year <sup>1</sup>																		
	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13
F04	2	--	--	--	--	2	2	2	--	--	--	A	Nest tree destroyed in 2007						
F14	3	--	--	--	--	2	1	2	--	--	--	I	I	I	I	2	1	I	2
F44							A	--	--	--	--	A	--	A	--	--	--	--	--

<sup>1</sup>Surveys were not conducted in years indicated by dashes (--). If the nest was active with young, the number of young was recorded, if the nest was inactive (I) or active (A) with no young that was also recorded.

At this time no nest trees are available for use by ferruginous hawks for nesting in the Sheep Trail Pasture. A few trees are available in the Signal Butte Pasture (2 junipers in the uplands currently being used, and numerous junipers along a 1.0 mile stretch of House Creek). Numerous junipers also occur in the Devil Creek Pasture along Devil Creek and in the Canal Field along House Creek. The Inside Lake Pasture contains approximately 10 junipers mostly along the western border of the pasture. Large areas in all pastures of the allotment are dominated by perennial grasslands which provide marginal habitat for mammalian prey (black-tailed jackrabbit, mountain cottontail, ground squirrels, etc.) favored by ferruginous hawks.

**Brewer’s Sparrow (*Spizella breweri*; BLM sensitive species)**

Brewer’s sparrows are typically associated with sagebrush steppe. Brewer’s sparrows nest primarily in shrubs, but occasionally on the ground. The nest shrub is typically taller and denser than in the surrounding habitat (Rotenberry et al., 1999). Shrubs used for nesting by Brewer’s sparrows include primarily big sagebrush (81%), with spiny hopsage (*Grayia spinosa*) (10%), antelope bitterbrush (6%), and rabbitbrush (*Chrysothamnus viscidiflorus*) (3%) (Rotenberry et al., 1999). Brewer’s sparrows construct their nest in the canopy of sagebrush which averaged 27 inches tall (Rotenberry et al., 1999). In Idaho, Brewer’s sparrow nests ranged from 7.8 to 19.6 inches above the ground, averaged 9 inches from the top of the sagebrush and averaged 7 inches from the edge of the shrub canopy (Rotenberry et al., 1999). These sparrows feed on small insects and seeds (Rotenberry et al., 1999).

Brewer’s sparrows were historically present in the allotment prior to the Murphy Complex Fire of 2007. While the allotment has been reseeded to sagebrush, sagebrush has not attained suitable height or density for nesting. The only area suitable for nesting occurs in the area of sagebrush in the southern portion of the Canal Field Pasture (5% of pasture).

**Loggerhead shrike (*Lanius ludovicianus*; BLM sensitive species)**

Loggerhead shrikes are associated with open grasslands and shrub steppe habitats. In southern Idaho, loggerhead shrikes nest in big sagebrush, antelope bitterbrush and greasewood (Woods and Cade, 1996). Nest shrubs ranged from 35 to 117 inches tall (Woods and Cade, 1996). The average height of the nest was 31 inches and ranged from 13 to 63 inches above ground (Woods and Cade, 1996). Although big sagebrush was shorter than greasewood or bitterbrush nest height was similar for all shrubs (Woods and Cade, 1996). In the Jarbidge Field Office a few loggerhead shrike nests have been found in western juniper (*Juniperus occidentalis*).

Loggerhead shrikes feed on arthropods, amphibians, reptiles, small mammals and birds (Yosef, 1996). They use thorny bushes or barbed wire fences to impale their prey to facilitate feeding and to store future meals.

Management of shrub steppe habitat that provides healthy native shrub and bunchgrass communities and a natural range of habitat variation would be expected to provide suitable habitat for loggerhead shrikes.

All but the southern portion of the Canal Pasture is generally unsuitable for loggerhead shrike nesting. At this time the allotment is dominated by perennial grasslands with limited shrubs of sufficient height for nesting. Scattered junipers in the allotment may provide limited nesting habitat where they occur.

**Sagebrush sparrow (*Artemisioispiza nevadensis*; BLM sensitive species)**

Sagebrush sparrows are sagebrush obligates that are typically common in shrubsteppe habitats (Martin and Carlson, 1998). Sagebrush sparrows nest in shrubs, in bunchgrasses or occasionally on the ground at the base of a shrub (Martin and Carlson, 1998). The nest shrub is usually taller than the surrounding vegetation (Martin and Carlson, 1998). In Idaho sagebrush sparrows nest in big sagebrush, however, in Oregon they may also use antelope bitterbrush, rabbitbrush, greasewood (*Sarcobatus vermiculatus*) and bunchgrasses (Martin and Carlson, 1998). In general sagebrush sparrow nests are placed closer to the main stem than the edge of the shrub. In shrubs the nest can range from 9 to 11 inches above the ground. Sagebrush sparrows feed on seeds, insects, spiders, fruits, and succulent vegetation (Martin and Carlson, 1998).

Sagebrush sparrows were historically present in the allotment prior to the Murphy Complex Fire of 2007. While the allotment has been reseeded to sagebrush, sagebrush has not attained suitable height or density for nesting. The only area suitable for nesting occurs in the area of sagebrush in the southern portion of the Canal Field Pasture (5% of pasture).

**Pygmy rabbit (*Brachylagus idahoensis*; BLM sensitive species)**

Pygmy rabbits are sagebrush obligates that are usually found in areas with tall dense stands of big sagebrush and deep soils (Green and Flinders, 1980; Heady and Landré, 2005). Pygmy rabbits usually excavate burrow systems with multiple entrances. Burrow entrances are often at the base of sagebrush (Green and Flinders, 1980). Pygmy rabbits spend most of their time (68%) in a generally small area (less than 200 feet radius [3 acres]) from the burrow within a larger (90 acres to 170 acres) home range. The primary food of pygmy rabbits is sagebrush which comprises 99% of its winter diet (Green and Flinders, 1980). Grasses and forbs make up more of the diet in the late spring into early summer.

Prior to the Murphy Complex Fire of 2007, pygmy rabbit were documented in the Canal Field, Devil Creek, and Inside Lake Pastures. In 2008 and 2009, field checks were made in the Canal Pasture where pygmy rabbits had been historically observed. No new burrows or scat were noted to indicate they continue to persist in the area that burned. While the southern portion of the Canal Field Pasture still contains shrub cover (143 acres), the area does not appear to contain

shrub cover of sufficient height or density to support pygmy rabbits. Overall, the allotment is predominately perennial grassland making it unsuitable for pygmy rabbits.

**Piute ground squirrel (*Urocitellus mollis*; BLM sensitive species)**

Piute ground squirrels are associated with shrub steppe habitats in southwestern Idaho. They emerge from hibernation in late February into March depending on the year and begin hibernation by late June (Yensen and Sherman, 2003). The diet of Piute ground squirrels is dominated by herbaceous vegetation including grasses and forbs, seeds, and animal matter (Rickart, 1987; Yensen and Sherman, 2003). Piute ground squirrels excavate deep and shallow burrow systems (Reynolds and Wakkinen, 1987).

Piute ground squirrels are an important prey item to many predators in shrub steppe habitats including other sensitive species like ferruginous hawks and prairie falcons. Management of shrub steppe habitat that provides healthy native shrub and bunchgrass communities and a natural range of habitat variation would be expected to provide suitable habitat for Piute ground squirrels.

Although Piute ground squirrels have been observed in the allotment, the BLM does not have distribution data on ground squirrels within the allotment. Wildfire has converted shrub-steppe habitats in the allotment to perennial grasslands. Because shrub habitats provide more favorable environments for ground squirrels than grass habitats (Yensen et al., 1992; Van Horne et al. 1997) the allotment was rated marginal for Piute ground squirrels.

**Spotted bat (*Euderma maculatum*; BLM sensitive species)**

Spotted bats are typically found in arid portions of the western United States where it forages primarily on moths (Adams, 2003). It roosts in rock crevices in tall cliffs. Little is known about the behavior and population size of spotted bats.

Roosting habitat for spotted bats is present in the canyon cliffs along Devil Creek in the Devil Creek Pasture and along House Creek in the Signal Butte Pasture. No cliff habitat is present in the Canal Field, Inside Lake, or Sheep Trail Pastures. Scattered junipers and aspen along portions of Devil Creek offer some habitat structure not found in some adjoining allotments. Spotted bats may forage over the allotment and drink and forage along riparian areas associated with Devil and House Creeks. The Conservation Data Center database contains 2 reports of spotted bats in the allotment. One observation occurred in 1998 by a livestock pond in the Canal Field Pasture. The other observation occurred in 1998 along Devil Creek in the Devil Creek Pasture.

**Additional information**

The Devil Creek Pasture contains 2 wildlife exclosures. One exclosure is 3.5 acres in size and is located about 0.3 miles downstream of Camas Slough. The exclosure is undersized to protect the wet meadow area and bisects the pond making it a collision hazard for waterfowl and shorebirds. Water in the pond varies annually, but the pond often has water into June. The other exclosure is 56 acres in size and is located in the southeast corner of the pasture along Devil Creek.

**Evaluation for Standard 8:**

There are no known BLM sensitive or federally listed plants within the Signal Butte Allotment. Approximately 1,328 acres have been surveyed for slickspot peppergrass. However, systematic inventories for other special status plants have not been conducted in the allotment. GIS modeling predicts that the allotment contains 1,486 acres of high potential and 107 acres of medium potential habitat for slickspot peppergrass. The nearest known occupied habitat for slickspot peppergrass is 12 miles to the west, on the west side of Clover Creek.

Redband trout, a BLM sensitive species are present in House Creek which is located along the east side of the Canal Field and Signal Butte Pastures. In the Canal Field Pasture, House Creek is located on private land. In the Signal Butte Pasture, approximately 1.0 mile of House Creek is present on BLM land. Redband trout do not occur in any other stream within the allotment.

House Creek within the allotment is listed by IDEQ as not supporting the beneficial use of cold-water aquatic life due to water temperature and sediment/siltation. During the summer when water temperature in House Creek exceed Idaho water temperature criteria for cold-water aquatic life, House Creek within the allotment is marginally suitable for redband trout. Additionally, the IDEQ listing for sedimentation/siltation indicates suitable spawning habitat may not be available within House Creek within the allotment. Excessive amounts of sediment can reduce recruitment and spawning success. Adult and juvenile redband trout life history requirements are likely met during from fall to early summer when water temperatures are cooler.

Other habitat needs of redband trout are likely met within the allotment. PFC assessments along House Creek within the allotment indicate the stream channel and riparian area are at PFC or are making progress towards being at PFC. Stream attributes (width/depth ratio, number of pools) are appropriate for the landscape, and riparian vegetation is shading the stream. Other than the sedimentation/siltation and water temperature issues, habitat within the allotment appears to be suitable for redband trout.

Habitat for BLM sensitive wildlife species occurs within the allotment. Overall habitat ratings for each species by pasture are shown in Table 38.

**Table 38: Overall Habitat Suitability for BLM Sensitive Wildlife Species by Pasture**

Species Name and Type of Habitat	Canal Field	Devil Creek	Inside Lake	Sheep Trail	Signal Butte
Sage-grouse (nesting & early brood rearing)	U	U	U	U	U
(late brood rearing)	U	U	U	U	U
(winter)	U	U	U	U	U
Ferruginous hawk (nesting)	S	S	S	U	S
(foraging)	M	M	M	M	M
Brewer’s sparrow (nesting)	U	U	U	U	U
Sagebrush sparrow (nesting)	U	U	U	U	U
Loggerhead shrike (nesting)	U	U	U	U	U
Pygmy rabbit (year round)	U	U	U	U	U
Piute ground squirrel (year round)	M	M	M	M	M
Spotted bat (roosting)	U	S	U	U	S
(foraging)	S	S	S	S	S

S = Suitable (combination of components make the habitat suitable), M = Marginal (some habitat components are missing), U = Unsuitable (one or more critical habitat components are missing).

The 2007 Murphy Complex Fire essentially eliminated all sagebrush in the allotment making it unsuitable for sage-grouse. Without sagebrush the area does not provide nesting, late brood rearing, or wintering habitat for sage-grouse. Despite this, the allotment has high restoration potential. Assessments documented suitable grass height in all pastures, except for the Canal Field (site 1) and Sheep Trail Pastures which had grass heights of 6.9 and 5.7 inches, respectively. These grass heights are slightly less than the  $\geq 7$  inch recommendation. The Canal Field, Devil Creek, Inside Lake, Sheep Trail, and Signal Butte Pastures were rated suitable for preferred forb abundance and diversity while the Devil Creek (site 2) was rated marginal and the Canal Field (site 2) was rated unsuitable. For all sites surveyed, cheatgrass, an exotic invasive annual, occurred at low density ranging from 0-2% cover (all layers).

More than an adequate number of potential nest trees are present for ferruginous hawk nesting in all pastures, except the Sheep Trail Pastures. All pastures are dominated by perennial grasslands which provide marginal habitat for prey species such as mountain cottontail, black-tailed jackrabbit and ground squirrels usually hunted by ferruginous hawk.

The majority of the allotment is perennial grassland. Sagebrush is re-establishing where sagebrush has been reseeded but has not attained suitable density or height to provide nesting habitat for Brewer's sparrow, sage sparrow, or loggerhead shrike.

Pygmy rabbit habitat was rated as unsuitable in all pastures. Grassland areas lack both shrub cover and height to support pygmy rabbit burrow areas. Although sagebrush has been reseeded following the Murphy Complex Fire of 2007, restoration of shrubs of sufficient density and height to support pygmy rabbits will take multiple decades.

All pastures contain perennial grasslands that provide marginal habitat for Piute ground squirrels.

Spotted bat roosting habitat was rated suitable in the Devil Creek and Signal Butte Pastures due to cliffs being present. The Canal Field, Inside Lake, and Sheep Trail Pastures were rated unsuitable because they lack cliffs for roosting. The allotment was rated suitable for spotted bat foraging due to its proximity to roosting habitat and the presence of grassland and riparian habitats that support insects eaten by spotted bats. Devil Creek, House Creek, and numerous ponds in the uplands provide water sources for spotted bats.

***Evaluation Finding – Allotment/watershed is:***

- Meeting the Standard
- Not meeting the Standard, but making significant progress towards meeting
- Not meeting the Standard

### ***Rationale for Evaluation Finding***

The 2007 Murphy Complex Fire eliminated the majority of sagebrush in the Canal Field, Devil Creek, Inside Lake, Sheep Trail, and Signal Butte Pastures making them unsuitable for sage-grouse and other sagebrush dependent species. The only area mapped as sagebrush in the allotment is located in the southern portion of the Canal Field Pasture (143 acres).

The allotment has been reseeded to sagebrush and sagebrush seedlings were observed at low densities during the assessments at all sites except for the Sheep Trail Pasture. The low density and small size of sagebrush makes the allotment currently unsuitable for sage-grouse but sagebrush is increasing. Recovery of the sagebrush community needed for sage-grouse is expected to take one (Wambolt and Payne, 1986) to several (Baker, 2006; Baker, 2011) decades assuming the absence of additional fire. Therefore, pastures in the Signal Butte Allotment are not meeting Standard 8.

While pastures in the allotment are not meeting Standard 8, pastures have a high potential for restoration. Assessments documented suitable grass height in all pastures, except for the Canal Field (site 1) and Sheep Trail Pastures (both marginal). The Canal Field, Devil Creek, Inside Lake, Sheep Trail, and Signal Butte Pastures were rated suitable for sage-grouse preferred forb abundance and diversity while the Devil Creek (site 2) was rated marginal and the Canal Field (site 2) was rated unsuitable. For all sites surveyed, cheatgrass, an exotic invasive annual, occurred at low density ranging from 0-2% cover (all layers).

## LITERATURE CITED

- Adams, R. A. (2003). Bats of the Rocky Mountain West. Bolder, CO: University Press of Colorado.
- Archer, A. J. (2000) *Achnatherum thurberianum*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/plants/graminoid/achthu/all.html>
- Autenrieth, R. E. (1981). Sage Grouse Management in Idaho. Wildlife Bulletin 9, Boise, ID: Idaho Department of Fish and Game.
- Baker, W. L. (2006). Fire and Restoration of Sagebrush Ecosystems. Wildlife Society Bulletin, 34(1), 177-185.
- Baker, W. L. (2011). Chapter 11: Pre–Euro-American and Recent Fire in Sagebrush Ecosystems. pp. 185-203. In S. T. Knick and J. W. Connelly (Eds.), Greater Sage-Grouse: Ecology and Conservation of a Landscape Species and Its Habitats (pp. 185-203). Studies in Avian Biology Series (Vol. 38), Berkeley, CA: University of California Press.
- Bechard, M. J., and J. K. Schmutz. (1995). Ferruginous Hawk (*Buteo regalis*), No. 172. In A. Poole (Ed.), The Birds of North America Online. Ithaca, NY: Cornell Laboratory of Ornithology, Retrieved in March, 2014 from: <http://bna.birds.cornell.edu/bna/species/172>.
- BLM. (1987). Jarbidge Resource Management Plan. Boise, ID: USDI, Bureau of Land Management.
- BLM. (1990). Livestock Management Plan- Guerry, Inc. Twin Falls, ID: USDI, Bureau of Land Management.
- BLM. (1996). Sampling Vegetation Attributes. Interagency Technical Reference 1734-4.
- BLM. (1998). A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas. BLM Technical Reference 1737-15.
- BLM. (2012). Slickspot Peppergrass Occurrence Potential Model (GIS). Twin Falls, ID: USDI, Bureau of Land Management, Jarbidge Field Office.
- Brewer, T. K., J. C. Mosley, D. E. Lucas, and L. R. Schmidt. (2007). Bluebunch Wheatgrass Response to Spring Defoliation on Foothill Rangeland. Rangeland Ecology and Management 60:498–507.
- Coates, P. S. (2007). Greater Sage-grouse (*Centrocercus urophasianus*) Nest Predation and Incubation Behavior. Ph.D. dissertation, Idaho State University, Pocatello, ID.

- Connelly, J. W., M. A. Schroeder, A. R. Sands, and C. E. Braun. (2000). Guidelines to Manage Sage Grouse Populations and their Habitats. *Wildlife Society Bulletin* 28(4): 967–985.
- Conover, M. R., J. S. Borgo, R. E. Dritz, J. B. Dinkins, and D. K. Dahlgren. (2010). Greater Sage-grouse Select Nest Sites to Avoid Visual Predators but not Olfactory Predators. *Condor* 112:331–336.
- Daubenmire, R. F. (1940). Plant Succession Due to Overgrazing in the Agropyron Bunchgrass Prairie of Southeastern Washington. *Ecology* 21:55–64.
- Green, J. S., and Flinders, J. T. (1980). *Brachylagus idahoensis*, No. 125. Washington, DC: American Society of Mammalogists.
- Heady, L. T., and J. W. Laundré. (2005). Habitat Use Patterns Within the Home Range of Pygmy Rabbits (*Brachylagus idahoensis*) in Southeastern Idaho. *Western North American Naturalist* 65(4):490–500.
- Hilty, J. H., D. J. Eldridge, R. Rosentretter, M. C. Wicklow-Howard and M. Pellant. 2004. Recovery of biological soil crusts following wildfire in Idaho. *Rangeland Ecology and Management* 57(1):89-96.
- Holloran, M. J., B. J. Heath, A. G. Lyon, S. J. Slater, J. L. Kuipers, and S. H. Anderson. (2005). Greater Sage-grouse Nesting Habitat Selection and Success in Wyoming. *Journal of Wildlife Management* 69:638–649.
- Howard, J. L. (1999). *Artemisia tridentate* subsp. *Wyomingensis*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/plants/shrub/arttriw/all.html>
- IDEQ. (2008). Salmon Falls Creek Sub-basin Assessment and Total Maximum Daily Loads. Twin Falls, Idaho: Idaho Department of Environmental Quality.
- IDEQ. (2014). Idaho Department of Environmental Quality Final 2010 Integrated Report. Boise, ID: Idaho Department of Environmental Quality.
- Klott, James. (2016). HAF Data Review.
- Knick, S. T., and J. W. Connelly. (2011). Greater Sage-grouse and Sagebrush: an Introduction to the Landscape. In S. T. Knick and J.W. Connelly (Eds.), *Greater Sage-grouse Ecology and Conservation of a Landscape Species and Its Habitats* (pp. 1-9). Berkeley, CA: University of California Press.
- Martin, J. W., and B. A. Carlson. (1998). Sage Sparrow (*Artemisiospiza belli*), No 326. In A. Poole (Ed.), *The Birds of North America Online*. Ithaca, NY: Cornell Laboratory of Ornithology, Retrieved in March, 2014 from: <http://bna.birds.cornell.edu/bna/species/326>.

- Moseley, R.K. (1994). Report on the Conservation Status of *Lepidium Papilliferum*. Boise, ID: Idaho Conservation Data Center and Idaho Department of Fish and Game.
- NRCS. (2012). Soil Survey Geographic (SSURGO) Database for Elmore, Owyhee, and Twin Falls Counties, Idaho. Boise, ID: USDA, Natural Resources Conservation Service, Soil Survey Staff, Retrieved in August, 2012 from: <http://sdmdataaccess.nrcs.usda.gov/>.
- Pellant, M., P. Shaver, D. A. Pyke, and J. E. Herrick. (2005). Interpreting Indicators of Rangeland Health, Version 4. Technical Reference 1734-6.
- Reynolds, T. D., and W. L. Wakkinen. (1987). Characteristics of the Burrows of Four Species of Rodents in Undisturbed Soils in Southeastern Idaho. *American Midland Naturalist* 118 (2): 245–250.
- Rickart, E. A. (1987). *Spermophilus townsendii*, No. 268. Washington, DC: American Society of Mammalogists.
- Rotenberry, J. T., M. A. Patten, and K. L. Preston. (1999). Brewer's Sparrow (*Spizella breweri*), No. 390. In A. Poole (Ed.), *The Birds of North America Online*. Ithaca, NY: Cornell Laboratory of Ornithology, Retrieved in March, 2014 from: <http://bna.birds.cornell.edu/bna/species/390>.
- Rowland, M. M., M. J. Wisdom, L. H. Suring, and C. W. Meinke. (2006). Greater Sage-grouse as an Umbrella Species for Sagebrush-associated Vertebrates. *Biological Conservation* 129: 323–335.
- Steinberg, P. D. (2002). *Artemisia arbuscula*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/plants/shrub/artarb/all.html>
- Stiver, S. J., E. T. Rinkes, and D. E. Naugle. (2010). Sage-grouse Habitat Assessment Framework. Boise, ID: USDI, Bureau of Land Management, Idaho State Office.
- Tirmenstein, D. (1999a). *Pascopyrum smithii*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/plants/graminoid/passmi/all.html>
- Tirmenstein, D. (1999b). *Chrysothamnus viscidiflorus*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/plants/shrub/chrvis/all.html>

- USDA and NRCS. (2013a). Draft Ecological Site Description R025XY019ID. Boise, ID: State Office.
- USDA and NRCS. (2013b). The PLANTS Database. Retrieved December 14, 2013, from <http://plants.usda.gov>.
- U.S. Geological Survey. 2014. National Hydrography Data for the United States. <http://nhd.usgs.gov/index.html>.
- Utilization Studies and Residual Measurements. (1999). Interagency Technical Reference 1734-3.
- Van Horne, B., G. S. Olson, R. L. Schooley, J. G. Corn, and K. P. Burnham. (1997). Effects of Drought and Prolonged Winter on Townsend's Ground Squirrel Demography in Shrub steppe Habitats. *Ecological Monographs* 67:295–315.
- Wambolt, C. L., and G. F. Payne. (1986). An 18-Year Compromise of Control Methods for Wyoming Big Sagebrush in Southwestern Montana. *Journal of Range Management*, 39(4), 314-319.
- Wisdom, M. J., R. S. Holthausen, B. C. Wales, C. D. Hargis, V. A. Saab, D. C. Lee, et al. (2000). Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-Scale Trends and Management Implications, Volume 2: Group Level Results (General Technical Report No. PNW-GTR-485). Portland, OR: USDA, Forest Service, Pacific Northwest Research Station.
- Woods, C. P., and T. J. Cade. (1996). Nesting Habits of the Loggerhead Shrike in Sagebrush. *Condor* 98 (1):75–81.
- Yensen, E., D. L. Quinney, K. Johnson, K. Timmerman, and K. Steenhof. (1992). Fire, Vegetation Changes, and Population Fluctuations of Townsend's Ground Squirrels. *American Midland Naturalist* 128:299–312.
- Yensen, E., and P. W. Sherman. (2003). Ground Dwelling Squirrels of the Pacific Northwest. Boise, ID and Portland, OR: US Fish and Wildlife Service and USDI, Bureau of Land Management.
- Yosef, R. (1996). Loggerhead Shrike (*Lanius ludovicianus*), No. 231. In A. Poole (Ed.), *The Birds of North America Online*. Ithaca, NY: Cornell Laboratory of Ornithology, Retrieved in March, 2014 from: <http://bna.birds.cornell.edu/bna/species/231>.
- Zlatnick, E. (1999). *Pseudoroegneria spicata*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/plants/graminoid/psespi/all.html>

Zouhar, K. L. (2000). *Festuca idahoensis* In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available:  
<http://www.fs.fed.us/database/feis/plants/graminoid/fesida/all.html>

DRAFT

## **APPENDIX A: PROCESS FOR GENERATING SAGE-GROUSE HABITAT ASSESSMENT FRAMEWORK SAMPLE SITES**

Sage-grouse Habitat Assessment Framework sites were randomly generated in the following manner. In GIS the vegetation layer was broken into the following habitat categories: shrublands, native perennial grass, non-native perennial grass, and annual grassland. The pasture layer was then incorporated and six random points were generated for each habitat category in the pasture.

Using National Agriculture Imagery Program imagery, any points that fell in non-habitat (maintained roads, ponds, gravel pits, cliffs) were removed. To ensure sampling transects did not cross allotment or pasture boundaries, randomly selected points within 100 meters of fences were removed. Random points were also evaluated for ease of access and to maximize sampling efficiency; random points that were more than one mile from a road, jeep trail, or fence were generally dropped. In cases where the amount of BLM land in a pasture was small and state or private land dominated the pasture, the pasture was generally dropped from sampling. Also if the habitat category was minimally present such as 30 acres of annual grassland out of a 1,200 acres pasture, no sampling would be done in the annual area. For shrublands to be evaluated they had to be at least 20 acres in size to accommodate sampling transects.

Ultimately, only two random sites in each habitat category were retained. Two points were retained to provide an alternate sampling site if the first point was not in the appropriate habitat category due to mapping errors. If both points were not in the appropriate habitat category, field crews were instructed to travel to the nearest appropriate habitat in the pasture, select a random bearing leading into the habitat category and pace a randomly selected distance prior to sampling.

Due to limited field crew and time when forbs are easily discernable, the following was the priority order for sampling: (1) shrubland habitats; (2) perennial native grassland, (3) non-native perennial grass; and (4) annual grass communities. When randomly generated points in shrubland habitats were in the same general area as randomly generated points in grassland habitats, field crews would often sample both sites on the same day regardless of their priority order. This was to increase sampling efficiency by reducing the amount of time spent traveling between points.

**APPENDIX B: SPECIES LIST ACCUMULATED DURING UPLAND ASSESSMENTS**

Scientific Name	Common Name	Species Type	Site(s) Where Species Occurred
<b>Perennial Grasses</b>			
<i>Achnatherum thurberianum</i>	Thurber's needlegrass	Native	CF_1, ST
<i>Agropyron cristatum</i>	Crested wheatgrass	Exotic, Seeded	CF_1, CF_2, IL, ST, SB
<i>Elymus elymoides</i>	Bottlebrush squirreltail	Native	CF_2, DC, IL, ST, SB
<i>Elymus lanceolatus</i>	Thickspike wheatgrass	Native	DC
<i>Festuca idahoensis</i>	Idaho fescue	Native	CF_1, CF_2, DC, IL, SB
<i>Leymus cinereus</i>	Basin wildrye	Native	CF_2, IL, SB
<i>Pascopyrum smithii</i>	Western wheatgrass	Native	CF_1, CF_2, DC, ST
<i>Poa secunda</i>	Sandberg bluegrass	Native	CF_1, CF_2, DC, IL, ST, SB
<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass	Native, Seeded	CF_2, DC, IL, ST, SB
<i>Thinopyrum intermedium</i>	Intermediate wheatgrass	Exotic, Seeded	CF_2, ST
<b>Annual Grasses</b>			
<i>Bromus arvensis</i>	Field brome	Exotic	CF_2
<i>Bromus tectorum</i>	Cheatgrass	Exotic, Invasive	CF_1, CF_2, DC, IL, ST, SB
<i>Vulpia octoflora</i>	Sixweeks fescue	Native	CF_2, DC, IL
<b>Perennial Forbs</b>			
<i>Achillea millefolium</i>	Western yarrow	Native, Sage-grouse Preferred	CF_2, IL
<i>Allium acuminatum</i>	Tapertip onion	Native	CF_1, IL, SB
<i>Allium nevadense</i>	Nevada onion	Native	CF_2
<i>Amsinckia menziesii</i>	Menzies' fiddleneck	Native	CF_2
<i>Arabis</i> spp.	Rockcress	Native	DC
<i>Asclepias speciosa</i>	Showy milkweed	Native	IL
<i>Astragalus</i> spp.	Milkvetch	Native	IL
<i>Astragalus atratus</i>	Mourning milkvetch	Native	CF_2, DC, IL, SB
<i>Astragalus lentiginosus</i>	Feckled milkvetch	Native	CF_1, CF_2, SB
<i>Castilleja angustifolia</i>	Northwestern Indian paintbrush	Native	IL
<i>Crepis</i> spp.	Hawksbeard	Native, Sage-grouse Preferred	ST
<i>Crepis acuminata</i>	Tapertip hawksbeard	Native, Sage-grouse Preferred	SB
<i>Erigeron pumilus</i>	Shaggy fleabane	Native, Sage-grouse Preferred	CF_1, CF_2, DC, SB
<i>Erigeron speciosus</i>	Aspen fleabane	Native, Sage-grouse Preferred	CF_2, IL
<i>Ionactis alpina</i>	Lava aster	Native, Sage-grouse Preferred	CF_2, DC, IL, ST, SB
<i>Iva axillaris</i>	Povertyweed	Native	CF_2
<i>Linanthus pungens</i>	Granite prickly phlox	Native	CF_1
<i>Lomatium cous</i>	Cous biscuitroot	Native, Sage-grouse Preferred	SB
<i>Lomatium foeniculaceum</i>	Desert biscuitroot	Native, Sage-grouse Preferred	CF_1
<i>Lupinus</i> spp.	Lupine	Native	CF_1, CF_2, DC, IL, ST, SB
<i>Mertensia oblongifolia</i>	Oblongleaf bluebells	Native	CF_1
<i>Medicago sativa</i>	Alfalfa	Exotic, Sage-grouse Preferred	CF_1

Scientific Name	Common Name	Species Type	Site(s) Where Species Occurred
<i>Onobrychis viciifolia</i>	Sainfoin	Exotic, Sage-grouse Preferred	DC, IL
<i>Opuntia polyacantha</i>	Plains pricklypear	Native	SB
<i>Orobanche corymbosa</i>	Flat-top broomrape	Native	IL
<i>Penstemon</i> spp.	Penstemon	Native	IL
<i>Phlox aculeata</i>	Sagebrush phlox	Native, Sage-grouse Preferred	DC, IL, ST, SB
<i>Phlox hoodii</i>	Spiny phlox	Native, Sage-grouse Preferred	CF_2, ST, SB
<i>Phlox longifolia</i>	Longleaf phlox	Native, Sage-grouse Preferred	CF_1, CF_2, DC, IL, ST, SB
<i>Senecio integerrimus</i>	Lambstongue ragwort	Native	CF_1, CF_2, IL
<i>Tragopogon dubius</i>	Yellow salsify	Exotic, Sage-grouse Preferred	CF_2, DC, IL, ST
<i>Trifolium gymnocarpon</i>	Hollyleaf clover	Native	CF_1, CF_2, DC,
<i>Zigadenus venenosus</i>	Meadow deathcamas	Native	CF_2, DC, IL, SB
<b>Annual Forbs</b>			
<i>Agoseris glauca</i>	Pale agoseris	Native, Sage-grouse Preferred	DC, IL, ST, SB
<i>Alyssum desertorum</i>	Desert madwort	Exotic	IL, ST, SB
<i>Cerastium nutans</i>	Nodding chickweed	Native	CF_2, DC, SB
<i>Ceratocephala testiculata</i>	Curveseed butterwort	Exotic	CF_1, CF_2, DC, IL, SB
<i>Collinsia parviflora</i>	Maiden blue eyed Mary	Native	CF_1, CF_2, DC, IL, SB
<i>Descurainia pinnata</i>	Western tansymustard	Native	IL
<i>Draba verna</i>	Spring draba	Exotic	CF_1
<i>Epilobium brachycarpum</i>	Tall annual willowherb	Native, Sage-grouse Preferred	CF_1, CF_2, DC, IL, ST, SB
<i>Gayophytum</i> spp.	Groundsmoke	Native, Sage-grouse Preferred	CF_2, DC, IL
<i>Lactuca serriola</i>	Prickly lettuce	Exotic, Sage-grouse Preferred	CF_1, CF_2, DC, IL
<i>Lepidium perfoliatum</i>	Clasping pepperweed	Exotic	SB
<i>Microsteris gracilis</i>	Slender phlox	Native, Sage-grouse Preferred	CF_1, CF_2, SB
<i>Myosotis stricta</i>	Strict forget-me-not	Exotic	CF_1
<i>Polygonum aviculare</i>	Prostrate knotweed	Exotic	CF_2
<i>Polygonum douglasii</i>	Douglas' knotweed	Native	CF_2
<i>Sisymbrium altissimum</i>	Tall tumbled mustard	Exotic	CF_2, IL, SB
<b>Noxious Weeds</b>			
<i>Onopordum acanthium</i>	Scotch cottonthistle	Exotic, Invasive	CF_2, IL
<b>Shrubs</b>			
<i>Artemisia arbuscula</i>	Little sagebrush	Native	CF_1
<i>Artemisia nova</i>	Black sagebrush	Native	CF_1
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming big sagebrush	Native	CF_1, CF_2, DC, IL, SB
<i>Chrysothamnus viscidiflorus</i>	Yellow rabbitbrush	Native	CF_1, CF_2, DC, IL, ST, SB
<i>Ericameria nauseosa</i>	Rubber rabbitbrush	Native	CF_1, IL, ST
<i>Purshia tridentata</i>	Antelope bitterbrush	Native	CF_1

This list does not include all plants that can be found in the Signal Butte Allotment and is not exhaustive. Scientific and common names were derived from the USDA NRCS Plant Database (USDA and NRCS, 2013b).