

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

RANGELAND HEALTH ASSESSMENT AND EVALUATION REPORT

PIGTAIL BUTTE ALLOTMENT #01125

February 2, 2016

U.S. Department of the Interior
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ALLOTMENT INFORMATION

Field Office: Jarbidge Field Office (JFO)

Name of Permittee: JRS Properties III L.P. (Cedar Creek Cattle Co.)
Guerry, Inc.

Allotment Name/Number: Pigtail Butte (01125)

Date of Field Assessment: June, 2013 and May, 2014

Stream Miles on Public Land: House Creek - 0.3 miles; Cedar Creek - 3.6 miles

Table 1: Pigtail Butte Allotment

Total Acres	BLM Acres	State Acres	Private Acres	Other Acres
30,828	28,523	1,280	1,025	0

Table 2: Assessment Participants

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

CURRENT PERMITTED LIVESTOCK GRAZING USE

Total Active Use: 3,384 AUMs (JRS Properties III L.P.)
2,136 AUMs (Guerry, Inc.)

Livestock Type: Cattle

Livestock Numbers:	Season of Use;
282 Cattle (JRS Properties III L.P.)	03/01 to 02/28 (JRS Properties III L.P.)
178 Cattle (Guerry, Inc.)	03/01 to 02/28 (Guerry, Inc.)

Current Livestock Grazing Use per Interim Grazing Management Plan (IGMP)

Total Active Use: 3,000 AUMs (JRS Properties III L.P.)
2,146 AUMs (Guerry, Inc.)

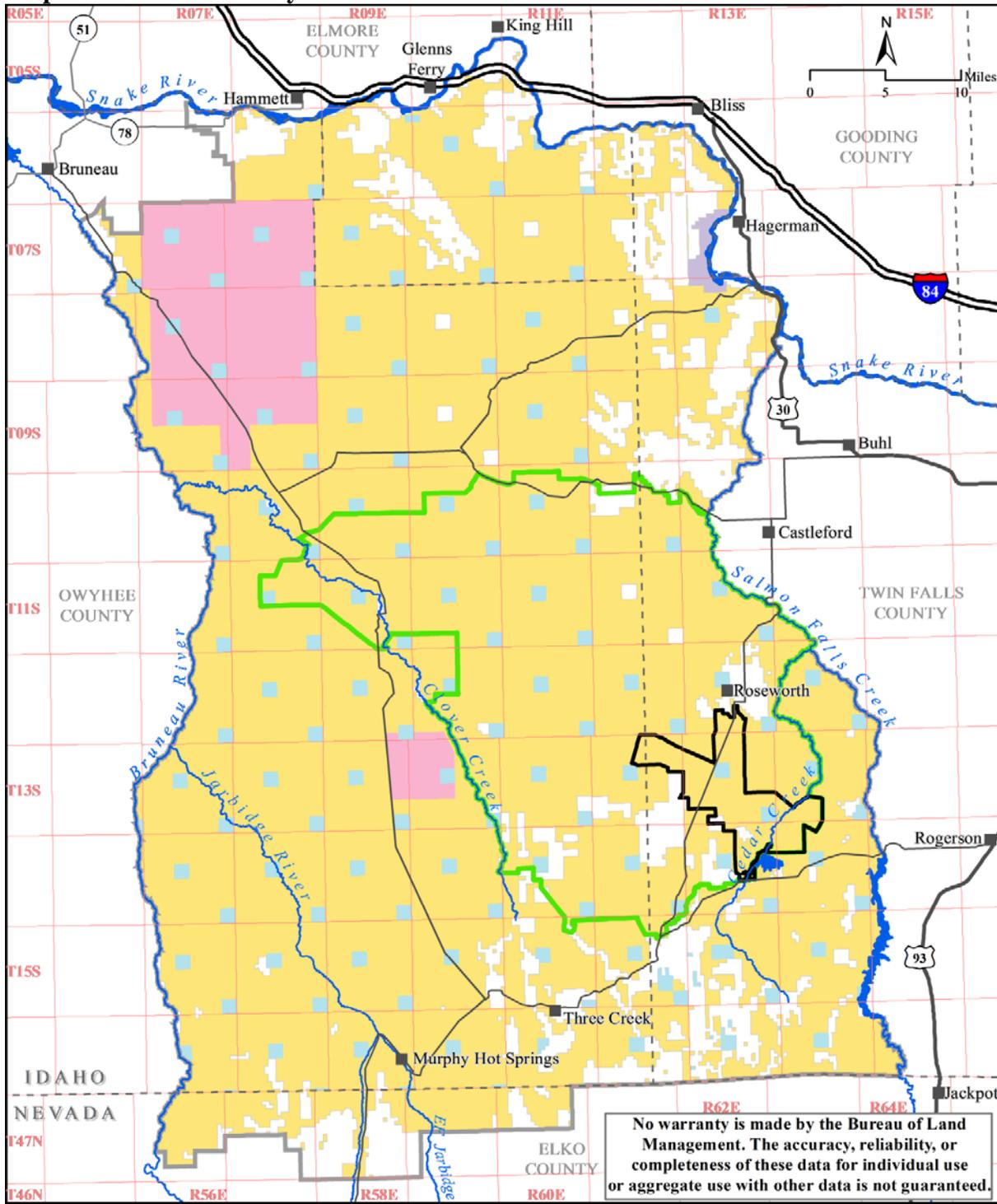
Livestock Type: Cattle

Livestock Numbers:	Season of Use:
1,500 Cattle (JRS Properties III L.P.)	03/01 to 02/28 (JRS Properties III L.P.)
600 Cattle (Guerry, Inc.)	03/01 to 02/28 (Guerry, Inc.)

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

Current Stocking Level: 5.5 Acres/AUM

Map 1: Allotment Vicinity



Pigtail 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 Pigtail Butte Allotment is located approximately 15 miles southwest of Castleford, Idaho (Map 1). The elevation ranges from approximately 4,700 feet to 5,500 feet.

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 Pigtail Butte Allotment ranges from 8 to 12 inches. 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 8-10" precipitation zone within the allotment boundary. 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 years. Moisture exceeded the thirty-year average by at least two inches in 2005 (14.12), 2006 (10.1"), and 2010 (10.46).

The thirty- year average for rain that fell during the growing season (March–June) is 4". 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

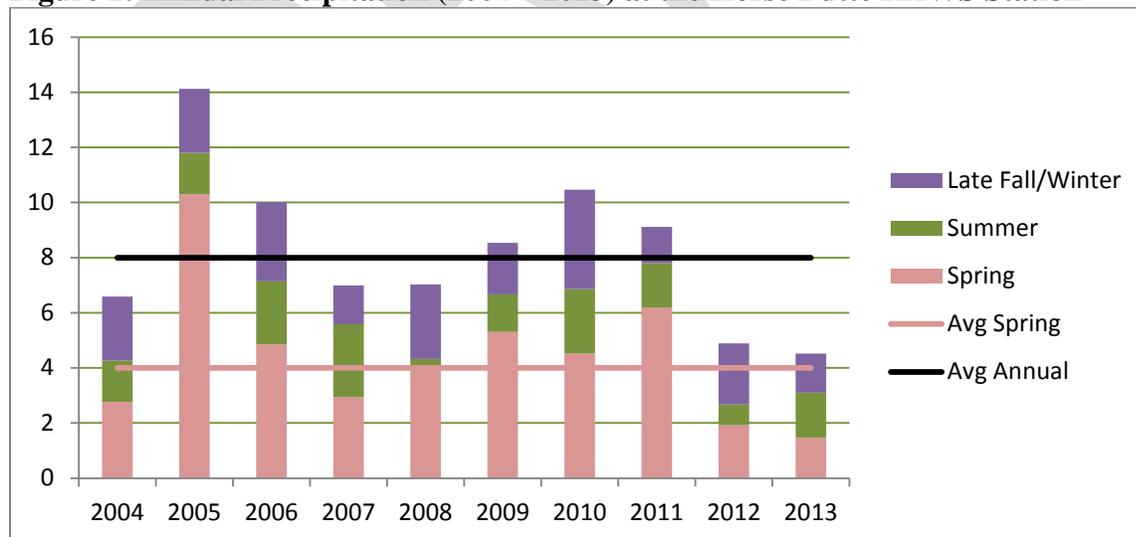
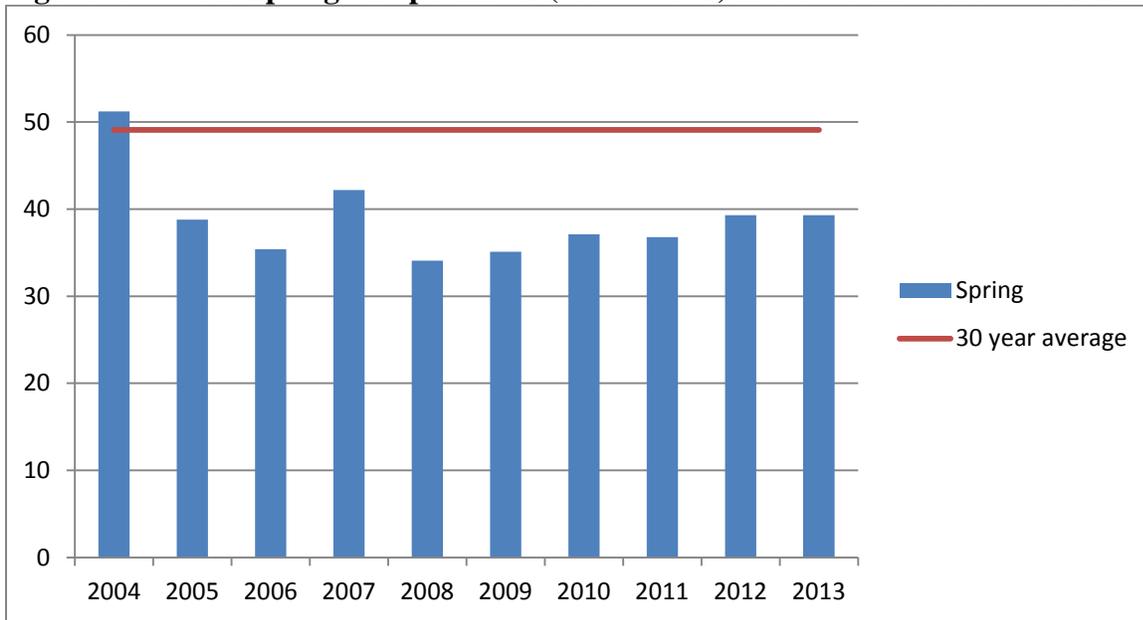


Figure 2: Annual Spring Temperatures (2004 – 2013) at the Horse Butte RAWs Station



Grazing Management

The Pigtail Butte Allotment is divided into twelve pastures (Table 3). Livestock water is available throughout the allotment in pipeline-fed water troughs and associated ponds, as well as water gaps located on Cedar Creek (Map 2).

Two permittees currently hold active grazing permits in the Pigtail Butte Allotment - JRS Properties III L.P. (JRS) and Guerry, Inc. Livestock grazing is permitted in the allotment from March 1 to February 28 for each permittee. Both permittees use the allotment 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.

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

Pasture Name	Public	State	Private	Total*
Cedar Mesa Reservoir**	75	0	0	75
East Clark Seeding	1,654	0	0	1,654
East Trailing Field	3,207	0	15	3,222
Monitoring Exclosure***	17	0	0	17
North Cedar Mesa	277	0	0	277
Northeast Roseworth Reservoir	2,791	0	19	2,810
Northwest Roseworth Reservoir	4,255	1	750	5,006
Pigtail Butte	2,330	624	0	2,954
South Pigtail Butte	4,656	639	0	5,295
Tank Field	1,292	0	0	1,292
Threemile Crossing	2,388	0	0	2,388
West Clark Seeding	1,593	9	6	1,608
West Trailing Field	4,059	0	0	4,059
Allotment Total	28,594	1,274	789	30,657

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

**The Cedar Mesa Reservoir Exclosure is a wildlife exclosure and livestock use is generally excluded. However, livestock use may be allowed in specific circumstances (i.e. the pipeline feeding the surrounding pastures failed and/or if no water was available in the canal) with IDT review and authorized officer approval.

***Monitoring Exclosure is not included in the Idaho Rangeland Health Standards Assessment discussions.

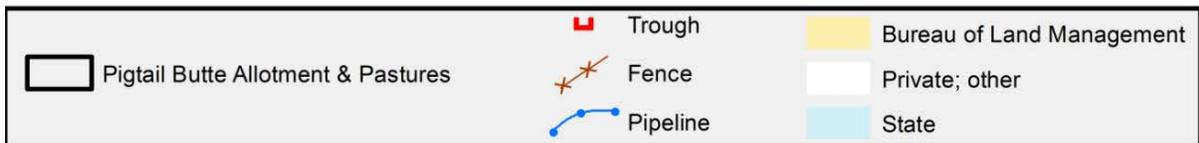
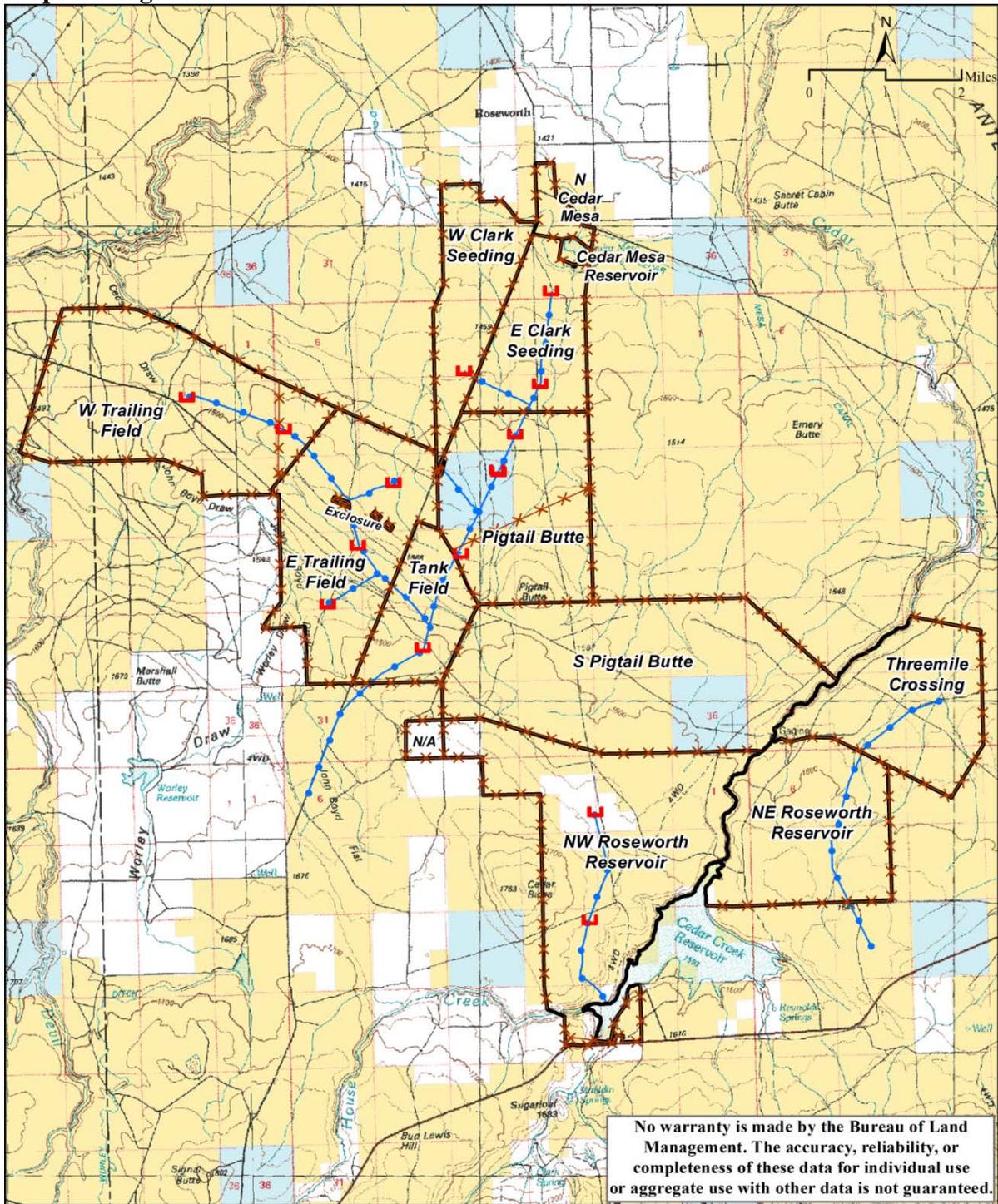
The Pigtail Butte Allotment was included in the 2005 Stipulated Settlement Agreement (SSA) and managed per the terms of the SSA through the 2010 grazing season. As a result of a Memorandum Decision and Order by Chief Judge Winmill dated July 22, 2011, the Pigtail Butte Allotment is currently being managed 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 3,384 Animal Unit Months (AUMs) for JRS and 2,136 AUMs for Guerry, Inc. in the Pigtail Butte Allotment for a combined active use of 5,520 AUMs. However, the IGMP for JRS provides that the Active Use be limited to 3,000 AUMs, and the IGMP for Guerry, Inc. provides that the Active Use be limited to 2,146 AUMs. Therefore, the combined total AUMs currently available for use within the allotment is 5,146.

Prior to 2005, JRS' use of the allotment was generally outlined in the Livestock Management Plan-Tews Land & Livestock Inc. and Guerry, Inc. used the allotment under the Livestock Management Plan-Guerry, Inc. From 2005 to 2011 the allotment was managed under the SSA, and since 2011, the IGMPs have prescribed management.

Since the 2005 SSA, management of the allotment 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.

Map 2: Range Infrastructure



A summary of actual use and average utilization in the Pigtail Butte Allotment from 2005 to 2013 can be seen in Table 4. Since 2005, actual use within the Pigtail Butte Allotment has averaged approximately 2,312 AUMs. Utilization in the allotment since 2005 has averaged 16% on bottlebrush squirreltail (*Elymus elymoides*), 13% on Thurber's needlegrass (*Achnatherum thurberianum*), 7% on bluebunch wheatgrass (*Pseudoroegneria spicata*), 16% on crested wheatgrass (*Agropyron cristatum*), and 11% on Sandberg bluegrass (*Poa secunda*). Unless otherwise noted, all utilization data was collected by the Height-Weight Method (Cooperative Extension Service et al., 1999). Locations of key utilization sites are shown on Map 3.

Table 4: Actual Use and Utilization Summary

Year	Actual Use		Utilization				
	Season of Use	AUMs	Crested wheatgrass	Thurber's needlegrass	Sandberg bluegrass	Bluebunch wheatgrass	Bottlebrush squirreltail
2005	Fall, Winter, Spring	3,636	27% (TMP) 35% (NEP) 32% (WCP) 31% (ETP, WTP) 22% (PBP) 50% (ECP) 50% (SPP) 17%* (NWP)	11%* (ETP, WTP) 25%* (SPP)	8%* (ETP, WTP) 12%* (PBP) 8% (ECP) 10%* (SPP)	-	-
2006	Fall, Winter, Spring	4,106	33% (WCP) 32% (PBP) 24%* (TMP) 17% (NEP) 14%* (NWP)	32%* (SPP) 25% (NEP)	36%* (WTP) 27% (SPP) 23%* (PBP)	10% (WCP)	-
2007	Fall, Winter, Spring	2,136	16% (NEP) 35%* (TMP) 3%* (WCP) 39% (ECP) 35% (PBP)	4% (NEP)	6%* (NEP)	15% (NEP)	-
2008	Fall, Winter, Spring	1,225	1%* (WCP) >1% (ECP) 30% (PBP) 21% (NEP) 21%* (TMP)	-	6% (ECP) 3% (PBP) 8% (NEP)	-	-
2009	Fall, Winter, Spring	1,719	0% (ETP) 11% (NEP) 3%* (NWP) 39%* (PBP) 8%* (TMP) 3%* (WCP)	-	0%* (ETP) 0% (NEP) 19% (PBP)	-	-
2010	Fall, Winter, Spring	2,413	12% (ECP) 8% (ETP) 15% (NEP) 16%* (PBP) 29% (TMP)	15% (NEP) 4%* (SPP) 12%* (WTP)	9% (ECP) 8%* (PBP)	4%* (SPP) 1%* (TFP)	16% (WTP)
2011	Fall, Winter, Spring	633	1% (NWP)	-	-	-	-
2012	Fall, Winter, Spring	2,948	10% (ECP) 7% (PBP)	-	-	1% (WTP)	-

Year	Actual Use		Utilization				
	Season of Use	AUMs	Crested wheatgrass	Thurber's needlegrass	Sandberg bluegrass	Bluebunch wheatgrass	Bottlebrush squirreltail
2013	Fall, Winter, Spring	1,992	0% (ETP) 23%* (NEP) 15%* (NWP) 0% (PBP) 11%* (TMP) 4% (WCP)	7% (NEP)	-	-	-

* Denotes an average of multiple sites within a pasture

- No Utilization data was collected

EC: East Clark Seeding Pasture

ETP: East Trailing Field Pasture

SPP: South Pigtail Butte Pasture

TFP: Tank Field Pasture

TMP: Three Mile Crossing Pasture

WTP: West Trailing Field Pasture

WCP: West Clark Seeding Pasture

PBP = Pigtail Butte Pasture

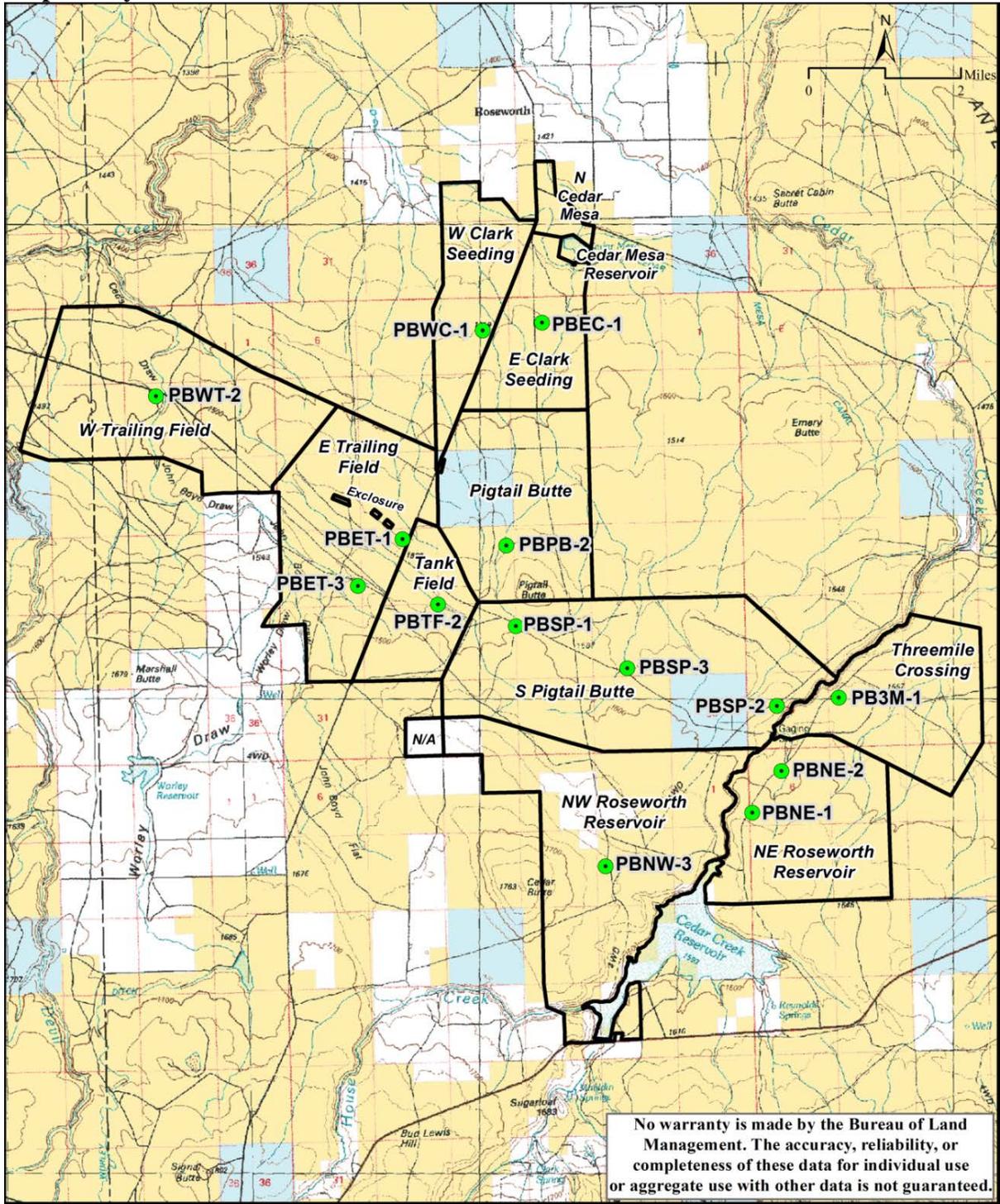
NEP: NE Roseworth Reservoir Pasture

NWP: NW Roseworth Reservoir Pasture

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 Pigtail Butte Allotment.

Camas Creek Cattle Association is permitted to trail up to 500 head of cattle through the Pigtail Butte Allotment between the dates of February 25 and April 15, May 15 and June 30, October 15 and November 15 and December 15 and January 31 via an identified route. There are no overnight stays authorized by the permit and trailing typically occurs for less than one day.

Map 3: Key Utilization Sites



Vegetation

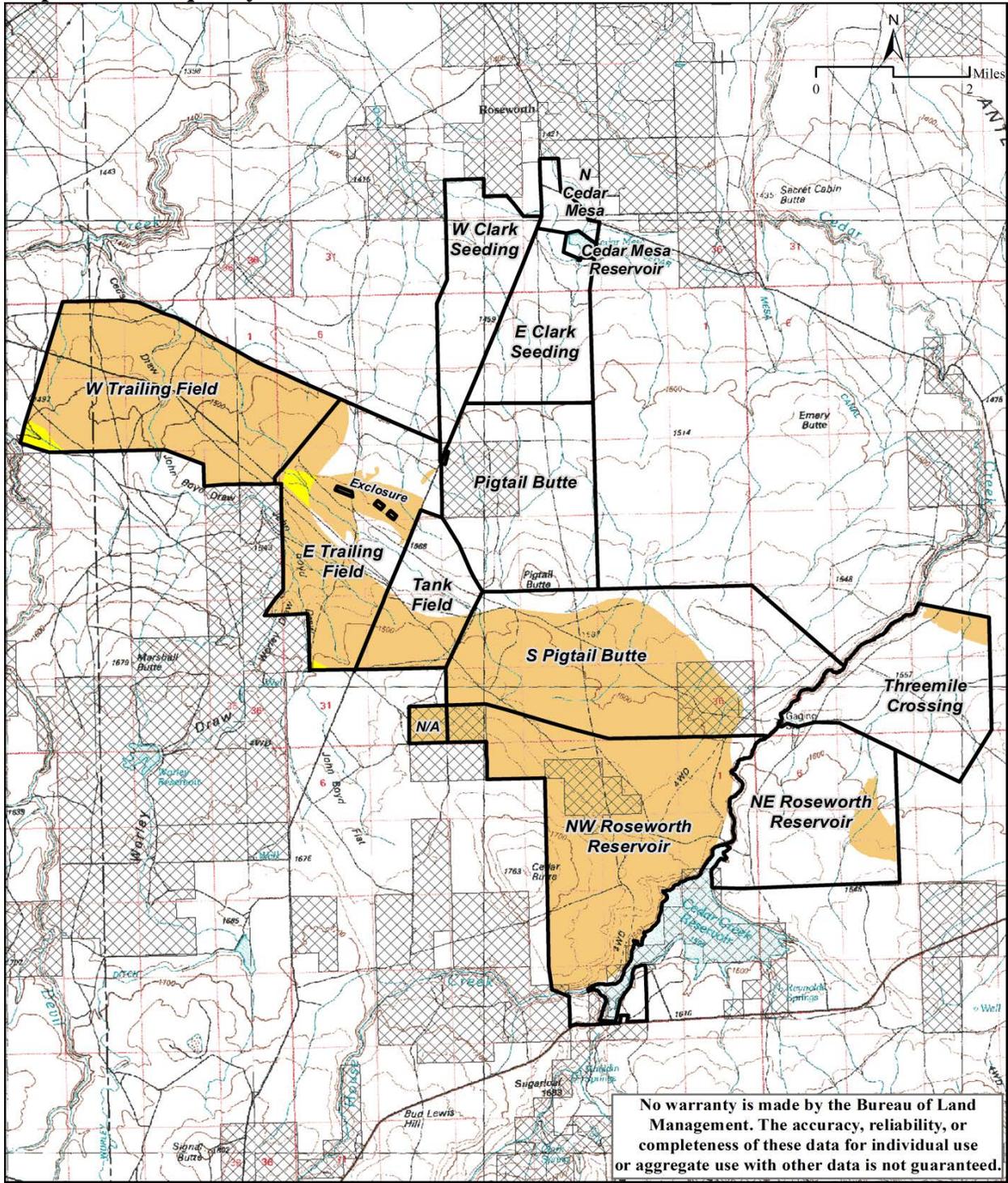
Vegetation in the allotment was initially mapped in 2006 using field observation, field cover data, and National Agriculture Imagery Program (NAIP) imagery. The vegetation map was updated again in 2013 using field observations and NAIP imagery. Vegetation communities were classified and mapped based 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, 53 vegetation communities were classified and mapped based on dominant plant cover. Other plant species, both native and non-native, are also present in the communities (Table 6). 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).

The Pigtail Butte Allotment was historically dominated by sagebrush-steppe plant communities. Portions of the allotment have been affected by past vegetation treatments and wildfire, both of which resulted dominance of treated or burned areas by native and non-native grassland plant communities. Approximately half of the Pigtail Butte Allotment burned at least once during the last 20 years, primarily in the southern and western portions of the allotment (Table 5, Map 4).

Table 5: Fire Frequency by Pasture from 1993 to 2012

Pasture	Total Acres in Pasture	Number of Times Burned from 1993 to 2012	Acres of Pasture Burned	Percentage of Pasture
Cedar Mesa Reservoir	75	0	0	0
East Clark Seeding	1,654	0	0	0
East Trailing Field	3,207	1	2,017	63
		2	93	3
Monitoring Exclosure	17	1	17	100
North Cedar Mesa	277	0	0	0
Northeast Roseworth Reservoir	2,791	1	278	10
Northwest Roseworth Reservoir	4,255	1	3,915	92
Pigtail Butte	2,330	0	0	0
South Pigtail Butte	4,656	1	2,930	63
Tank Field	1,292	1	603	47
Threemile Crossing	2,388	1	158	7
West Clark Seeding	1,593	0	0	0
West Trailing Field	4,059	1	3,972	98
		2	86	2

Map 4: Fire Frequency 1993 to 2012



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.

 Pigtail Butte Allotment & Pastures	Number of Times Burned (1993 thru 2013)
 Non-BLM Land	 1 Time Burned
	 2 Times Burned

Fourteen wildfires occurred in the allotment from 1978 to the present, with the most recent fire being the 2007 Murphy Complex Fire, which burned over 425,000 acres of public land in the JFO. After 1990, 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 1990 but known ESR treatments are summarized with the fire history below.

The 1978 Cedar Mesa Fire burned 337 acres (7%) of the Northwest Roseworth Reservoir Pasture. No post-fire ESR information is available for this fire.

The 1981 Pigtail Butte Fire burned 667 acres (13%) of the Northwest Roseworth Reservoir Pasture. No post-fire ESR information is available for this fire.

The 1984 Boyd Draw fire burned 502 acres (16%) of the East Trailing Field Pasture. No post-fire ESR information is available for this fire.

The 1984 John Boyd Fire burned 1,098 acres (22%) of the Northwest Roseworth Reservoir Pasture and 3,233 acres (61%) of the South Pigtail Butte Pasture. No post-fire ESR information is available for this fire.

The 1985 House Creek Fire burned 1,901 acres (68%) of the Northeast Roseworth Reservoir Pasture; 3,837 acres (77%) of the Northwest Roseworth Reservoir Pasture; and 53 acres (1%) of the South Pigtail Butte Pasture. No post-fire ESR information is available for this fire.

The 1985 Cedar Draw Fire burned 297 acres (7%) of the West Trailing Field Pasture. No post-fire ESR information is available for this fire.

The 1990 Pigtail Fire burned 782 acres (27%) of the Pigtail Butte Pasture and 64 acres (5%) of the Tank Pasture. Following the fire the burned areas were drill seeded. Information on the seed mix is not available. However, since the current vegetation is crested wheatgrass it is assumed that the species was drill seeded at that time.

The 1994 Greenstrip Fire burned 10 acres (<1%) of the East Trailing Field Pasture. No post-fire ESR information is available for this fire.

The 1994 Greenstrip II Fire burned 626 acres in the East Trailing Field (19%). Areas burned in the 1994 Greenstrip II Fire were drill seeded following the fire with 'Fairway' and 'Ephraim' crested wheatgrass, 'Bozoisky' Russian wildry (*Psathyrostachys junceus*), and fourwing saltbush (*Atriplex canescens*) and aerially seeded with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*); 'Ladak', 'Spreador II', and 'Travois' alfalfa (*Medicago stiva*); and yellow sweetclover (*Melilotus officinalis*). The Monitoring Enclosures were established following this fire to evaluate post-fire recovery of vegetation and biological soil crusts with and without drill seeding. In addition, test plots evaluating seeding of various forbs were also contained within the enclosures.

The 1996 Antelope Fire burned 158 acres (7%) of the Threemile Crossing Pasture. The area burned by the 1996 Antelope Fire was drill seeded with 'Ephraim' crested wheatgrass, 'Goldar' bluebunch wheatgrass, 'Delar' small burnett (*Sanguisorba minor*), and fourwing saltbush. The drilled area was aerially seeded with Wyoming big sagebrush.

The 1999 17 Mile Fire burned 2 acres (<1%) of the East Trailing Field Pasture and 3 acres (<1%) of the Tank Field. No post-fire ESR information is available for this fire.

The 2000 Grass Fire burned 20 acres (<1%) of the East Trailing Field Pasture and 86 acres (2%) of the West Trailing Field Pasture. Only a small portion of the area burned in the 2000 Grass Fire was contained in the Pigtail Butte Allotment. The burned area in the West Trailing Field Pasture was drill seeded 'Secar' Snake River wheatgrass (*Elymus wawawaiensis*), Basin wildrye (*Leymus cinereus*), squirreltail (*Elymus elymoides*), western wheatgrass (*Pascopyrum smithii*), and fourwing saltbrush and aerially seeded with Wyoming big sagebrush.

The 2006 Reynolds Creek Fire burned 278 acres (10%) of the Northeast Roseworth Reservoir Pasture. No post-fire ESR information is available for this fire.

The 2007 Murphy Complex Fire burned 1,894 acres (59%) of the East Trailing Field Pasture; 4,544 acres (91%) of the Northwest Roseworth Reservoir Pasture; 3,385 acres (64%) of the South Pigtail Butte Pasture; 599 acres (46%) of the Tank Field Pasture; and 3,738 acres (92%) of the West Trailing Field Pasture. Following the fire, approximately 1,497 acres (40%) of the burned area within the West Trailing Field Pasture was drill seeded with the Thurber's seed mix consisting of 'Secar' Snake River wheatgrass, Sandberg bluegrass, 'Sherman' big bluegrass (*Poa ampla*), squirreltail, Lewis flax (*Linum lewisii*), alfalfa, and Munro's globemallow (*Sphaeralcea munroana*). In addition, about 8,500 acres within the allotment were aerially seeded in strips with Wyoming big sagebrush.

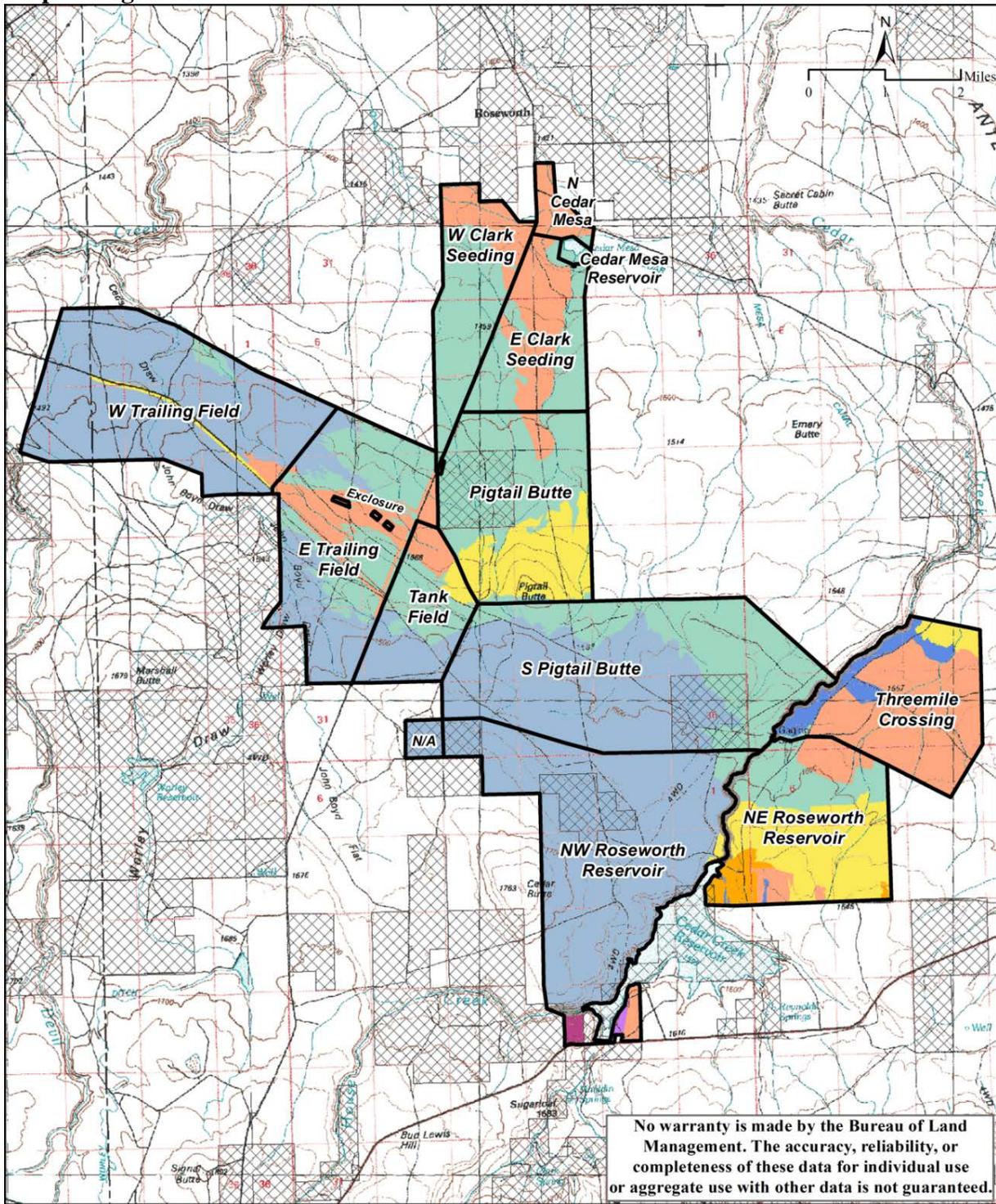
As a result of the fires and seeding efforts, plant communities within the Pigtail Butte Allotment have been modified. As a result of these treatments, the allotment is currently dominated by both native and non-native perennial grass species. Some sagebrush has reestablished as the result of post-fire seeding and planting efforts, but remains sparse in burned areas.

Table 6: Vegetation Community in Acres and Percentage of Pasture

Pasture/ Total Acres	WY sage/ bluegrass	WY sage/ crested	WY sage/ Thurber's	Low sage/ ID fescue	Mtn. sage/ bluebunch ID fescue	Rabbitbrush/ crested	Bluegrass	Crested	Other**
Cedar Mesa Reservoir (75 Ac)	52 Acres (69%)	-	-	-	-	-	-	-	23 Acres (31%)
East Clark Seeding (1,654 Total Acres)	855 Acres (52%)	793 Acres (48%)	-	-	-	-	-	N/A	5 Acres (<1%)
East Trailing Field (3,207 Total Acres)	1,142 Acres (36%)	580 Acres (18%)	-	-	-	-	1,453 Acres (45%)	4 Acres (<1%)	30 Acres (<1%)
North Cedar Mesa (277 Ac)	16 Acres (6%)	255 Acres (92%)	-	-	-	-	-	-	6 Acres (2%)
NE Roseworth Res. (2,791 Ac)	680 Acres (24%)	812 Acres (29%)	-	-	-	162 Acres (6%)	-	1,059 Acres (38%)	80 Acres (3%)
NW Roseworth Res. (4,255 Ac)	77 Acres (2%)	87 Acres (2%)	-	33 Acres (>1%)	59 Acres (1%)	-	3,882 Acres (91%)	23 Acres (<1%)	92 Acres (2%)
Pigtail Butte (2,330 Total Acres)	1,248 Acres (54%)	54 Acres (2%)	-	-	-	-	-	1,026 Acres (44%)	2 Acres (<1%)
South Pigtail Butte (4,656 Total Acres)	1,841 Acres (40%)	-	-	-	-	-	2,769 Acres (59%)	-	44 Acres (<1%)
Tank Field (1,292 Total Acres)	509 Acres (39%)	175 Acres (14%)	-	-	-	-	515 Acres (40%)	92 Acres (7%)	1 Acre (>1%)
Three Mile Crossing (2,388 Total Acres)	2 Acres (>1%)	1,795 Acres (75%)	353 Acres (15%)	-	-	-	-	154 Acres (6%)	94 Acres (4%)
W. Clark Seeding (1,593 Total Acres)	1,128 Acres (71%)	440 Acres (28%)	-	-	-	-	-	-	21 Acres (1%)
W. Trailing Field (4,059 Total Acres)	84 Acres (2%)	-	-	-	-	-	3,859 Acres (95%)	114 Acres (3%)	-

* Vegetation community is listed by dominate cover species. Numerous other plant species, both native and non-native, are present in the communities. Shrubs are listed as the dominant overstory if cover is 10% or greater.

Map 5: Vegetation Communities



Eighteen ESI sites are located within the Pigtail Butte Allotment and were read in 2006. Seven of the sites were burned in the 2007 Murphy Complex Fire. Cover and production data from seventeen of the eighteen sites that were read in 2006 are included in Table 7 and 8. One of the 2006 ESI sites (2006-LH-8b in the NE Roseworth Reservoir Pasture) was found to have missing data and therefore was not included in Table 7 and 8. 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 7: Summary of 2006 ESI Production Data (Total Dry Weight) in Loamy 8-12 ESD

Class	Species	Loamy 8-12 ARTRW8/P SSPS- ACTH7 ESD	West Trailing Field	East Trailing Field	Tank Field		Pigtail Butte Pasture
			RA- 45a	RA- 44a	RA- 42a	RA- 43a	LH- 20b
Perennial Grasses	Squirreltail	25-45	45.9	3.3	10.2	3.9	
	Sandberg bluegrass	25-45	80.4	136.4	125.1	164.4	74.7
	Thurber's needlegrass	8-180	-	24.5	4.0	-	-
	Western wheatgrass	-	-	-	-	-	-
	Bluebunch wheatgrass	100-225	-	17.9	137.7	24.0	-
	Crested wheatgrass	-	-	39.0	-	-	52.5
	Indian ricegrass	0-22	-	-	-	-	-
Perennial Forbs	Longleaf phlox	0-5	23.0	-	-	-	12.8
	Hood's phlox	0-5	-	4.6	-	-	-
	Sagebrush phlox	-	-	-	-	-	-
	Mourning milkvetch	0-5	0.8	26.5	-	-	-
	Blue penstemon	0-5	-	-	-	-	-
Annual Forbs	Willowherb	-	-	0.6	-	-	-
Shrubs	Yellow rabbitbrush	0-10	-	72.3	-	-	-
	Rubber rabbitbrush	0-18	-	-	-	-	-
	Wyoming big sagebrush	100-225	245.8	112.5	84.3	195.6	186.6
Total		400-900	395.9	437.6	361.3	387.9	326.6

Table 8: Summary of 2006 ESI Production Data (Total Dry Weight) in Loamy 8-12 ESD

Class	Species	Loamy 8-12 ARTRW8/PS SPS-ACTH7 ESD	Pigtail Butte Pasture	South Pigtail Butte	NE Roseworth Reservoir	Three Mile Crossing	
			LH- 20b	RA- 46a	LH- 28b	LH- 1b	LH- 2b
Perennial Grasses	Bottlebrush squirreltail	25-45		25.8			130.0
	Sandberg bluegrass	25-45	74.7	134.8	67.0	49.5	45.7
	Thurber's needlegrass	8-180	-	74.1	-	4.6	7.4
	Western wheatgrass	-	-	8.1	-	-	-
	Bluebunch wheatgrass	100-225	-	1.6	35.3	-	-
	Crested wheatgrass	-	52.5	-	163.2	435.3	6.6
	Indian ricegrass	0-22	-	-	-	-	26.5
Perennial Forbs	Longleaf phlox	0-5	12.8	1.6	-	-	8.0
	Hood's phlox	0-5	-	16.0	-	-	-
	Sagebrush phlox	-	-	1.5	-	-	-
	Mourning milkvetch	0-5	-	-	-	5.6	0.8
	Blue penstemon	0-5	-	-	-	-	9.0
Annual Forbs	Willowherb	-	-	-	-	-	-
Shrubs	Yellow rabbitbrush	0-10	-	-	-	-	-
	Rubber rabbitbrush	0-18	-	-	-	-	0.5
	Wyoming big sagebrush	100-225	186.6	186.1	37.1	247.7	190.3
Total		400-900	326.6	449.6	302.6	742.7	424.8

The majority of the allotment falls into either the Loamy 8-12 ARTRW8/PSSPS-ACTH7 (Wyoming big sagebrush/bluebunch wheatgrass-Thurber's needlegrass) or the Loamy 10-13 ARTRW8/PSSPSS (Wyoming big sagebrush/bluebunch wheatgrass) ecological site. Expected production for the Loamy 8-12 ARTRW8/PSSPS-ACTH7 ecological site ranges from 400 pounds per acre in an unfavorable year to 1,200 pounds per acre in a favorable year. An average of 750 pounds per acre can be expected in a year experiencing normal conditions. Expected production for the Loamy 10-13 ARTRW8/PSSPSS ecological site ranges from 400 pounds per acre in an unfavorable year to 1,200 pounds per acre in a favorable year. An average of 750 pounds per acre can be expected in a year experiencing normal conditions.

Table 9: Summary of 2006 ESI Production Data (Total Dry Weight) in Loamy 10-13 ESD

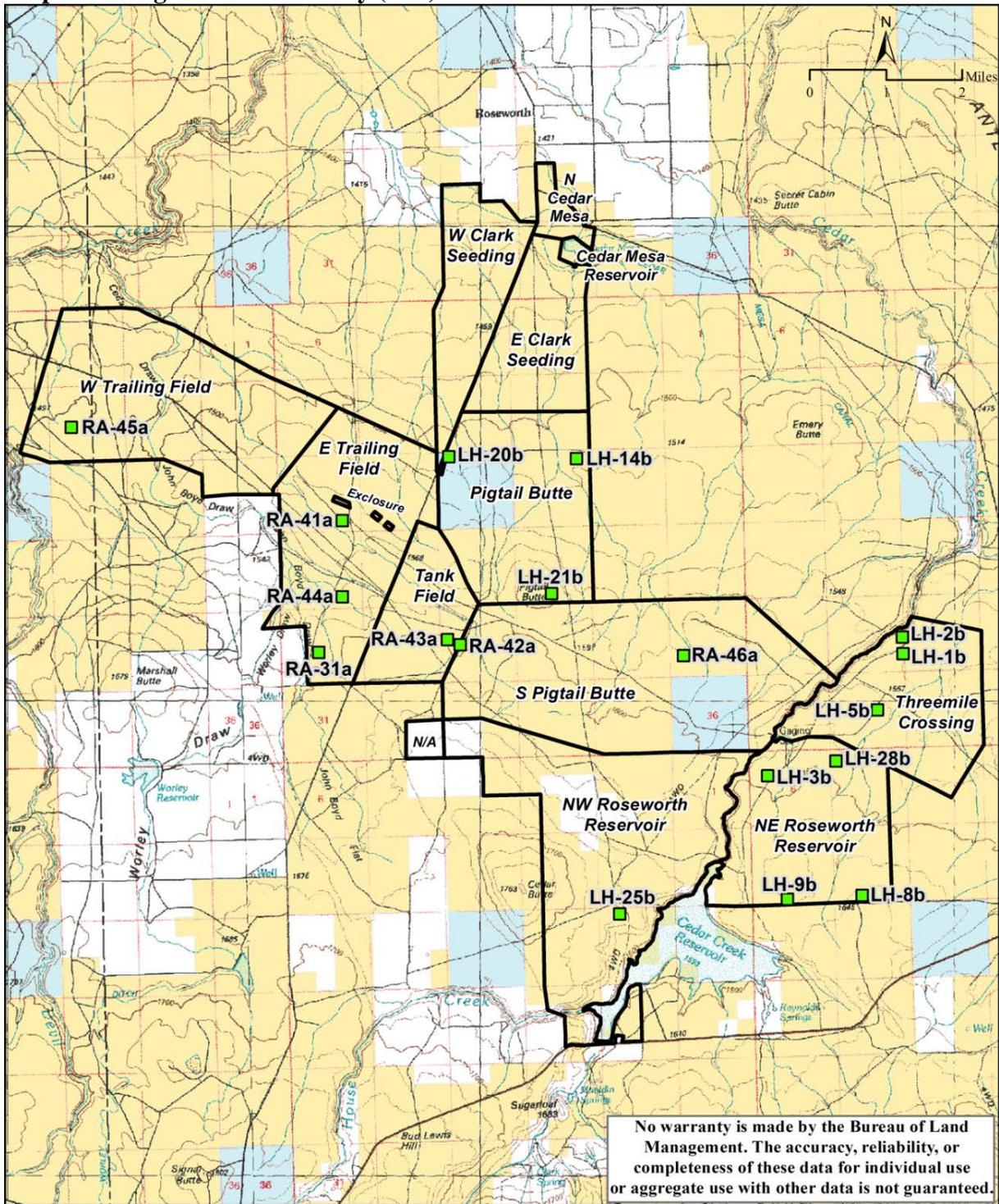
Class	Species	Loamy 10-13 ARTR W8/ PSSPS ESD	East Trailing Field		Pigtail Butte Pasture		NE Roseworth Reservoir Pasture		Three Mile Crossing
			RA-31a	RA-41a	LH-14b	LH-21b	LH-3b	LH-9b	LH-5b
Perennial Grasses	Squirreltail	12-33	10.1	7.9	0.7	-	51.4	-	3.7
	Sandberg bluegrass	12-33	163.5	196.1	200.6	71.7	103.0	27.5	65.3
	Thurber's needlegrass	12-33	-	-	-	1.2	-	-	5.4
	Idaho fescue	-	-	-	-	-	27.1	-	-
	Western wheatgrass	-	14.3	-	-	-	-	-	-
	Crested wheatgrass	-	-	567.6	12.9	596.2	-	312.9	259.1
	Bluebunch wheatgrass	160-440	44.4	-	-	-	-	-	-
	Russian wildrye	-	-	3.2	-	-	-	-	-
	Prairie junegrass	-	-	3.4	-	-	-	-	-
	Thickspike wheatgrass	1-17	-	-	-	-	-	-	-
Perennial Forbs	Longleaf phlox	8-22	0.7	-	-	2.0	-	0.5	-
	Hood's phlox	8-22	0.6	34.3	-	-	-	1.2	34.2
	Mourning milkvetch	1-11	26.7	-	-	12.4	-	-	-
	Freckled milkvetch	-	-	-	4.0	-	-	-	-
	Woolly pod milkvetch	-	-	7.5	-	-	-	-	-
	Meadow deathcamas	-	5.6	-	-	-	-	-	-
	Lupine	6-17	2.6	-	-	-	-	-	-
Annual Forbs	Yellow salsify	-	-	-	-	1.4	-	-	-
Shrubs	Rabbitbrush	10-28	-	-	-	25.8	4.1	-	-
	Spiny hopsage	-	-	-	-	-	-	-	51.7
	Wyoming big sagebrush	100-275	95.5	109.7	81.8	3.9	37.0	51.6	80.1
Total		400-1100	364	929.7	300	714.6	222.6	393.7	499.5

Table 10: Summary of 2006 ESI Production Data (Total Dry Weight) in Shallow Claypan 12-16 ESD

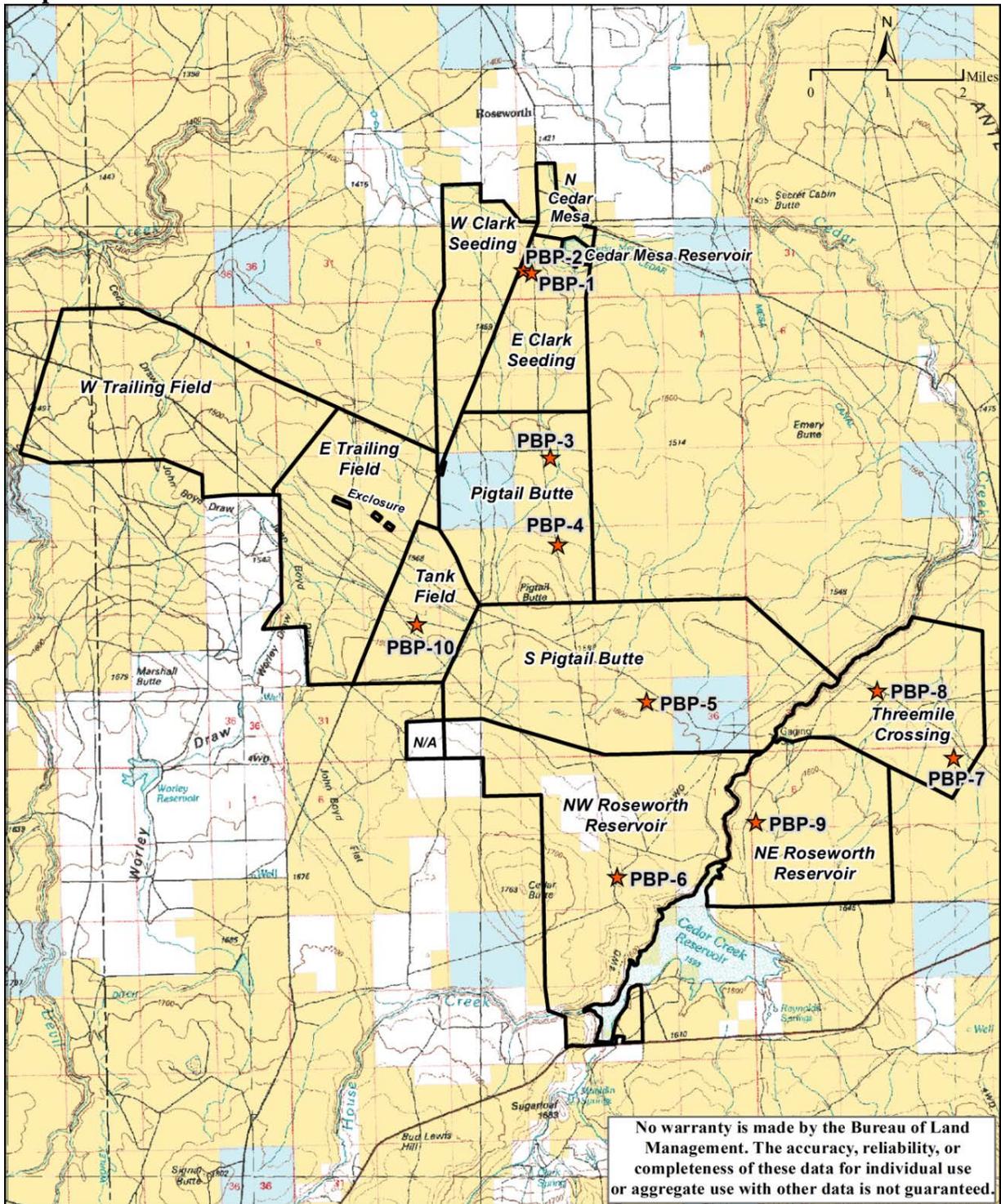
Class	Species	Shallow Claypan 12-16 ARAR8/FEID ESD	NW Roseworth Reservoir Pasture LH-25b
Perennial Grasses	Bottlebrush squirreltail	7-19	6.2
	Sandberg bluegrass	12-33	154.9
	Thurber's needlegrass	7-19	-
	Bluebunch wheatgrass	88-238	17.1
	Idaho fescue	88-238	-
	Crested wheatgrass	-	613.0
Perennial Forbs	Longleaf phlox	7-19	7.7
	Lupine	1-14	3.0
	Yellow salsify	-	0.8
Shrubs	Yellow rabbitbrush	7-19	5.0
	Wyoming big sagebrush	-	150.4
	Low sagebrush	79-214	-
Total		350-950	958.1

Production and cover data was collected at an additional ten sites in 2002. Production data from the eight sites collected in 2002 is available at the JFO.

Map 6: Ecological Site Inventory (ESI) Plots



Map 7: Production and/or Cover Plots



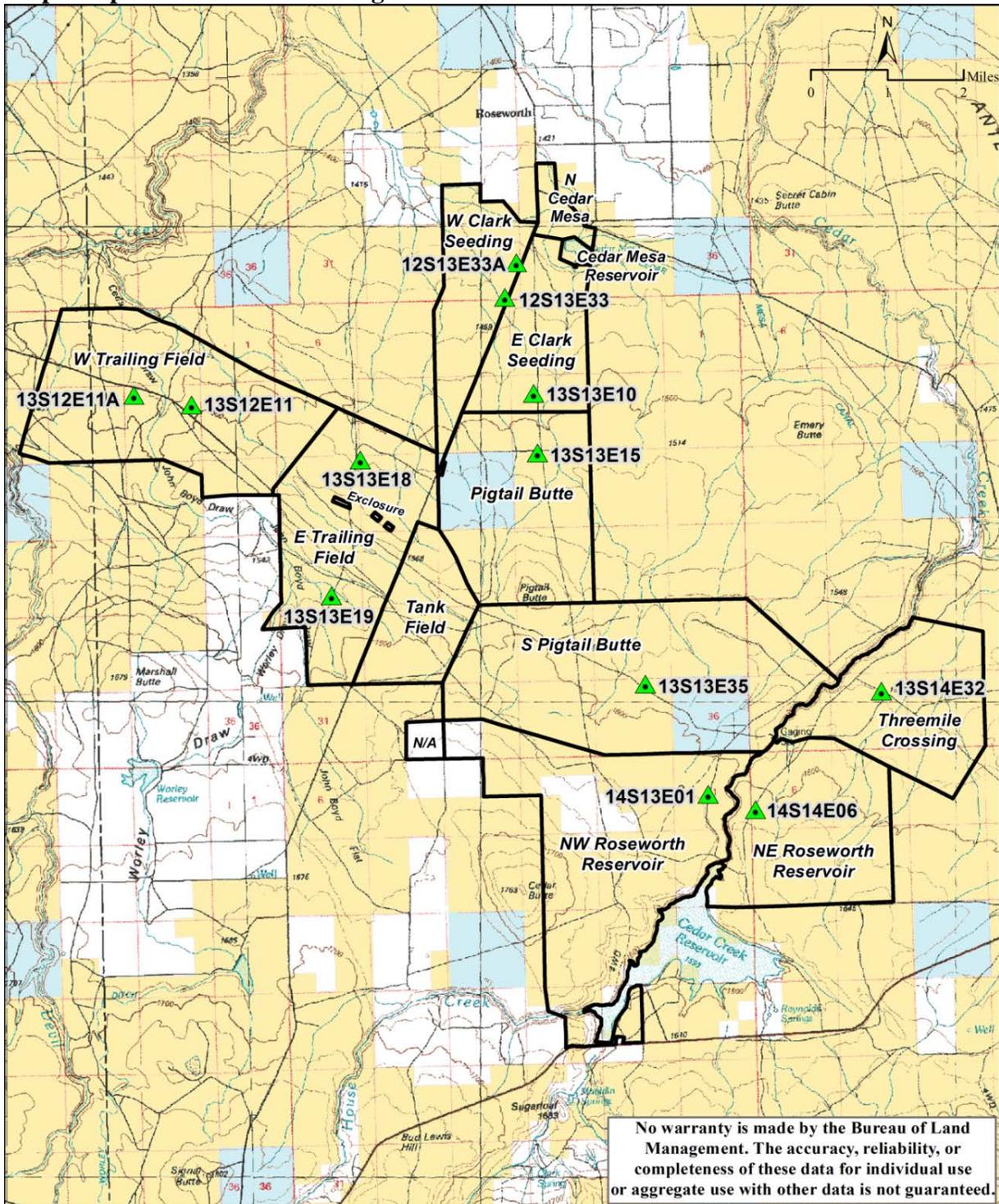
Upland Trend Monitoring

Upland trend monitoring sites have been established in all pastures within the Pigtail Butte Allotment except for the Tank Field, Cedar Mesa Reservoir and North Cedar Mesa Pastures (Map 8). Study protocols used to collect trend data on the allotment are the Nested Plot Frequency and Photo Plot study sites (BLM, 1996). Nested plot frequency records the frequency of plant species along five transects at each site using 4 different nested plots. For species that are common, the smallest nested plot (plot 1) size is generally chosen to describe changes in frequency. A larger plot size is typically chosen (plots 2-4) for species that occur at lower amounts. The 3x3 photo plots are used to record plant cover.

Portions of the Pigtail Butte Allotment have been burned in wildfire since the previous time that trend data was collected. Therefore, in the burned areas (predominantly within the Murphy Complex Fire burned area) the effects of fire on vegetation should be considered when comparisons of trend data collected in 2012 and 2013 are made to the previously collected trend data.

Factors that limit the comparison of trend data over time include: 1) data is 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; 5) ground cover for shrubs and biological soil crusts were not always recorded when the plots were established. An overview of upland trend monitoring is described below.

Map 8: Upland Trend Monitoring Sites



West Trailing Field Pasture:

The West Trailing Field Pasture has two Nested Frequency/Photo Plot upland trend sites. Site 13S12E11 and site 13S12E11A were both last read in 2013. Both sites burned in the 2007 Murphy Complex and were subsequently aerially seeded in strips with Wyoming sagebrush and drill seeded with a mix of native grasses and native and non-native forbs. 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 2013 trend reading is discussed below to show the general recovery and current baseline of the site.

Trend Site 13S12E11:

Site 13S12E11 (Photos 1 and 2) is located in a Loamy 10-13” Wyoming big sagebrush/bluebunch wheatgrass ARTRW8/PSSP6 ecological site. The site was established and initially read in 1989 and re-read in 2013.

Photo 1: Overview of Trend Site 13S12E11 - May 23, 1989



Photo 2: Overview of Trend Site 13S12E11 - July 10, 2013



The key species at the site are Sandberg bluegrass and crested wheatgrass. The number of occurrences for comparison between years is based on plot 4 within the nested frequency frame for Sandberg bluegrass and plot 2 for crested wheatgrass. The frequency of Sandberg bluegrass has increased from 68 occurrences in 1989 to 97 occurrences in 2013 and crested wheatgrass increased from 64 occurrences in 1989 to 78 occurrences in 2013 (Table 9).

Squirreltail decreased from 23 occurrences in 1989 to 2 occurrences in 2013 based on plot 4. Perennial and annual forbs decreased from 99 occurrences in 1989 to 49 occurrences in 2013 based on plot 4. Three species of forbs were recorded at the site.

Bare ground decreased from 65.25 percent cover in 1989 to 34.5 percent in 2013. Vegetation remained static at 6.50 in both 1989 and 2013. Biological crust increased from 0.0 percent in 1989 to 13.5 percent in 2013. Litter increased from 24.75 percent cover in 1989 to 34.25 percent in 2013.

Table 11: West Trailing Field Pasture Trend Site 13S12E11 Nested Frequency Data Summary

Species or Vegetation Class	Plot	Occurrences	
		1989	2013
crested wheatgrass	2	64	78
Sandberg bluegrass	4	68	97
squirreltail	4	23	2
Idaho fescue	4	3	0
stipa	4	1	0
alfalfa	4	90	0
phlox	4	8	49
Wild onion	4	1	0
Big sagebrush	4	3	6

Cover data was not collected at the 3x3 Photo Plot in 1989, so there is no way to compare the data collected in 2013.

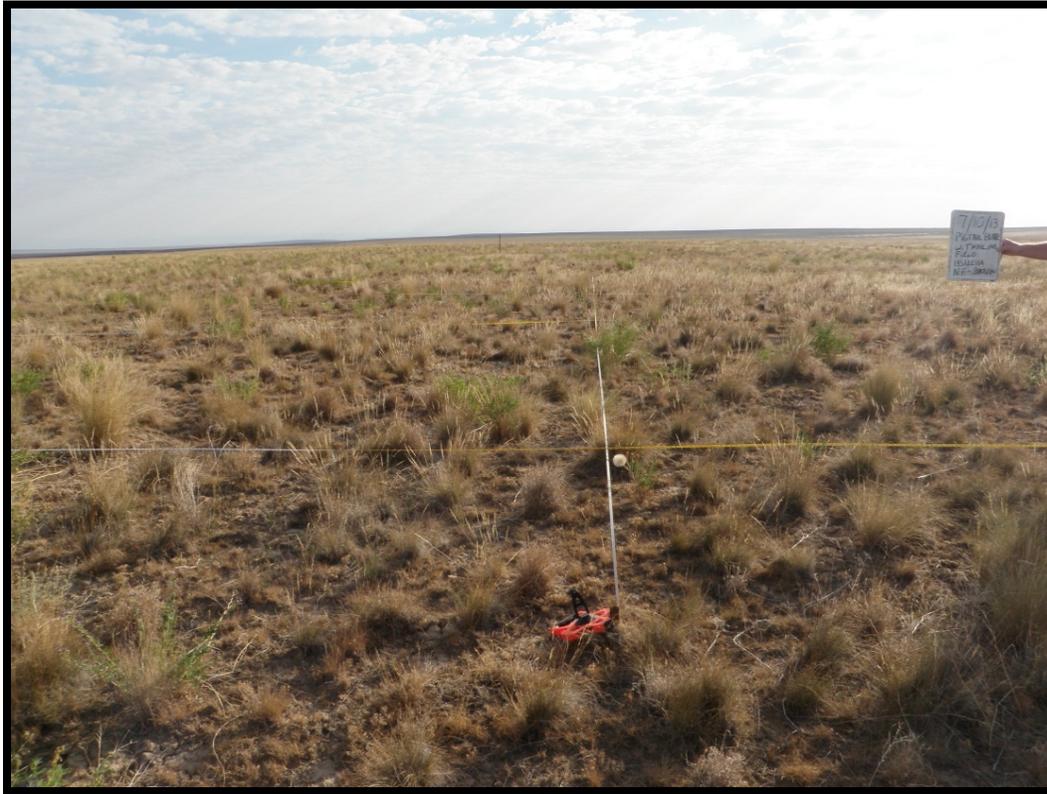
Trend Site 13S12E11A

Site 13S12E11A (Photos 3 and 4) is located in a Loamy 10-13” Wyoming big sagebrush/bluebunch wheatgrass ARTRW8/PSSP6 ecological site. The site was established and initially read in in 1989 and re-read in 2013.

Photo 3: Overview of Trend Site 13S12E11A – May 23, 1989



Photo 4: Overview of Trend Site 13S12E11A - July 10, 2013



The key species at the site are Sandberg bluegrass and Thurber's needlegrass. The number of occurrences for comparison between years is based on plot 1 within the nested frequency frame for Sandberg bluegrass and plot 4 for Thurber's needlegrass. The frequency of Sandberg bluegrass has increased from 21 occurrences in 1989 to 36 occurrences in 2013 and Thurber's needlegrass increased from 28 occurrences in 1989 to 50 occurrences in 2013 (Table 12).

Squirreltail decreased from 72 occurrences in 1989 to 40 occurrences in 2013 based on plot 4. Cheatgrass increased from 0 occurrences in 1989 to 23 occurrences in 2013 based on plot 4. Perennial and annual forbs increased from 78 occurrences in 1989 to 263 occurrences in 2013 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. Thirteen species of forbs were recorded at the site.

Bare ground decreased from 42.25 percent cover in 1989 to 16.75 percent in 2013. Vegetation increased from 9.0 percent cover in 1989 to 21.5 percent in 2013. Biological crust increased from 0.0 percent in 1989 to 18.0 percent in 2013. Litter decreased from 48.25 percent cover in 1989 to 38.0 percent in 2013.

Table 12: West Trailing Field Pasture Trend Site 13S12E11A Nested Frequency Data Summary

Species or Vegetation Class	Plot	Occurrences	
		1989	2013
Thurber's needlegrass	4	28	50
Sandberg bluegrass	1	21	36
squirreltail	4	72	40
cheatgrass	4	0	23
paintbrush	4	6	0
larkspur	4	1	0
Longleaf phlox	4	64	21
Spiny phlox	4	3	5
Sagebrush phlox	4	0	72
Wild onion	4	4	1
Indian ricegrass	4	0	1
Small fescue	4	0	1
Slender phlox	4	0	56
deathcamas	4	0	1
maiden blue eyed Mary	4	0	60
Lewis flax	4	0	37
agoseris	4	0	8
tumblemustard	4	0	21
yellow salsify	4	0	7
curvseed butterwort	4	0	17
nodding chickweed	4	0	18
western tansymustard	4	0	12
Big sagebrush	4	45	0

Cover data was not collected at the 3x3 Photo Plot in 1989, so there is no way to compare the data collected in 2013.

East Trailing Field Pasture:

The East trailing Field Pasture has one Nested Frequency/Photo Plot upland trend site that was read in 2013, and one Nested Frequency/Photo Plot upland trend site that was read in 2011.

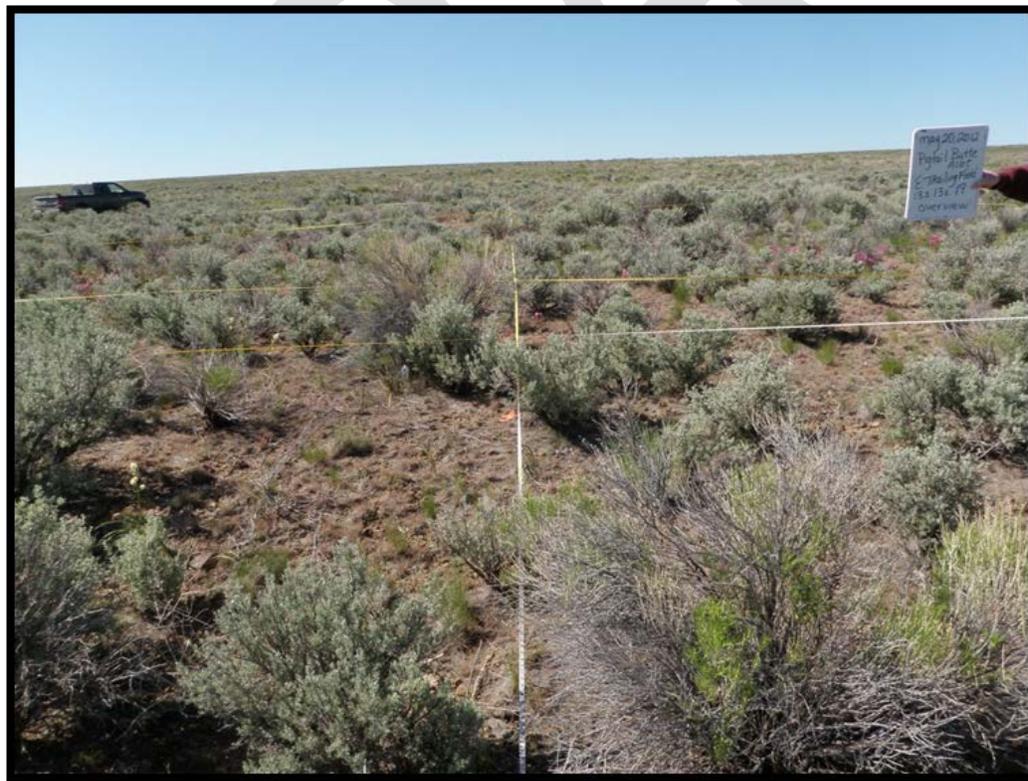
Tend Site 13S13E19:

Site 13S13E19 (Photos 5 and 6) is located in a Loamy 8-12" Wyoming big sagebrush/bluebunch wheatgrass ARTRW8/PSSP6 ecological site. The site was established and initially read in in 1989 and re-read in 2004 and 2013. This site was burned in 1984 and 2007.

Photo 5: Overview of Trend Site 13S13E19 - May 22, 1989



Photo 6: Overview of Trend Site 13S13E19 - May 20, 2013



The key species at the site are Sandberg bluegrass and Thurber’s needlegrass. The number of occurrences for comparison between years is based on plot 1 within the nested frequency frame for Sandberg bluegrass and plot 2 for Thurber's needlegrass. The frequency of Sandberg bluegrass has increased from 26 occurrences in 1989 to 34 occurrences in 2004 to 54 occurrences in 2013 and Thurber's needlegrass increased from 47 occurrences in 1989 to 49 occurrences in 2004, then decreased to 45 occurrences in 2013 (Table 12).

Squirreltail decreased from 59 occurrences in 1989 to 24 occurrences in 2004 to 20 occurrences in 2013 based on plot 4. Cheatgrass increased from 0 occurrences in 1989 to 7 occurrences in 2004 to 8 occurrences in 2013 based on plot 4. Perennial and annual forbs increased from 67 occurrences in 1989 to 97 occurrences in 2004 to 217 occurrences in 2013 based on plot 4. Longleaf phlox decreased from 55 occurrences in 1989 to 32 occurrences in 2004 then increased to 34 occurrences in 2013, 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. Thirteen species of forbs were recorded at the site.

Bare ground decreased from 42.0 percent cover in 1989 to 24.75 percent in 2004, then increased to 28.5 percent in 2013. Vegetation increased from 11.75 percent cover in 1989 to 12.0 in 2004, then decreased to 5.0 in 2013. Biological crust increased from 0.0 percent in 1989 to 14.25 percent in 2004, then to 27.5 percent in 2013. Litter increased from 46.25 percent cover in 1989 to 47.50 in 2004, then decreased to 17.0 percent in 2013.

Table 13: East Trailing Field Pasture Trend Site 13S13E19 Nested Frequency Data Summary

Species or Vegetation Class	Plot	Occurrences		
		1989	2004	2013
Thurber’s needlegrass	2	47	49	45
Sandberg bluegrass	1	26	34	54
squirreltail	4	59	24	20
cheatgrass	4	0	7	8
moss	4	6	7	9
lomatogonium	4	1	0	0
lettuce	4	1	0	0
phlox	4	24	10	15
Wild onion	4	11	15	6
longleaf phlox	2	55	32	34
goatsbeard	4	9	0	0
fleabane	4	5	2	18
agoseris	4	3	8	13
milkvetch	4	3	1	12
beardtongue	4	4	0	0
Bur buttercup	4	0	53	60

Species or Vegetation Class	Plot	Occurrences		
		1989	2004	2013
larkspur	4	0	7	0
paintbrush	4	0	1	11
maiden blue eyed Mary	4	NR	NR	69
slender phlox	4	NR	NR	4
tall annual willowherb	4	NR	NR	12
mountain tansymustard	4	NR	NR	10
Big sagebrush seedling	4	1	NR	1
Big sagebrush	4	NR	46	30
rabbitbrush	4	0	17	9

NR-Not recorded

No cover data was collected in 1989. However, cover data collected at the 3x3 photo plot at the site shows that from 2004 to 2013, Thurber's needlegrass decreased from 3.85 percent to 1.9 percent and Sandberg bluegrass decreased from 8.68 percent to 4.725 percent.

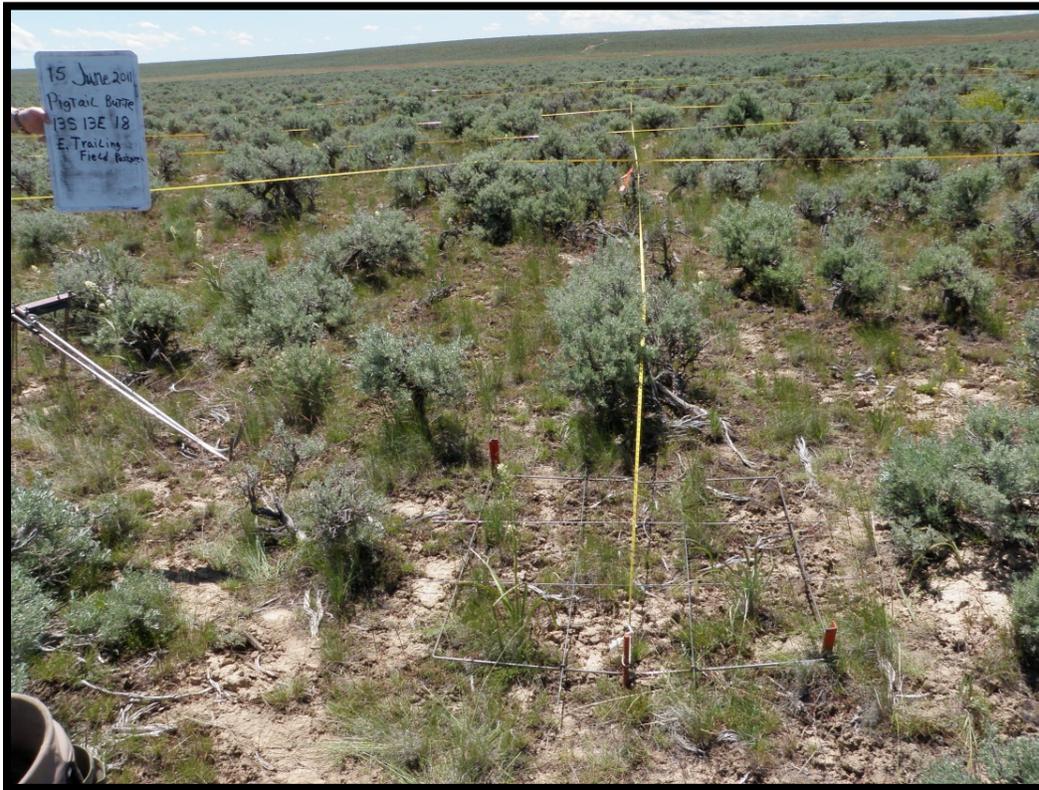
Trend Site 13S13E18:

Site 13S13E18 (Photos 7 and 8) is located in a Loamy 8-12" Wyoming big sagebrush/bluebunch wheatgrass/Thurber's needlegrass ecological site. The site was established and initially read in in 1989 and re-read in 2011.

Photo 7: Over of Trend Site 13S13E18 - May 22, 1989



Photo 8: Over of Trend Site 13S13E18 - May 15, 2011



The key species at the site are Sandberg bluegrass and Thurber's needlegrass. The number of occurrences for comparison between years is based on plot 2 within the nested frequency frame for Sandberg bluegrass and plot 4 for Thurber's needlegrass. The frequency of Sandberg bluegrass has increased from 75 occurrences in 1989 to 93 occurrences in 2011 and Thurber's needlegrass decreased from 56 occurrences in 1989 to 44 occurrences in 2011 (Table 14).

Squirreltail decreased from 64 occurrences in 1989 to 63 occurrences in 2011 based on plot 4. Cheatgrass increased from 0 occurrences in 1989 to 3 occurrences in 2011 based on plot 4. Perennial and annual forbs increased from 103 occurrences in 1989 to 233 occurrences in 2011 based on plot 4. Longleaf phlox decreased from 41 occurrences in 1989 to 22 occurrences in 2011, 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. Thirteen species of forbs were recorded at the site.

Bare ground decreased from 47.5 percent cover in 1989 to 30.0 percent in 2011. Vegetation increased from 12.0 percent cover in 1989 to 13.0 in 2011. Biological crust increased from 0.0 percent in 1989 to 12.25 percent in 2011. Litter decreased from 39.75 percent cover in 1989 to 22.5 percent in 2011.

Table 14: East Trailing Field Pasture Trend Site 13S13E18 Nested Frequency Data Summary

Species or Vegetation Class	Plot	Occurrences	
		1989	2011
Thurber's needlegrass	4	56	44
Sandberg bluegrass	2	75	93
squirreltail	4	64	63
Bluebunch wheatgrass	4	3	0
cheatgrass	4	0	3
Moss	4	5	0
lomatogonium	4	1	4
paintbrush	4	25	2
Phlox	4	55	26
Wild onion	4	8	2
longleaf phlox	2	41	22
penstimon	4	2	1
fleabane	4	0	3
agoseris	4	0	2
milkvetch	4	7	19
Bur buttercup	4	0	17
maiden blue eyed Mary	4	0	74
slender phlox	4	0	81
tansymustard	4	NR	61
Spring draba	4	0	12
deathcamas	4	NR	7
Big sagebrush seedling	4	4	0
Big sagebrush	4	47	35

NR-Not recorded

Cover data was not collected at the 3x3 Photo Plot in 1989, so there is no way to compare the data collected in 2011.

West Clark Seeding Pasture:

The West Clark Seeding Pasture has one Nested Frequency/Photo Plot upland trend site that was read in 2010, and one Nested Frequency/Photo Plot upland trend site that was read in 2011.

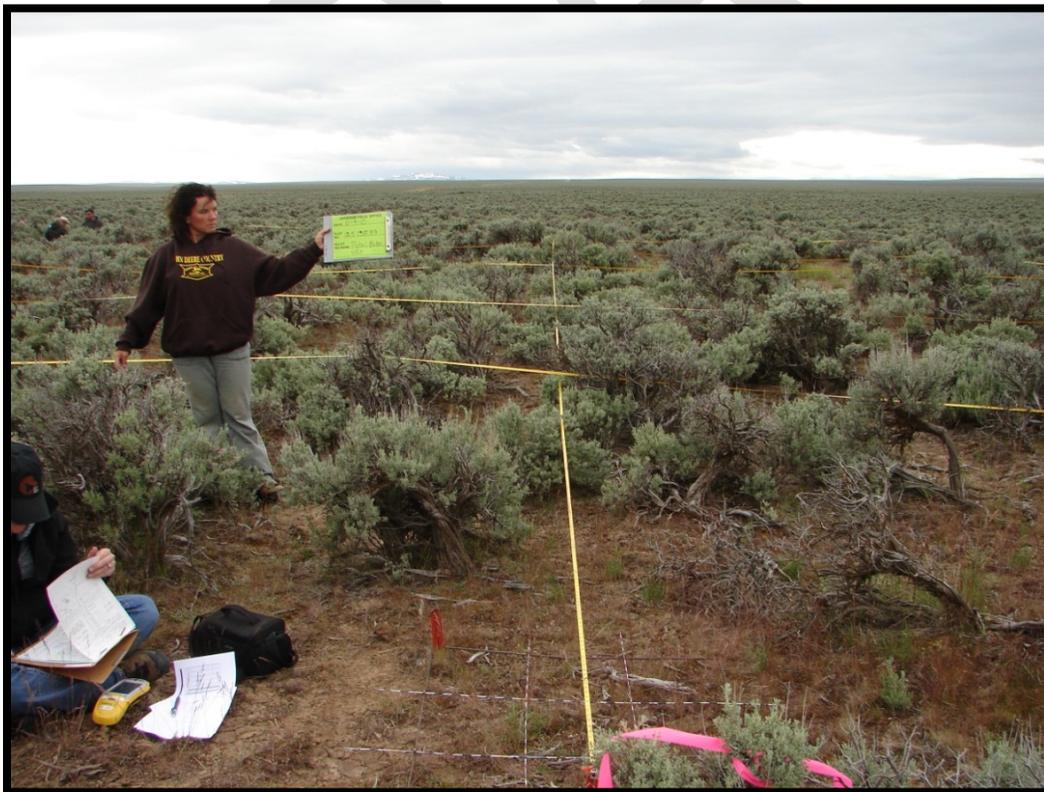
Trend Site 12S13E33:

Site 12S13E33 (Photos 9 and 10) is located in a Loamy 8-12" Wyoming big sagebrush/bluebunch wheatgrass/Thurber's needlegrass (R011XY001ID) ecological site. The site was established and initially read in in 1989 and re-read in 2010.

Photo 9: Overview of Trend Site 12S13E33 – May 22, 1989



Photo 10: Overview of Trend Site 12S13E33 - June 4, 2010



The key species at the site are Sandberg bluegrass and squirreltail. The number of occurrences for comparison between years is based on plot 1 within the nested frequency frame for Sandberg bluegrass and plot 3 for squirreltail. The frequency of Sandberg bluegrass has increased from 18 occurrences in 1989 to 24 occurrences in 2010 and squirreltail decreased from 41 occurrences in 1989 to 30 occurrences in 2010 (Table 15).

Crested wheatgrass increased from 1 occurrence in 1989 to 2 occurrences in 2010 based on plot 4. Cheatgrass was not recorded in 1989; 2 occurrences were recorded in 2010 based on plot 4. Perennial and annual forbs increased from 6 occurrences in 1989 to 22 occurrences in 2010 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. Seven species of forbs were recorded at the site.

Bare ground decreased from 37.75 percent cover in 1989 to 14.75 percent in 2010. Vegetation decreased from 7.50 percent cover in 1989 to 3.5 in 2010. Biological crust increased from 0.0 percent in 1989 to 48.25 percent in 2010. Litter decreased from 48.75 percent cover in 1989 to 26.5 percent in 2010.

Table 15: West Clark Seeding Pasture Trend Site 12S11E33 Nested Frequency Data Summary

Species or Vegetation Class	Plot	Occurrences	
		1989	2010
Sandberg bluegrass	1	18	24
squirreltail	3	41	30
Crested wheatgrass	4	1	2
cheatgrass	4	NR	5
pussytoes	4	1	0
phlox	4	1	1
Sagebrush phlox	4	NR	12
longleaf phlox	4	4	1
Bur buttercup	4	0	94
draba	4	0	1
tansymustard	4	NR	29
rockcress	4	0	1
agosaris	4	0	1
Big sagebrush seedling	4	1	NR
Big sagebrush	4	48	56

NR-Not recorded

Cover data collected at the 3x3 photo plot at the site shows that from 1989 to 2010, squirreltail decreased from 3.57 percent to 2.52 and Sandberg bluegrass increased from 11.7 percent to 29.19.

Trend Site 12S13E33A:

Site 12S13E33A (Photos 11 and 12) is located in a Loamy 8-12" Wyoming big sagebrush/bluebunch wheatgrass/Thurber's needlegrass (R011XY001ID) ecological site. The site was established and initially read in in 1989 and re-read in 2011.

Photo 11: Overview of Trend Site 12S13E33A – May 22, 1989



Photo 12: Overview of Trend Site 12S13E33A - June 14, 2011



The key species at the site are Sandberg bluegrass and thickspike wheatgrass. The number of occurrences for comparison between years is based on plot 1 within the nested frequency frame for Sandberg bluegrass and plot 4 for thickspike wheatgrass. The frequency of Sandberg bluegrass has increased from 14 occurrences in 1989 to 30 occurrences in 2011 and thickspike wheatgrass decreased from 98 occurrences in 1989 to 72 occurrences in 2011 (Table 16).

Cheatgrass was not recorded in 1989 and was recorded as 0 occurrences in 2011 based on plot 4. Perennial and annual forbs increased from 21 occurrences in 1989 to 72 occurrences in 2011 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. Eight species of forbs were recorded at the site.

Bare ground decreased from 42.5 percent cover in 1989 to 33.75 percent in 2011. Vegetation decreased from 9.25 percent cover in 1989 to 7.25 percent in 2011. Biological crust increased from 0.0 percent in 1989 to 13.25 percent in 2011. Litter decreased from 48.25 percent cover in 1989 to 13.25 percent in 2011.

Table 16: West Clark Seeding Pasture Trend Site 12S11E33A Nested Frequency Data Summary

Species or Vegetation Class	Plot	Occurrences	
		1989	2011
Sandberg bluegrass	1	14	30
desert wheatgrass	4	98	72
cheatgrass	4	NR	0
Wild onion	4	1	NR
phlox	4	1	NR
Bur buttercup	4	NR	95
longleaf phlox	4	19	32
Slender phlox	4	NR	6
maiden blue eyed Mary	4	0	21
desert madwort	4	0	2
Prickly lettuce	4	0	7
spring draba	4	0	4
tall annual willowherb	4	0	1
Big sagebrush seedling	4	24	3
Big sagebrush	4	46	42

*Species should be thickspike wheatgrass (ELLA3)

NR-Not recorded

Cover data was not collected at the 3x3 Photo Plot in 1989, so there is no way to compare the data collected in 2011.

East Clark Seeding Pasture:

The East Clark Seeding Pasture has one Nested Frequency/Photo Plot upland trend site that was read in 2013.

Trend Site 13S13E10:

Site 13S13E10 (Photos 13 and 14) is located in a Loamy 8-12" Wyoming big sagebrush/bluebunch wheatgrass/Thurber's needlegrass (R011XY001ID) ecological site. The site was established and initially read in in 1987 and re-read in 2013.

Photo 13: Overview of Trend Site 13S13E10 - July 8, 1987



Photo 14: Overview of Trend Site 13S13E10 - July 23, 2013



The key species at the site are Sandberg bluegrass and crested wheatgrass. The number of occurrences for comparison between years is based on plot 2 within the nested frequency frame for Sandberg bluegrass and plot 1 for crested wheatgrass. The frequency of Sandberg bluegrass has increased from 57 occurrences in 1987 to 68 occurrences in 2013 and crested wheatgrass decreased from 15 occurrences in 1987 to 8 occurrences in 2013 (Table 17).

Squirreltail increased from 0 occurrences in 1987 to 3 occurrences in 2013, based on plot 4. Perennial and annual forbs increased from 2 occurrences in 1987 to 15 occurrences in 2013 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. One species of forbs was recorded at the site.

Bare ground decreased from 51.0 percent cover in 1987 to 27.5 percent in 2013. Vegetation decreased from 18.75 percent cover in 1987 to 4.5 in 2013. Biological crust increased from 1.25 percent in 1987 to 28.0 percent in 2013. Litter decreased from 29.0 percent cover in 1987 to 14.25 percent in 2013.

Table 17: East Clark Seeding Pasture Trend Site 13S13E10 Nested Frequency Data Summary

Species or Vegetation Class	Plot	Occurrences	
		1987	2013
Sandberg bluegrass	2	57	68
crested wheatgrass	1	15	8
squirreltail	4	0	3
phlox	4	2	15
Bur buttercup	4	NR	95
yellow rabbitbrush	4	NR	1
rubber rabbitbrush	4	NR	4
Big sagebrush seedling	4	2	2
Big sagebrush	4	20	27

NR-Not recorded

Cover data was not collected at the 3x3 Photo Plot in 1987, so there is no way to compare the data collected in 2013.

Pigtail Butte Pasture:

The Pigtail Butte Pasture has one Nested Frequency/Photo Plot upland trend site that was read in 2011.

Trend Site 13S13E15:

Site 13S13E15 (Photos 15 and 16) is located in a Loamy 8-12" Wyoming big sagebrush/bluebunch wheatgrass/Thurber's needlegrass (R011XY001ID) ecological site. The site was established and initially read in 1987 and re-read in 2011.

Photo 15: Overview of Trend Site 13S13E15 – July 8, 1987



Photo 16: Overview of Trend Site 13S13E15 - June 14, 2011



The key species at the site are Sandberg bluegrass and crested wheatgrass. The number of occurrences for comparison between years is based on plot 2 within the nested frequency frame for Sandberg bluegrass and plot 1 for crested wheatgrass. The frequency of Sandberg bluegrass has increased from 44 occurrences in 1987 to 71 occurrences in 2011 and crested wheatgrass decreased from 19 occurrences in 1987 to 1 occurrence in 2011 (Table 18).

Perennial and annual forbs increased from 5 occurrences in 1987 to 14 occurrences in 2011 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. Nine species of forbs was recorded at the site.

Bare ground decreased from 56.0 percent cover in 1987 to 38.0 percent in 2011. Vegetation decreased from 11.25 percent cover in 1987 to 7.5 in 2011. Biological crust increased from 1.5 percent in 1987 to 8.75 percent in 2011. Litter decreased from 31.25 percent cover in 1987 to 9.0 percent in 2011.

Table 18: Pigtail Butte Pasture Trend Site 13S13E15 Nested Frequency Data Summary

Species or Vegetation Class	Plot	Occurrences	
		1987	2011
Sandberg bluegrass	2	44	71
crested wheatgrass	1	19	1
Milkvetch	4	4	NR
Longleaf phlox	4	1	8
Spiny phlox	4	NR	2
Bur buttercup	4	NR	72
desertparsley	4	0	1
Wild onion	4	0	2
maiden blue eyed Mary	4	NR	12
tansymustard	4	NR	19
Prickly lettuce	4	0	2
fleabane	4	0	1
yellow rabbitbrush	4	0	1
Big sagebrush seedling	4	12	2
Big sagebrush	4	12	23

NR-Not recorded

Cover data was not collected at the 3x3 Photo Plot in 1989, so there is no way to compare the data collected in 2011.

South Pigtail Butte Pasture:

The South Pigtail Butte Pasture has one Nested Frequency/Photo Plot upland trend site that was read in 2013.

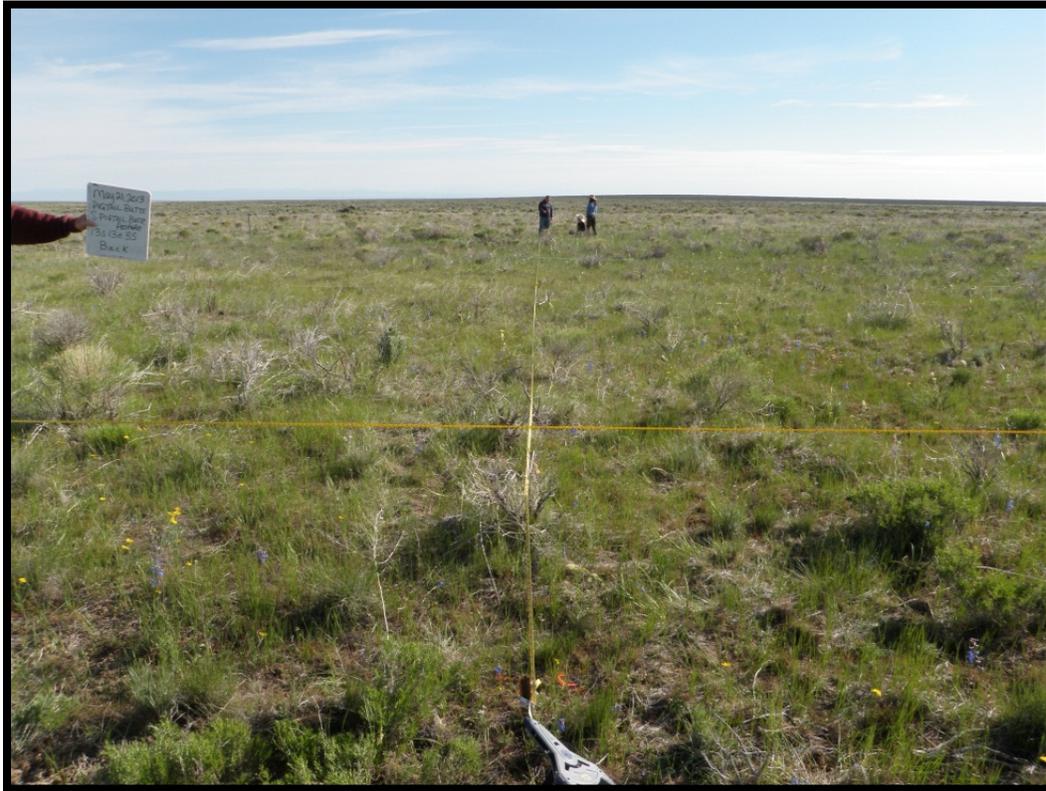
Trend Site 13S13E35:

Site 13S13E35 (Photos 17 and 18) is located in a Loamy 8-12" Wyoming big sagebrush/bluebunch wheatgrass/Thurber's needlegrass (R011XY001ID) ecological site. The site was established and initially read in in 1987 and re-read in 2013.

Photo 17: Overview of Trend Site 13S13E35 - July 20, 1987



Photo 18: Overview of Trend Site 13S13E35 - June 21, 2013



The key species at the site are Sandberg bluegrass and squirreltail. The number of occurrences for comparison between years is based on plot 2 within the nested frequency frame for Sandberg bluegrass and plot 4 for squirreltail. The frequency of Sandberg bluegrass has increased from 51 occurrences in 1987 to 73 occurrences in 2013 and squirreltail decreased from 47 occurrences in 1987 to 14 occurrences in 2013 (Table 19).

Cheatgrass increased from 0 occurrences in 1987 to 9 occurrences in 2013 based on plot 4. Perennial and annual forbs increased from 50 occurrences in 1987 to 338 occurrences in 2013 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. Fourteen species of forbs were recorded at the site.

Bare ground decreased from 71.0 percent cover in 1987 to 10.0 percent in 2013. Vegetation decreased from 14.0 percent cover in 1987 to 9.0 in 2013. Biological crust increased from 0.0 percent in 1987 to 13.0 percent in 2013. Litter decreased from 13.75 percent cover in 1987 to 62.0 percent in 2013.

Table 19: South Pigtail Butte Pasture Trend Site 13S13E35 Nested Frequency Data Summary

Species or Vegetation Class	Plot	Occurrences	
		1987	2013
Sandberg bluegrass	2	51	73
squirreltail	4	47	14
Bluebunch wheatgrass	4	4	0
Idaho fescue	4	2	0
Thurber's needlegrass	4	0	5
Crested wheatgrass	4	0	2
thickspike wheatgrass	4	0	69
cheatgrass	4	0	9
Spring draba	4	0	62
Prickly lettuce	4	11	0
milkvetch	4	3	0
longleaf phlox	4	14	23
Spiny phlox	4	14	14
yellow salsify	4	8	1
maiden blue eyed Mary	4	0	70
Bur buttercup	4	0	62
lens pod milkvetch	4	0	12
Slender phlox	4	0	34
mountain tansymustard	4	0	31
tall annual willowherb	4	0	29
agoseris	4	0	31
deathcamas	4	0	17
unknown	4	0	8
milkvetch	4	0	6
Russian thistle	4	0	8
Yellow salsify	4	0	1
tall tumbledustard	4	0	7
desert biscuitroot	4	0	1
onion	4	0	1
yellow rabbitbrush	4	NR	4
yellow rabbitbrush seedling	4	NR	3

NR-Not recorded

Cover data was not collected at the 3x3 Photo Plot in 1987, so there is no way to compare the data collected in 2013.

NW Roseworth Reservoir Pasture:

The NW Roseworth Reservoir Pasture has one Nested Frequency/Photo Plot upland trend site that was read in 2013.

Trend Site 14S13E01:

Site 14S13E01 (Photos 19 and 20) is located in a Loamy 8-12" Wyoming big sagebrush/bluebunch wheatgrass/Thurber's needlegrass (R011XY001ID) ecological site. The site was established and initially read in in 1987 and re-read in 2013.

Photo 19: Overview of Trend Site 14S13E01 – July 20, 1987



Photo 20: Overview of Trend Site 14S13E01 - June 3, 2013



The key species at the site are Sandberg bluegrass and squirreltail. The number of occurrences for comparison between years is based on plot 4 within the nested frequency frame for Sandberg bluegrass and plot 4 for squirreltail. The frequency of Sandberg bluegrass has increased from 38 occurrences in 1987 to 70 occurrences in 2013 and squirreltail decreased from 14 occurrences in 1987 to 1 occurrence in 2013 (Table 20).

Crested wheatgrass increased from 30 occurrences in 1987 to 76 occurrences in 2013, based on plot 4. Perennial and annual forbs increased from 152 occurrences in 1987 to 155 occurrences in 2013 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. Seventeen species of forbs were recorded at the site.

Bare ground decreased from 87.0 percent cover in 1987 to 36.50 percent in 2013. Vegetation increased from 5.0 percent cover in 1987 to 21.0 in 2013. Biological crust increased from 0.0 percent in 1987 to 0.5 percent in 2013. Litter increased from 8.0 percent cover in 1987 to 40.5 percent in 2013.

Table 20: Northwest Roseworth Reservoir Pasture Trend Site 14S13E01 Nested Frequency Data Summary

Species or Vegetation Class	Plot	Occurrences	
		1987	2013
Sandberg bluegrass	4	38	70
squirreltail	4	14	1
Thurber's needlegrass	4	0	1
Crested wheatgrass	4	30	76
basin wildrye	4	0	19
wheatgrass	4	0	2
Aster spp	4	27	0
Prickly lettuce	4	8	0
milkvetch	4	1	4
longleaf phlox	4	51	34
Spiny phlox	4	5	0
forage kochia	4	3	0
lupine	4	7	0
intermediate wheatgrass	4	2	0
yellow salsify	4	2	0
Alfalfa	4	25	1
Prickly lettuce	4	8	0
beardtongue	4	8	0
buckwheat	4	7	0
maiden blue eyed Mary	4	0	29
Bur buttercup	4	0	51
draba	4	0	18
Slender phlox	4	0	23
tall annual willowherb	4	0	7
sagebrush phlox	4	0	6
western tansymustard	4	0	1
desert biscuitroot	4	0	17
onion	4	0	22
Wyoming Big sagebrush	4	1	0

NR-Not recorded

Cover data was not collected at the 3x3 Photo Plot in 1987, so there is no way to compare the data collected in 2013.

Northeast Roseworth Reservoir Pasture:

The Northeast Roseworth Reservoir Pasture has one Nested Frequency/Photo Plot upland trend site that was read in 2011.

Trend Site 14S14E06:

Site 14S14E06 (Photos 21 and 22) is located in a Loamy 8-12" Wyoming big sagebrush/bluebunch wheatgrass/Thurber's needlegrass (R011XY001ID) ecological site. The site was established and initially read in in 1987 and re-read in 2011.

Photo 21: Overview of Trend Site 14S14E06 – July 6, 1987



Photo 22: Overview of Trend Site 14S14E06 - June 14, 2011



The key species at the site are Sandberg bluegrass and squirreltail. The number of occurrences for comparison between years is based on plot 3 within the nested frequency frame for Sandberg bluegrass and plot 4 for squirreltail. The frequency of Sandberg bluegrass has increased from 44 occurrences in 1987 to 68 occurrences in 2011 and squirreltail decreased from 26 occurrences in 1987 to 4 occurrences in 2011 (Table 21).

Crested wheatgrass increased from 22 occurrences in 1987 to 76 occurrences in 2011, based on plot 3. Cheatgrass was not recorded in 1987 but was recorded as 7 occurrences in 2011, based on plot 4. Perennial and annual forbs increased from 154 occurrences in 1987 to 330 occurrences in 2011 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. Sixteen species of forbs were recorded at the site.

Bare ground decreased from 81.0 percent cover in 1987 to 28.0 percent in 2011. Vegetation increased from 6.0 percent cover in 1987 to 23.0 in 2011. Biological crust increased from 0.0 percent in 1987 to 3.0 percent in 2011. Litter increased from 11.5 percent cover in 1987 to 39.0 percent in 2011.

Table 21: Northeast Roseworth Reservoir Pasture Trend Site 14S14E06 Nested Frequency Data Summary

Species or Vegetation Class	Plot	Occurrences	
		1987	2011
Sandberg bluegrass	3	44	68
squirreltail	4	26	4
Thurber's needlegrass	4	1	0
Crested wheatgrass	3	22	76
Idaho fescue	4	1	0
cheatgrass	4	NR	7
agoseris	4	1	61
Aster spp	4	6	0
Prickly lettuce	4	12	0
milkvetch	4	0	3
longleaf phlox	4	61	9
Spiny phlox	4	24	3
Alfalfa	4	27	0
Prickly lettuce	4	12	0
Idaho fleabane	4	0	12
maiden blue eyed Mary	4	0	79
Bur buttercup	4	0	63
draba	4	0	16
Slender phlox	4	0	63
tall annual willowherb	4	0	3
strict forget-me-not	4	0	18
western tansymustard	4	0	9
Anderson larkspur	4	0	3
onion	4	7	60
moss	4	4	0
fourwing saltbush	4	NR	2
Wyoming Big sagebrush	4	0	2

NR-Not recorded

Cover data was not collected at the 3x3 Photo Plot in 1987, so there is no way to compare the data collected in 2013.

Threemile Crossing Pasture:

The Threemile Crossing Pasture has one Nested Frequency/Photo Plot upland trend site that was read in 2011.

Trend Site 13S14E32:

Site 13S14E32 (Photos 23 and 24) is located in a Loamy 8-12" Wyoming big sagebrush/bluebunch wheatgrass/Thurber's needlegrass (R011XY001ID) ecological site. The site was established and initially read in 1987 and re-read in 2011.

Photo 23: Overview of Trend Site 13S14E32 – July 8, 1987



Photo 24: Overview of Trend Site 13S14E32 - June 9, 2011



The key species at the site are Sandberg bluegrass and crested wheatgrass. The number of occurrences for comparison between years is based on plot 2 within the nested frequency frame for Sandberg bluegrass and plot 1 for crested wheatgrass. The frequency of Sandberg bluegrass has increased from 60 occurrences in 1987 to 72 occurrences in 2011 and crested wheatgrass decreased from 32 occurrences in 1987 to 21 occurrences in 2011 (Table 22).

Cheatgrass was not recorded in 1987 but was recorded as 3 occurrences in 2011, based on plot 4. Perennial and annual forbs increased from 5 occurrences in 1987 to 198 occurrences in 2011 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. Ten species of forbs was recorded at the site.

Bare ground decreased from 29.0 percent cover in 1987 to 30.0 percent in 2011. Vegetation decreased from 24.5 percent cover in 1987 to 19.0 in 2011. Biological crust increased from 2.5 percent in 1987 to 12.5 percent in 2011. Litter decreased from 44.0 percent cover in 1987 to 27.0 percent in 2011.

Table 22: Threemile Crossing Pasture Trend Site 13S14E32 Nested Frequency Data Summary

Species or Vegetation Class	Plot	Occurrences	
		1987	2011
Sandberg bluegrass	2	60	72
Crested wheatgrass	1	32	21
cheatgrass	4	NR	3
longleaf phlox	4	4	7
Spiny phlox	4	1	0
Prickly lettuce	4	0	2
maiden blue eyed Mary	4	0	40
Bur buttercup	4	0	78
draba	4	0	70
Slender phlox	4	0	68
tall annual willowherb	4	0	3
strict forget-me-not	4	0	3
western tansymustard	4	0	4
onion	4	0	4
northwestern Indian paintbrush	4	0	1
Wyoming Big sagebrush seedling	4	4	5
Wyoming Big sagebrush	4	7	11

NR-Not recorded

Cover data was not collected at the 3x3 Photo Plot in 1987, so there is no way to compare the data collected in 2011.

Noxious Weeds

The State of Idaho has listed 65 plant species as noxious weeds. Four noxious weed species are known to occur within the Pigtail Butte Allotment and include diffuse knapweed (*Centaurea diffusa*), Russian knapweed (*Acroptilon repens*), whitetop (*Cardaria draba*) and scotch broom (*Cytisus scoparius*).

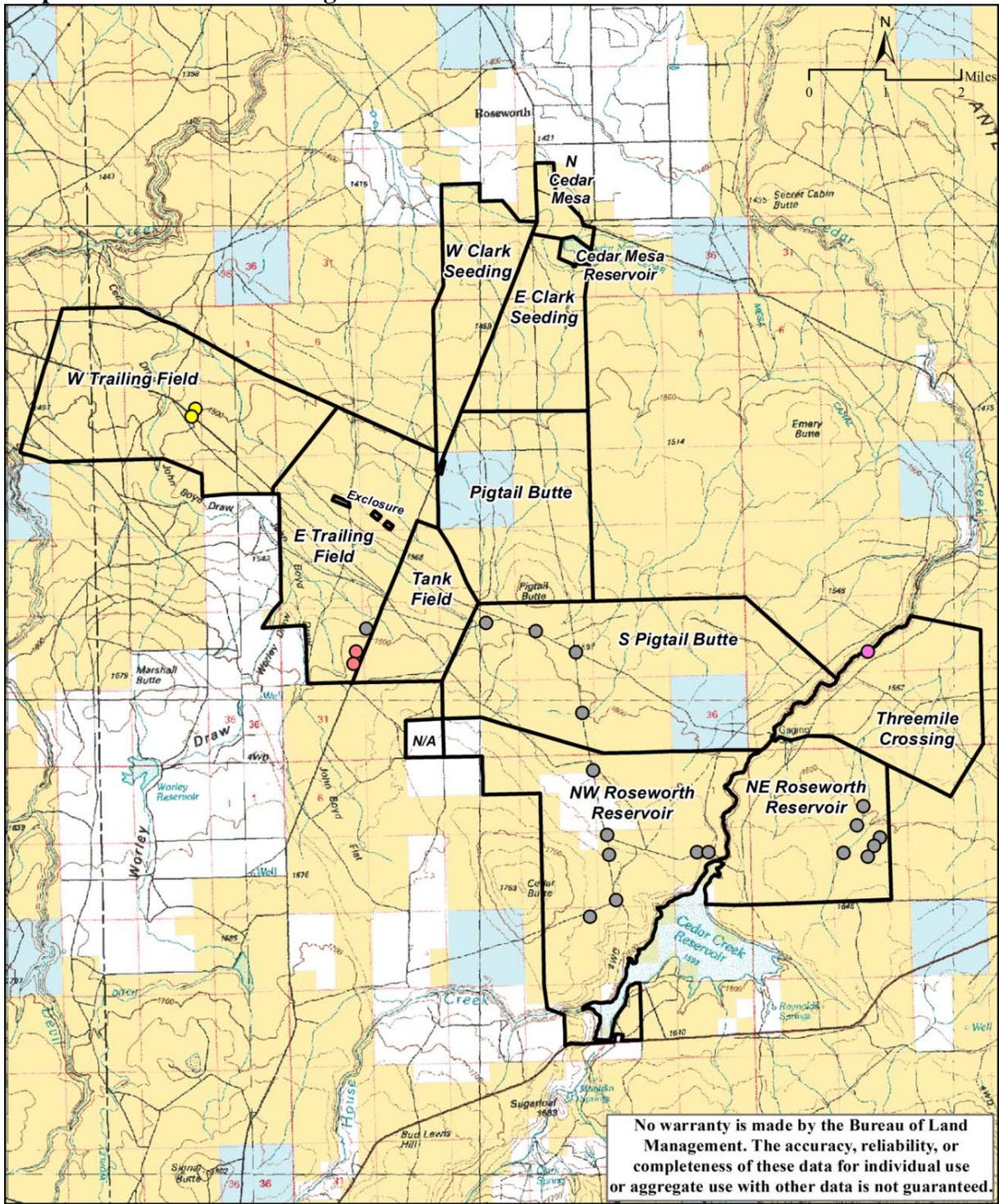
Map 9 illustrates the documented occurrences within the Pigtail Butte Allotment, which were chemically treated in 2005, 2007 and 2011. Treatment goals are to reduce noxious weeds to where they will not have a significant economic or environmental impact and/or to eradicate them completely. The BLM also 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 9: Noxious Weed Management



IDAHO RANGELAND HEALTH STANDARDS ASSESSMENT

There are eight standards for healthy rangelands that apply to BLM lands in the State of Idaho. Not all of the Standards apply to the Pigtail 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 Pigtail Butte Allotment:

- **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 channel and floodplains are properly functioning relative to the geomorphology (e.g., gradient, size, shape, roughness, confinement, and sinuosity) and landform to provide for the 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 Pigtail Butte Allotment*

Table 23: Standards Applicable to the Pigtail Butte Allotment

Standard	Pastures
1	All Pastures
2	South Pigtail Butte, Threemile Crossing, Northwest Roseworth Reservoir, and Northeast Roseworth Reservoir
3	South Pigtail Butte, Threemile Crossing, Northwest Roseworth Reservoir, and Northeast Roseworth Reservoir
4	East Trailing Field, South Pigtail Butte and Tank Field
5	East Clark Seeding, West Clark Seeding, Pigtail Butte, North Cedar Mesa, Three Mile Crossing, Northeast Roseworth Reservoir, West Trailing Field, and Northwest Roseworth Reservoir
6	Not applicable

Standard	Pastures
7	South Pigtail Butte, Threemile Crossing, Northwest Roseworth Reservoir, and Northeast Roseworth Reservoir
8	All Pastures

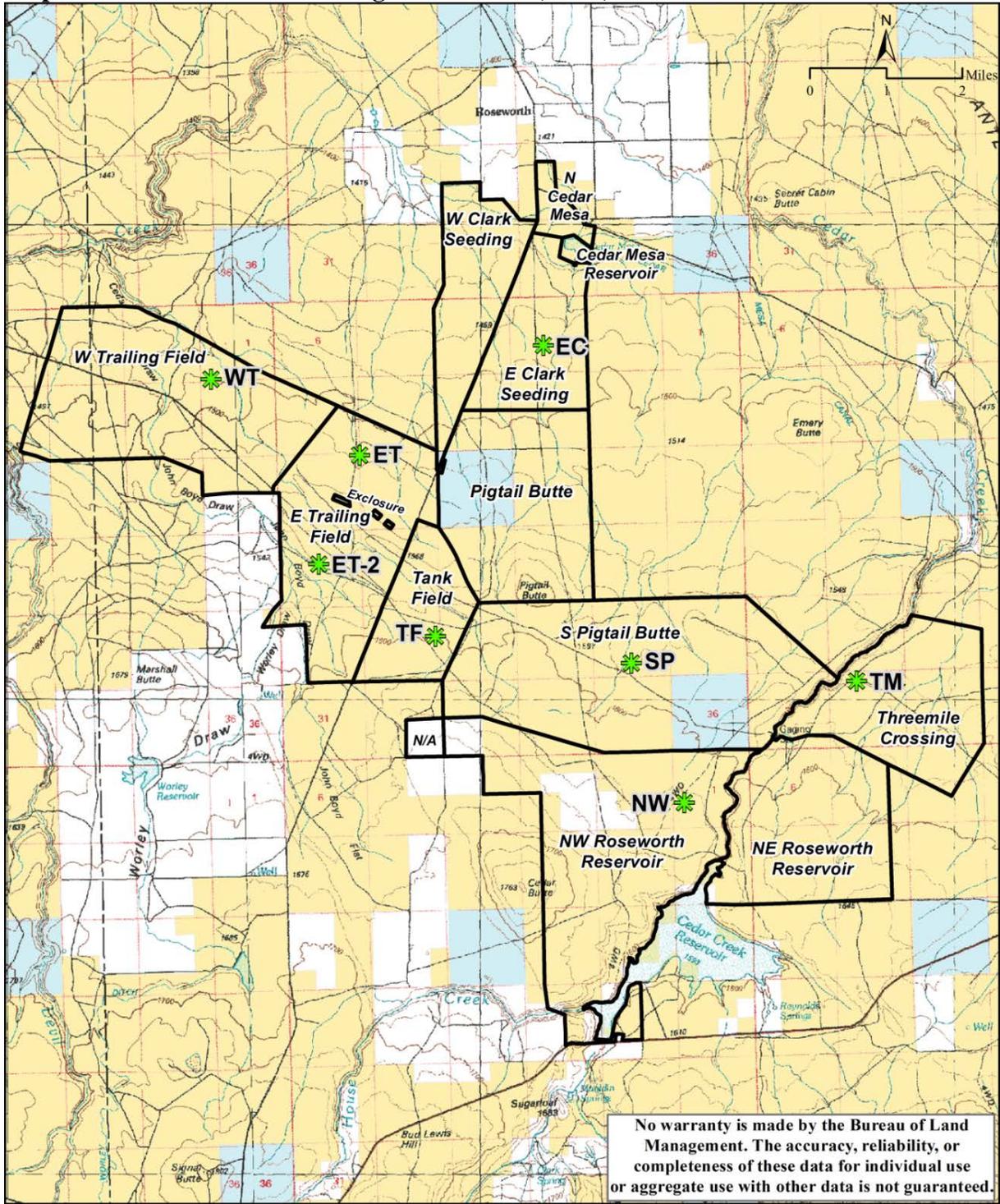
An interdisciplinary team (IDT) conducted IIRH field evaluations at six sites representative of the Pigtail Butte Allotment during June, 2013 and at an additional two sites in May, 2014. Sites were located in both native areas and in seedings, with one site in each of the East Clark Seeding, West Trailing Field, South Pigtail Butte, Tank Field, Northwest Roseworth Reservoir and Three Mile Crossing Pastures as well as two sites in the East Trailing Field Pasture. Map 8 shows the location of the evaluation sites. Each of the sites at which IIRH evaluations were conducted were 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 16) were used to evaluate three rangeland health attributes (Table 17): 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 10: Idaho Indicators of Rangeland Health (IIRH) Sites



In addition to evaluating rangeland health indicators at each of the IIRH sites, the IDT also examined other areas to ensure evaluation sites were representative of the vegetation communities throughout the allotment. 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 Pigtail Butte Allotment. The EC and TM IIRH sites were located in the Loamy 10-13 ARTRW8/PSSPSS (Wyoming big sagebrush/bluebunch wheatgrass) ecological site (USDA and NRCS, 2012a). All of the other IIRH sites were located in Loamy 8-12 ARTRW8/PSSPSS-ACTH7 (Wyoming big sagebrush/bluebunch wheatgrass-Thurber’s needlegrass) ecological site (USDA and NRCS, 2012a). The ESD reference sheets describe the expected condition of the ecological site in state 1, phase A of the reference state.

The Loamy 8-12 ARTRW8/PSSPS-ACTH7 (R011XY001ID) plant community should have Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) in the overstory with bluebunch wheatgrass dominating the understory. Thurber’s needlegrass is the sub-dominant grass species. Other significant species include Sandberg bluegrass, Tapertip hawksbeard (*Crepis acuminata*), and arrowleaf balsamroot (*Balsamorhiza sagittata*). There can be a variety of other grasses, forbs, and shrubs in minor amounts. The natural fire frequency should be 50-70 years.

The Loamy 10-13 ARTRW8/PSSPSS (R025XY019ID) plant community should have Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) in the overstory with bluebunch wheatgrass dominating the understory. Sub-dominant species include Thurber’s needlegrass, Sandberg bluegrass, bottlebrush squirreltail, arrowleaf balsamroot (*Balsamorhiza sagittata*), tapertip hawksbeard (*Crepis acuminata*), and lupine (*Lupinus* L.). There can be a variety of other grasses, forbs, and shrubs in minor amounts. The natural fire frequency should be 50-70 years.

Indicator ratings for each site in the Pigtail Butte Allotment are shown in Table 24. Rangeland health attributes ratings are shown in Table 25.

Table 24: Summary of 17 Rangeland Health Indicators

Indicators	Attributes	Degree of Departure from Ecological Site Description and/or Ecological Reference Area(s)				
	S = Soil & Site Stability H = Hydrologic Function B = Biotic Integrity	Extreme	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
1. Rills	S, H					EC, ET, ET_2, SP, TF, TM, WT, NW
2. Water-flow Patterns	S, H			ET_2		EC, ET, SP, TF, TM, WT, NW
3. Pedestals and/or terracettes	S, H			ET_2	WT	EC, ET, SP, TF, TM, NW
4. Bare ground	S, H				NW	EC, ET, ET_2, SP, TF, TM, WT

Indicators	Attributes	Degree of Departure from Ecological Site Description and/or Ecological Reference Area(s)				
	S = Soil & Site Stability H = Hydrologic Function B = Biotic Integrity	Extreme	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
5. Gullies	S, H				WT	EC, ET, ET_2, SP, TF, TM, NW
6. Wind-scoured, blowouts, and/or deposition areas	S				WT	EC, ET, ET_2, SP, TF, TM, NW
7. Litter movement	S					EC, ET, ET_2, SP, TF, TM, WT, NW
8. Soil surface resistance to erosion	S, H, B					EC, ET, ET_2, SP, TF, TM, WT, NW
9. Soil surface loss or degradation	S, H, B			ET_2, NW		EC, ET, SP, TF, TM, WT
10. Plant community composition and distribution relative to infiltration	H				SP, WT	EC, ET, ET_2, TF, TM, NW
11. Compaction layer	S, H, B					EC, ET, ET_2, SP, TF, TM, WT, NW
12. Functional/structural groups	B			EC, NW	SP, WT, ET_2	ET, TF, TM
13. Plant mortality/decadence	B					EC, ET, ET_2, SP, TF, TM, WT, NW
14. Litter amount	H, B			SP, WT	TF, TM	EC, ET, ET_2, NW
15. Annual production	B				NW	EC, ET, ET_2, SP, TF, TM, WT
16. Invasive plants	B		EC, ET_2, NW	SP, WT	TM	ET, TF
17. Reproductive capability of perennial plants	B					EC, ET, ET_2, SP, TF, TM, WT, NW

EC: East Clark Seeding Pasture (representative of the East Clark Seeding, West Clark Seeding, Pigtail Butte, Cedar Mesa Reservoir and North Cedar Mesa Pastures) ET: East Trailing Field Pasture (northern portion) ET_2: East Trailing Field Pasture (southern portion) SP: South Pigtail Butte Pasture TF: Tank Field Pasture TM: Three Mile Crossing Pasture (representative of the Three Mile Crossing and NE Roseworth Reservoir Pastures) WT: West Trailing Field Pasture NW: Northwest Roseworth Reservoir 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 24 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 25.

Table 25: 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				WT, ET_2, NW	EC, ET, SP, TF, TM
Hydrologic Function				ET_2, NW	EC, ET, SP, TF, TM, WT
Biotic Integrity			ET_2, NW	EC, SP, WT	ET, TF, TM

EC: East Clark Seeding Pasture (representative of the East Clark Seeding, West Clark Seeding, Pigtail Butte, Cedar Mesa Reservoir and North Cedar Mesa Pastures) ET: East Trailing Field Pasture (northern portion) ET_2: East Trailing Field Pasture (southern portion) SP: South Pigtail Butte Pasture TF: Tank Field Pasture TM: Three Mile Crossing Pasture (representative of the Three Mile Crossing and NE Roseworth Reservoir Pastures) WT: West Trailing Field Pasture NW: Northwest Roseworth Reservoir 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

Two IIRH sites (EC, TM) were evaluated with the reference sheet for the Loamy 8-12 ARTRW8/PSSPS-ACTH7 (USDA and NRCS, 2013a) Ecological Site Description (ESD), and six IIRH sites (ET, ET_2, WT, SP, NW, and TF) were evaluated with the reference sheet for the Loamy 10-13 ARTRW8/PSSPS (USDA and NRCS, 2013a) ESD. The reference sheets for both of the ESDs indicate that bare ground should range from 30 to 40 percent, litter cover should range from 5 to 10 percent and the soil stability test values should range from 4 to 6 (on a scale of 1 to 6; Pellant et al., 2005).

Multiple soil series exist within the Pigtail Butte Allotment and are typically silt loams. The majority of the allotment is relatively flat. The Soil Survey Geographic (SSURGO) Database (NRCS 2012) shows that 79% of the allotment has a moderate wind erosion factor and 1% of the allotment has a severe wind erosion factor, 18% of the allotment has a non-erosion factor, and the remaining 1% shows no data. SSURGO data further indicates that >1% of the allotment has a low erosion factor for water erosion, 43% of the allotment has a medium water erosion factor, 55% has a high water erosion factor, and the remaining 1% shows no data.

Although the soil survey shows potential for both wind and water erosion in this area, adequate soil cover is present within the allotment to reduce potential erosion. Bare ground is generally low, with an abundance of vegetation, litter, and biological soil crusts throughout the majority of the allotment (Tables 13, 14, 15, and 16).

East Clark Seeding, West Clark Seeding, Pigtail Butte, Cedar Mesa Reservoir and North Cedar Mesa Pastures

IIRH were not evaluated in the West Clark Seeding, Pigtail Butte, Cedar Mesa Reservoir, and North Cedar Mesa Pastures. However, IIRH site EC is located in the East Clark Seeding Pasture and the IDT felt that the site was generally representative of the vegetation and soils found in the West Clark Seeding, Pigtail Butte, Cedar Mesa Reservoir and North Cedar Mesa Pastures; therefore, IIRH site EC will be used to evaluate all five pastures.

IIRH site EC (Photo 25) is located in an historic crested wheatgrass seeding in a Loamy 10-13 ARTRW8/PSSPS ESD. Crested wheatgrass is the dominant deep-rooted grass species at 5 percent cover and Sandberg bluegrass is the dominant shallow rooted grass species at 21 percent cover (Table 34).

The site has a mostly flat topography with a generally north aspect. No soil stability test was completed at this site; however, the field notes refer to the soil test performed in the West Trailing Field Pasture. The soil stability test (Pellant et al., 2005) completed in the West Trailing Field Pasture resulted in a soil stability value of 4.3 (values should range from 4 to 6), indicating resistance to erosion. Biological crust comprised 9 percent cover and bare ground was 19 percent cover.

The four pastures that are represented by IIRH site EC have vegetation that was influenced by vegetation treatment projects in the 1960's; although many areas of these pastures currently have a significant sagebrush component, they have all undergone sagebrush reduction projects accompanied by non-native perennial grass seedings. None of the pastures have burned in wildfire since at least 1960, with the exception of the 1990 Pigtail Fire, which affected approximately 25 percent of the Pigtail Butte Pasture.

All 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 both rated as a none to slight departure.

Photo 25: Soil Profile in the East Clark Seeding Pasture – June 26, 2013



East Trailing Field Pasture

IIRH site ET (Photo 26) is located in a native vegetation community in a Loamy 8-12 ARTRW8/PSSPS-ACTH7 ESD. Thurber's needlegrass is the dominant deep-rooted grass species at 6 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 14 percent cover (Table 31). Squirreltail is also present at 4.5 percent cover.

The topography of the site is flat to gently sloped, with a generally north-northeast aspect. No soil stability test was completed at this site; however, the field notes refer to the soil test performed in the West Trailing Field Pasture. The soil stability test (Pellant et al., 2005) completed in the West Trailing Field Pasture resulted in a soil stability value of 4.3 (values should range from 4 to 6), indicating resistance to erosion. Biological crusts comprised 16.5 percent cover and bare ground was 25.5 percent cover.

All indicators related to the Soil and Site Stability and Hydrologic Function attributes were rated none to slight departure from the reference condition. Therefore, the Soil and Site Stability and Hydrologic Function attributes were each rated as none to slight departure (Table 5).

Photo 26: Soil Profile in the East Trailing Field Pasture (IIRH Site ET) – June 26, 2013



IIRH site ET_2 (Photo 27) is located in a native vegetation community in a Loamy 8-12 ARTRW8/PSSPS-ACTH7 ESD. Thurber's needlegrass, thickspike wheatgrass and western wheatgrass are co-dominant deep-rooted grass species at 10 percent cover each and Sandberg bluegrass is the dominant shallow-rooted grass species at 16 percent cover.

The site is located in the bottom of a draw. No soil stability test was performed completed at this site; however, the field notes refer to the soil test performed in the West Trailing Field Pasture. The soil stability test (Pellant et al., 2005) completed in the West Trailing Field Pasture resulted in a soil stability value of 4.3 (values should range from 4 to 6), indicating resistance to erosion. Biological soil crusts comprise 4 percent cover and bare ground 6 percent cover.

The 2007 Murphy Complex Fire burned 1,894 acres (59%) of the East Trailing Field Pasture. No drill seeding was prescribed; however, about 8,500 acres within the allotment were aerially seeded in strips with Wyoming big sagebrush.

The Water-flow Patterns indicator was rated as a moderate departure from reference condition due to some flow patterns observed on the site. Most flow patterns observed were short, disconnected and vegetated with no recent evidence of erosion. The Plant Pedestals and/or Terracettes indicator was rated as moderate departure from the reference condition due to numerous pedestals observed. Some of the pedestals observed were active but most were stable and no terracettes were observed. The Soil Surface Loss or Degradation indicator was rated as a

moderate departure. The site has lost soil following wildfire and soil organic matter is reduced in the plant interspaces. The IIRH field notes also state “areas with problems were healing.”

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 the Hydrologic Function attributes were both rated as a slight to moderate departure.

Photo 27: Soil Profile in East Trailing Field Pasture (IIRH Site ET_2) – May 29, 2014



West Trailing Field Pasture

IIRH site WT (Photo 28) is located in a seeded vegetation community in a Loamy 8-12 ARTRW8/PSSPS-ACTH7 ESD. Thurber’s needlegrass is the dominant deep-rooted grass species at 11 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 31.5 percent cover. Squirreltail was also present at 9 percent cover (Table 34).

The topography of the site is flat to rolling, with a generally north aspect. The soil stability test (Pellant et al., 2005) completed at this site resulted in a soil stability value of 4.3 (values should range from 4 to 6), indicating resistance to erosion. Biological soil crusts comprise 1.5 percent cover and bare ground 10.5 percent cover.

The 2007 Murphy Complex Fire burned 3,738 acres (92%) of the West Trailing Field Pasture. Following the fire, approximately 1,497 acres (40%) of the burned area within the West Trailing Field Pasture was drill seeded with the Thurber’s seed mix consisting of ‘Secar’ Snake River

wheatgrass, Sandberg bluegrass, 'Sherman' big bluegrass, squirreltail, Lewis flax, alfalfa and Munro's globemallow. In addition, about 8,500 acres within the allotment were aerially seeded in strips with Wyoming big sagebrush.

The Plant Pedestals and/or Terracettes indicator was rated as slight to moderate departure from the reference condition due to old, inactive pedestals observed at this site. The Gullies indicator was rated as a slight to moderate departure due to old gullies observed at the site; however, the gullies are healing and are fully vegetated, indicating that erosion is not occurring. The Wind-scoured, Blowouts, and/or Deposition Areas indicator was rated as a slight to moderate departure although these areas were few, directly associated with the previously mentioned gullies and are most likely the result of post-fire wind events. The Plant Community Composition and Distribution relative to Infiltration indicator was rated slight to moderate departure because the site generally lacked shrubs. Litter Amount indicator was rated as a moderate departure due to a moderate increase in litter (40 percent) 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 attribute was rated as slight to moderate departure and the overall Hydrologic Function attribute was rated as none to slight departure.

Photo 28: Soil Profile in the West Trailing Field Pasture – June 26, 2013



Tank Field and South Pigtail Butte Pastures - Native Areas

IIRH site TF is located in the Tank Field Pasture; however, the IDT felt that the site was also generally representative of the vegetation and soils found in the native areas of the Tank Field and the South Pigtail Butte Pastures.

IIRH site TF (Photo 29) is located in a mixture of old and newer seedings, which is comprised of crested wheatgrass and various native and native-like species. IIRH site TF is located in a Loamy 8-12 ARTRW8/PSSPS-ACTH7 ESD. Bluebunch wheatgrass is the dominant deep-rooted grass species at 3.5 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 23.5 percent cover. Squirreltail was also present at 2.5 percent cover (Table 31).

The site is of relatively flat topography with generally an east aspect. No soil stability test was completed at this site; however, the field notes refer to the soil test performed in the South Pigtail Butte Pasture. The soil stability test (Pellant et al., 2005) completed in the South Pigtail Butte Pasture resulted in a soil stability value of 4.7 (values should range from 4 to 6), indicating resistance to erosion. Biological crust comprised 9 percent cover and bare ground was 14.5 percent cover.

Approximately half of the Tank Pasture burned in the 2007 Murphy Complex Fire. No drill seeding was prescribed; however, about 8,500 acres within the allotment were aerially seeded in strips with Wyoming big sagebrush.

The Litter Amount indicator was rated as a slight to moderate departure from reference condition due to a slight increase in litter (23 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 both rated as a none to slight departure.

Photo 29: Soil Profile in the Tank Field Pasture – June 19, 2013



Three Mile Crossing and Northeast Roseworth Reservoir Pastures

IIRH site TM (Photo 30) is located in the Three Mile Crossing Pasture; however, the IDT felt that the site was also generally representative of the vegetation and soils found in the Northeast Roseworth Reservoir Pasture. Therefore, IIRH site TM will be used to evaluate both pastures

IIRH site TM is located in an historic crested wheat seeding in a Loamy 10-13 ARTRW8/PSSPS ESD. Crested wheatgrass is the dominant deep-rooted grass species at 6 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 20.5 percent cover. Thurber's needlegrass is also present at 4 percent cover (Table 34).

The site is of relatively flat topography with west aspect and the soil stability test (Pellant et al., 2005) completed at the site resulted in a soil stability value of 4.1 (values should range from 4 to 6), indicating resistance to erosion. Biological soil crusts comprise 9.5 percent cover and bare ground is 10 percent.

The Litter Amount indicator was rated as slight to moderate departure from reference condition due to a slight increase in litter (25 percent) 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 both rated as a none to slight departure.

Photo 30: Soil Profile in the Three Mile Crossing Pasture – June 19, 2013



South Pigtail Butte, Tank Field and Northwest Roseworth Reservoir Pastures - Burned Areas

IIRH site SP (Photo 31) is located in the South Pigtail Butte Pasture; however, the IDT felt that the site was also generally representative of the vegetation and soils found in the burned areas of the South Pigtail Butte, Tank Field and Northwest Roseworth Reservoir Pastures.

IIRH site SP (Photo 30) is located is a seeding comprised of various perennial bunchgrasses and in a Loamy 8-12 ARTRW8/PSSPS-ACTH7 ESD. Thickspike wheatgrass is the dominant deep-rooted grass species at 20 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 17% percent cover. Thurber's needlegrass and squirreltail is also present at 5 percent cover each (Table 31).

The site is of relatively flat topography and the soil stability test (Pellant et al., 2005) resulted in a soil stability value of 4.7 (values should range from 4 to 6), indicating resistance to erosion. Biological soil crusts comprise 6 percent cover and bare ground is 13 percent cover.

The Plant Community Composition and Distribution relative to Infiltration and Functional/Structural Group indicator were rated as a slight to moderate departure from reference condition due to a reduced shrub component. The Litter Amount indicator was rated as a moderate departure from reference condition due to a moderate increase in litter (42 percent) 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 both rated as a none to slight departure.

Photo 31: Soil Profile of the South Pigtail Butte Pasture – June 19, 2013



Northwest Roseworth Reservoir Pasture

IIRH site NW(Photo 32) is located in a historic crested wheatgrass seeding in a Loamy 10-13 ARTRW8/PSSPS ESD. Crested wheatgrass is the dominant deep-rooted grass species at 27 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 7 percent cover (Table 34).

The site is of relatively flat topography with an east aspect. No soil stability test was completed at this site; however, the field notes refer to the soil tests performed in the Three Mile Crossing and South Pigtail Butte Pastures. The Three Mile Crossing Pasture soil stability test (Pellant et al., 2005) completed at the site resulted in a soil stability value of 4.1 and the South Pigtail Butte Pasture soil stability test resulted in a soil stability value of 4.7 (values should range from 4 to 6), both indicating resistance to erosion. Biological crust was 0 percent cover and bare ground was 31 percent.

The 2007 Murphy Complex Fire burned 4,544 acres (91%) of the Northwest Roseworth Reservoir Pasture. No drill seeding was prescribed following the fire; however, about 8,500 acres within the allotment were aerially seeded in strips with Wyoming big sagebrush.

The Bare Ground indicator was rated as a slight to moderate departure from reference condition due to slightly higher bare ground than would be expected for the site. The Soil Surface Loss or Degradation indicator was rated a moderate departure due to “the site’s fire history; however, pedestals are limited” per the IDT notes.

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 both rated as a slight to moderate departure.

Photo 32: Soil Profile in the Northwest Roseworth Reservoir Pasture – May 29, 2014



Evaluation of Standard 1

Wildfire has affected a portion of the pastures within the Pigtail Butte Allotment prior to the IIRH monitoring efforts completed in 2013 and 2014. As a result of the fires and seeding efforts, some plant communities within the Pigtail Butte Allotment have been modified. As a result of these treatments, the allotment is currently dominated by both native and non-native perennial grass species. Some sagebrush has reestablished as the result of post-fire seeding and planting efforts but remains sparse in areas affected by wildfire.

The lack of shrub cover is apparent in some of the plant communities in the West Trailing Field, Northwest Roseworth Reservoir, South Pigtail Butte and East Trailing Field (IIRH site ET_2) 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 ET_2 site was rated moderate departure for water flow patterns, while all of the other sites were rated none to slight departure. Water flow patterns at the ET_2 site were observed, but were mostly short, disconnected, and with no recent evidence of erosion. For the pedestals and terracettes indicator, the ET_2 site was rated moderate, and the WT site was rated slight to moderate. Numerous pedestals were observed at the ET_2 site; most were stable, although some were active, and both shallow and deeper rooted perennial grasses were associated with pedestals. Historic, inactive pedestals were observed at the WT site. No terracettes were observed at either the ET_2 or the WT site. The bare ground indicator was rated slight to moderate departure at the NW site (31%). The indicator for gullies was rated slight to moderate at the WT site due to the presence of historic gullies. Although old gullies were observed, they were vegetated and healing with no signs of recent erosion. The wind-scoured, blowouts, and/or deposition areas indicator was rated slight to moderate at the WT site, where a few wind scoured areas were observed; most were associated with gullies, and are likely the result of post-wildfire wind events. The indicator for soil surface loss or degradation was rated moderate departure at the ET_2 and NW sites. Field notes indicate that soil loss was observed at both sites, mostly within plant interspaces. Field notes further indicate that soil organic matter is reduced at the ET_2 site. The SP and WT sites were rated slight to moderate departure for plant community composition and distribution relative to infiltration and runoff due to the lack of shrubs at the two sites.

Litter was noted to be higher than described in the ESD at four of the eight IIRH sites evaluated and resulted in the Litter Amount indicator being rated between a slight to moderate to a moderate 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 three of the eight IIRH sites ranged from 4.1 to 4.7 (soil stability range should be 4 to 6), indicating resistance to erosion; in addition, the topography within the pastures is relatively flat.

Overall, the Soil and Site Stability and Hydrologic Function attributes were rated as a none to slight departure from the reference condition for the East Clark Seeding (Site ET), East Trailing Field, Threemile, Northeast Roseworth Reservoir, Tank Field, South Pigtail Butte and the burned areas in the Northwest Roseworth Reservoir Pastures. In the West Trailing Field Pasture, the Soil and Site Stability attributes was rated as a slight to moderate departure and the Hydrologic Function was rated as a none to slight departure. In the East Clark Seeding (Site ET_2) and Northwest Roseworth Reservoir Pastures, the Soil and Site Stability and Hydrologic Function attributes were both rated as a slight to moderate departure.

Evaluation Finding – All (Cedar Mesa Reservoir, East Clark Seeding, North Cedar Mesa, Three Mile Crossing, West Clark Seeding, East Trailing Field, Northeast Roseworth Reservoir, Pigtail Butte, South Pigtail Butte, Tank Field, Northwest Roseworth Reservoir and West Trailing Field) Pastures are:

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

Rationale for Evaluation Finding

Perennial vegetation is present within all pastures of the Pigtail Butte Allotment to provide protection for site stability. 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 ranged between 4.1 and 4.7, which also indicates resistance to erosion and bare ground is within the ESD range throughout all the pastures.

Pedestals were noted as being present and due to wildfire at two of the IIRH sites. The Pedestals and/or Terracettes attribute was rated as a none to slight departure from the reference condition in the South Pigtail Butte, Northwest Roseworth Reservoir, East Trailing Field (IIRH site ET), Threemile, Tank Field, East Clark Seeding, West Clark Seeding, Pigtail Butte and North Cedar Mesa Pastures, slight to moderate in the West Trailing Field Pasture and moderate in the East Trailing Field (IIRH site ET_2) Pasture.

At IIRH site ET_2 in the East Trailing Field Pasture, water flow patterns were observed but were short, disconnected and inactive. At IIRH site WT in the West Trailing Field, historic gullies were present but were “vegetated and healing” and some wind scour was noted as being associated with the gullies and occurring post fire. No other signs of accelerated erosion, such as active water flow patterns or gullies, rills, terracettes, wind-scoured/blowouts/deposition areas or litter movement were observed at any of the other IIRH sites.

Litter was noted to be higher than described in the ESD at four of the eight IIRH sites evaluated and resulted in the Litter Amount indicator being rated between a slight to moderate to a moderate 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.

There was a lack of shrubs was noted in some areas within the allotment and has the potential to affect infiltration and retention of soil moisture. However, shrubs are present in other areas of the allotment to capture and store precipitation and facilitate the infiltration of moisture deeper into the soil profile. Perennial forbs were present in varying degrees within all 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 efforts. The perennial grasses appeared vigorous and were producing seed heads at all sites, suggesting that the absence of shrub cover in some areas 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.

The combination of the lack of active gullies and flow patterns, rills, 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, Cedar Mesa Reservoir, East Clark Seeding, North Cedar Mesa, Three Mile Crossing, West Clark Seeding, East Trailing Field, Northeast Roseworth Reservoir, Pigtail Butte, South Pigtail Butte, Tank Field, Northwest Roseworth Reservoir and West Trailing Field Pastures of the Pigtail 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

Rangeland Health Assessment

The Pigtail Butte Allotment contains 3.6 miles of Cedar Creek, from the upstream boundary of Cedar Creek Reservoir (stream mile 18.8) downstream to the Cedar Mesa Canal (stream mile 15.2) and 0.3 miles of lower House Creek (stream mile 0.0 to 0.3) (Maps 1 and 2). According to the National Hydrologic Database (USGS 2014), there are 3.3 miles of perennial stream within the allotment. The reaches of Cedar Creek and House Creek within the allotment contain enough surface water for riparian conditions to be present. Therefore, Standard 2 applies to the Three Mile Crossing, South Pigtail Butte, Northeast Roseworth Reservoir and Northwest Roseworth Reservoir Pastures of the Pigtail Butte Allotment.

The entire length of Cedar Creek within the allotment has an altered streamflow regime due to the operation of the Cedar Creek Reservoir. Streamflows occur primarily during the irrigation season (typically April-October) when water is released from Cedar Creek Reservoir (also known as Roseworth Reservoir). Natural fluvial processes are not occurring due to the operation of the dam and periods of dewatering. The dam was originally constructed around 1910 and regulated flows at the reservoir have altered fluvial processes downstream of the dam since that time.

In the Three Mile Crossing Pasture, all of the streamflow in Cedar Creek is diverted into a siphon that feeds the Cedar Mesa Canal which distributes the water for irrigation on private land. Cedar Creek downstream of the diversion/siphon does not contain a riparian signature because the only water it receives is from occasional surface water or groundwater that seeps past the diversion. The portion of Cedar Creek located in the Three Mile Crossing Pasture, upstream of the diversion/siphon, contains enough surface water to support riparian vegetation.

Three artificially created water bodies also occur within the allotment: Cedar Creek Reservoir, Cedar Mesa Canal and Cedar Mesa Reservoir. These three water developments were constructed for the purpose of storing and delivering water for irrigation to private land in the Roseworth

area. Cedar Mesa Reservoir is located within the Cedar Mesa Reservoir Pasture and is fenced to exclude livestock. Cedar Mesa Canal supplies water released from Cedar Creek Reservoir to Cedar Mesa Reservoir and private farmlands in the Roseworth area. Riparian vegetation occurs around these water developments, but the riparian vegetation only exists as a result of these developments. Standard 2 does not apply to these water bodies as they are artificial in origin.

Riparian condition assessments were conducted within the allotment along Cedar Creek during 1998, 2002, and 2007 and in House Creek during 1998 and 2007 using the BLM Technical Reference 1737-15 for assessing Proper Functioning Condition (PFC) of streams (BLM, 1998) (Table 7). The PFC assessment is a broad-scale assessment that uses hydrology, vegetation, and erosion/deposition (soil) attributes and processes to qualitatively assess the condition of riparian areas. The PFC determinations 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 26: Proper Functioning Condition Assessment Ratings in the Pigtail Butte Allotment by Stream, Stream Reach, Pasture and Year

Stream Name	Stream Reach (miles)	Pasture	1998 Rating	2002 Rating	2007 Rating
Cedar Creek	15.2-15.7	Three Mile Crossing	NF	NF	FAR
	15.7-16.7	Three Mile Crossing and South Pigtail Butte	NF	NF	PFC
	16.7-17.3	Three Mile Crossing, South Pigtail Butte, and NE Roseworth Reservoir	NF	NF	FAR-UP
	17.3-18.8	NW Roseworth Reservoir and NE Roseworth Reservoir	NF	FAR	PFC
House Creek	0.0-0.3	NW Roseworth Reservoir	NF	N/A	FAR-NA

Cedar Creek:

In 2013, an IDT revisited the Cedar Creek PFC reaches to assess whether conditions had changed from the previous assessment ratings. Photographs were taken at the same locations as the previous PFC assessments and were used to confirm if the current riparian conditions were consistent with the previous PFC ratings. None of the ratings were changed for the Cedar Creek PFC reaches.

As a result of the 2005 court ordered stipulated settlement agreement, two riparian Designated Monitoring Area (DMAs) were established on Cedar Creek within the allotment in 2011. A DMA is a designated area where short-term and long-term stream channel condition indicators are assessed using the BLM protocol 1737-23 (BLM 2011) to determine trends in riparian condition over the short and long-term. Both DMAs are located within water gaps, one at stream mile 15.3 and the second at stream mile 17.1. Each water gap is approximately 0.3 stream miles in length. The water gap fences are intended to restrict livestock access to the majority of Cedar Creek within the allotment; however, during a 2007 field visit, signs of livestock use was observed in areas where use was not supposed to occur.

House Creek:

House Creek is the only perennial stream within the Pigtail Butte Allotment. The reach of House Creek is approximately 0.3 mile in length and is located near the mouth of House Creek at Cedar Creek Reservoir (Roseworth Reservoir). House Creek experiences reduction of flows during the summer months due to irrigation on the private land upstream of the allotment. Private lands exist immediately upstream and downstream of this stream reach. Also from the 2005 court ordered stipulated settlement agreement, one riparian Designated Monitoring Area (DMAs) was established on House Creek within the allotment in 2011.

PFC assessments were conducted on the stream reach 0.0 to 0.3 in 1998, 2006 and validated in 2007 (Table 26). The 2006 PFC assessment for House Creek rated the stream as FAR-DN. A review was conducted by an interdisciplinary team to validate the qualitative assessment rating with quantitative fisheries instream habitat condition (HC) data that was collected in 2006 within the same reach of House Creek. The interdisciplinary team adjusted the rating to FAR-NA based on the photos taken during the HC surveys and the 2007 PFC assessment noted beaver activity and a diverse age class distribution of willow.

Evaluation of Standard 2

Cedar Creek Stream Reach 15.2-15.7 (Three Mile Crossing Pasture):

In 2007, stream reach 15.2-15.7 was rated as FAR due a narrowing floodplain, encroachment of Kentucky bluegrass (*Poa pratensis*) or other upland species, actively eroding streambanks, and sedimentation in the stream channel (Table 8). In this reach, a few willows are present, but are generally more common near the pond associated with the diversion/siphon. Western Juniper is a potential source of large woody debris but overall, coarse and/or large woody debris is lacking in this portion of Cedar Creek. The assessment determined that riparian vegetation is not adequate to protect streambanks or dissipate energy during high flows. However, the streamflows within this reach are altered and only occur as infrequent water releases from Cedar Creek Reservoir. The natural, historic high flow regimes no longer occur within the reach. Riparian vegetation is not sufficient to maintain streambank stability and is a result of the altered flow regime combined with livestock use along the stream. The herbaceous riparian vegetation had a diverse composition of species, but only mature willows were observed. This indicates recruitment of woody plants was low or not occurring. Riparian herbaceous plants did not exhibit high vigor which was indicated by a lack of seed heads. Kentucky bluegrass, which is a poor stabilizer of streambanks, was noted as encroaching in the riparian-wetland area and had reduced or replaced sedges (*Carex* spp.) and rushes (*Juncus* spp.) in many areas. A few small Canada thistle patches were present.

Table 27: Condition Assessments for Riparian Vegetation along Cedar Creek by Stream Reach and Year

Vegetation Indicator	Cedar Creek 15.2-15.7			Cedar Creek 15.7-16.7			Cedar Creek 16.7-17.3		
	1998	2002	2007	1998	2002	2007	1998	2002	2007
There is a diverse age class distribution of riparian-wetland vegetation (recruitment for maintenance and recovery)	No	No	No	No	No	Yes	No	No	No

Vegetation Indicator	Cedar Creek 15.2-15.7			Cedar Creek 15.7-16.7			Cedar Creek 16.7-17.3		
	1998	2002	2007	1998	2002	2007	1998	2002	2007
There is a diverse composition of riparian-wetland vegetation (for maintenance/recovery)	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Species present indicate maintenance of riparian-wetland soil moisture characteristics	Yes	Yes	No	Yes	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	No	No	No	No	Yes	No	No	No
Riparian plants exhibit high vigor	No	No	No	No	No	Yes	No	No	No
Adequate riparian-wetland vegetative cover is present to protect banks and dissipate energy during high flows	No	No	No	No	No	N/A	No	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	N/A	N/A	Yes	N/A	N/A	N/A

Photo 33: Cedar Creek PFC Reach 15.2-15.7 photo point site during October, 2007



Photo 34: Cedar Creek PFC Reach 15.2-15.7 photo point site during May, 2013



Livestock within the Three Mile Crossing Pasture on the east side of Cedar Creek only have access to stream miles 15.2-15.5 due to fencing. During 2013, the upstream and downstream fences were found to be maintained and in good condition. The riparian DMA located at mile 15.3 had a greenline to greenline width was 13.4 meters when the DMA was established in 2011. Livestock use at the DMA has not been annually monitored as it occurs within a water gap. Livestock from the Cedar Creek Canyon Allotment on the west side of Cedar Creek have access to miles 15.5-15.7. Pasture boundary fences are effective in preventing livestock from moving between these allotments.

Evaluation Finding – Cedar Creek Reach 15.2-15.7 is:

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

Rationale for Evaluation Finding

Cedar Creek stream reach 15.2-15.7 was determined to be FAR during the most recent evaluation (2007). Riparian vegetation throughout this reach is not sufficient to stabilize streambanks and control erosion. Actively eroding streambanks were evident in portions of this reach. Age class and structural diversity of riparian hydric vegetation species are not appropriate for this reach. The herbaceous riparian vegetation had a diverse composition of species but only mature willows were observed, indicating recruitment of woody plants was very low or not occurring. Riparian herbaceous plants did not exhibit high vigor which was indicated by a lack of

seed heads. An altered flow regime and concentrated livestock use along accessible segments of the streambanks has resulted in upland vegetation species being dominant to the stream margin. Therefore, Cedar Creek stream reach 15.2-15.7 is not meeting Standard 2.

Cedar Creek Stream Reach 15.7-16.7 (Three Mile Crossing and South Pigtail Butte Pastures):

In 2007, stream reach 15.7-16.7 was determined to be properly functioning (Table 27). This reach of Cedar Creek is functionally different than the downstream dewatered reach (15.2-15.7). The stream channel substrate includes more large rock and boulders, and junipers are common along the streambank. This stream reach is naturally more protected and less accessible to livestock than reach 15.2-15.7 because of the steep canyon topography. All items related to riparian vegetation for the 2007 PFC assessment were marked “yes”, indicating that the stream attribute is appropriate for the reach (Table 28). Throughout this reach, a diverse composition of riparian species was present and exhibited high vigor. Although sedges and rushes were present, their extent along the streambank was somewhat limited due to the streamside shading produced by the abundant juniper within the reach. Streambank vegetation root mass, primarily junipers, was sufficient to withstand high stream flows in areas where they are present. The large substrate (i.e., cobbles, small and large boulders) within this reach also aid in dissipating stream energy. Actively eroding streambanks were not observed to the extent present in reach 15.2-15.7.

Evaluation Finding – Cedar Creek Reach 15.7-16.7 is:

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

Rationale for Evaluation Finding

Cedar Creek stream reach 15.7-16.7 was determined to be functioning properly during the most recent PFC assessment (2007). Riparian vegetation within this reach includes diverse age-classes and composition of riparian-wetland vegetation species. Riparian vegetation established within the reach includes species with sufficient roots strength to stabilize streambanks with the present flow regime. Noxious weeds are not increasing. Therefore, Cedar Creek reach 15.7-16.7 is meeting Standard 2.

Cedar Creek Stream Reach 16.7-17.3 (Three Mile Crossing, South Pigtail Butte, and NE Roseworth Reservoir Pastures):

In 2007, stream reach 16.7-17.3 was determined to be FAR because vegetative cover was not sufficient to protect streambanks and dissipate energy during high flow events. Riparian conditions have improved since 2002 when the reach was rated as NF but in 2007 the reach lacked vegetative cover sufficient to protect streambanks and dissipate energy, and riparian plants did not exhibit high vigor. Fencing and topography limit livestock access to this stream reach to miles 17.0-17.3. The reach was revisited during 2013 and conditions where livestock have limited access (stream miles 16.7-17.0) appeared to be improving. Heavy livestock use continues to occur between stream miles 17.0 and 17.3 as it is used as a water gap for the South Pigtail Butte and Three Mile Crossing Pastures of the allotment. The riparian DMA is located at mile 17.1 in this reach and the mean greenline to greenline width was 13.0 meters when the DMA was established in 2011. Livestock use at the DMA is not annually monitored as it occurs within a water gap.

Evaluation Finding – Cedar Creek Reach 16.7-17.3 is:

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

Rationale for Evaluation Finding

Cedar Creek reach 16.7-17.3 was determined to be FAR during the most recent evaluation (2007). Heavy livestock use occurs along miles 17.0-17.3 as livestock from both the South Pigtail Butte and Three Mile Crossing Pastures have access to this area. Livestock access to Cedar Creek miles 16.7-17.0 is restricted by fencing and topography. Riparian conditions have improved since the 2002 PFC assessment, when the reach was not functioning. However, in 2007, this reach still lacked vegetative cover sufficient to protect streambanks and dissipate energy and riparian plants did not exhibit high vigor. Altered streamflows are primarily affecting riparian condition within the reach but livestock impacts have also contributed to destabilizing streambanks and overwidening the stream channel. Therefore, Cedar Creek stream reach 16.7-17.3 is not meeting Standard 2.

Cedar Creek Stream Reach 17.3-18.8 (NE and NW Roseworth Reservoir Pastures):

In 2007, stream reach 17.3-18.8 was determined to be functioning properly. Vegetation indicator ratings from the evaluation conducted in 2007 were all marked “yes” (Table 9). The “yes” rating indicates the age-class distribution and diversity of riparian species are appropriate for the stream. The hydric vegetation was sufficient to protect and stabilize streambanks, although impacts to willows from livestock were noted for both woody and herbaceous vegetation. Despite fencing and topography, livestock have access to this stream reach in several areas.

Table 28: Condition Assessments for Riparian Vegetation for Cedar Creek and House Creek by Stream reach and Year

Vegetation Item from Evaluation	Cedar Creek 17.3-18.8			House Creek 0.0-0.3	
	1998	2002	2007	1998	2007
There is a diverse age class distribution of riparian-wetland vegetation (recruitment for maintenance and recovery) (6)	No	No	Yes	No	Yes
There is a diverse composition of riparian-wetland vegetation (for maintenance/recovery) (7)	Yes	Yes	Yes	No	Yes
Species present indicate maintenance of riparian-wetland soil moisture characteristics (8)	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 (9)	No	No	Yes	No	Yes
Riparian plants exhibit high vigor (10)	No	No	Yes	No	Yes
Adequate riparian-wetland vegetative cover is present to protect banks and dissipate energy during high flows (11)	No	No	Yes	No	Yes
Plant communities in the riparian area are an adequate source of coarse and/or large woody material (for maintenance/recovery) (12)	N/A	N/A	N/A	N/A	N/A

Evaluation Finding – Cedar Creek Reach 17.3-18.8 is:

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

Rationale for Evaluation Finding

Cedar Creek stream reach 17.3-18.8 was determined to be functioning properly during the most recent PFC assessment (2007). Riparian vegetation within this reach includes diverse age-classes and composition of riparian-wetland vegetation species. Riparian vegetation established within the reach includes species with sufficient roots strength to stabilize streambanks with the present flow regime. Noxious weeds are not increasing. Therefore, Cedar Creek reach 17.3-18.8 is meeting Standard 2.

House Creek Stream Reach 0.0-0.3 (NW Roseworth Reservoir Pasture):

In 2007, stream reach 0.0-0.3 was determined to be in FAR with no apparent trend. Vegetation indicator ratings from the assessment were all marked “yes” (Table 28). The “yes” rating indicates the age-class distribution and diversity of riparian species are appropriate for the reach. Vegetation is sufficient to protect and stabilize streambanks during periods of high flow.

A DMA is located at mile 0.1 in this reach and is used to assess the effects of livestock grazing on the stream. When the DMA was established in 2011, photopoints were taken at the upstream and downstream boundaries and the mean greenline to greenline width 7.1 meters. No other data was collected at the DMA in 2011. In 2012, stubble height, streambank alteration, and woody browse utilization could not be measured as the DMA was inundated by high water levels in Cedar Creek Reservoir. The riparian conditions at the DMA were assessed in 2013. The median stubble height on hydric herbaceous plants was 3.0 inches which exceeded the 4.0-6.0 inch minimum stubble height criteria intended to result in improved riparian conditions. The streambank alteration was measured to be 37% which is more than the 20% streambank alteration criteria (10% alteration attributed to livestock grazing) for maintaining streambank stability for fish bearing streams. The woody browse utilization of willows was 3.1% of the current year’s growth which is below the criteria for maintaining healthy riparian shrub species (50%).

Evaluation Finding –House Creek Reach 0.0-0.3 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 0.0-0.3 was determined to be FAR with no apparent trend during the 2007 PFC assessment. The 2013 riparian conditions at the House Creek DMA (stream mile 0.1) had a median stubble height of 3.0 inches on hydric herbaceous plants that exceeded the 4.0-6.0 inch minimum stubble height criteria intended to result in improved riparian conditions. The streambank alteration of 37% exceeded the 20% streambank alteration criteria (10% attributed to livestock grazing) for maintaining streambank stability for fish bearing streams. Altered streamflows are primarily affecting riparian condition within the reach but livestock impacts

have also contributed to streambank erosion. Therefore, House Creek reach 0.0-0.3 is not meeting Standard 3.

Standard 3 (Stream Channel/Floodplain)

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

Rangeland Health Assessment

A description of the riparian resources within the allotment is provided under Standard 2. The reaches of Cedar Creek and House Creek within the allotment contain stream channels and floodplains. Therefore, Standard 3 applies to the Three Mile Crossing, South Pigtail Butte, NE Roseworth Reservoir and NW Roseworth Reservoir Pastures of the Pigtail Butte Allotment.

Evaluation of Standard 3

Cedar Creek Stream Reach 15.2-15.7 (Three Mile Crossing Pasture):

During the most recent PFC assessment stream reach 15.2-15.7 was rated as FAR based on a “no” response on six of the eight applicable hydrologic and soils/erosion indicators (Table 29). There were two indicators on the data form (^) that were marked as “yes” but should have been “no” based on the comments provided on the data sheet.

Table 29: Condition Assessments for Hydrology and Soils/Erosion Deposition for Cedar Creek by Stream Reach and Year

Hydrology and Soils/Erosion Deposition Indicators	Cedar Creek 15.2-15.7			Cedar Creek 15.7-16.7			Cedar Creek 16.7-17.3		
	1998	2002	2007	1998	2002	2007	1998	2002	2007
Floodplain above bank-full inundated in "relatively frequently" events (1-3 years)	Yes	Yes	^No	Yes	Yes	Yes	Yes	Yes	Yes
Active/stable beaver dams, where present	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)	No	No	No	No	No	Yes	No	No	No
Riparian zone is widening or has achieved potential extent	No	No	No	No	No	Yes	No	No	No
Upland watershed is not contributing to riparian-wetland degradation	Yes	Yes	^No	Yes	Yes	Yes	Yes	Yes	Yes
Floodplain and channel characteristics (i.e. rocks, overflow channels, coarse and/or large woody debris) are adequate to dissipate energy	No	No	No	No	No	Yes	No	No	No
Point bars are revegetating with riparian-wetland vegetation	N/A	No	N/A	N/A	No	N/A	N/A	No	N/A

Hydrology and Soils/Erosion Deposition Indicators	Cedar Creek 15.2-15.7			Cedar Creek 15.7-16.7			Cedar Creek 16.7-17.3		
	1998	2002	2007	1998	2002	2007	1998	2002	2007
Lateral stream movement is associated with natural sinuosity	No	No	Yes	No	No	Yes	No	No	Yes
System is vertically stable	Yes	Yes	Yes	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	No	No	No	No	No	No

^Indicators were marked as “yes” on the data form; should have been “no” based on comment provided.

The PFC assessment determined the floodplain is not inundated in relatively frequent events due to the altered streamflows which do not allow for streambanks to be rebuilt during high flow events. Dencutting of the stream channel has made the historic floodplain no longer accessible during high flows. The width/depth ratio and sinuosity of this stream reach are not in balance with the landscape. There were high amounts of fine sediment in the stream channel, and the channel was over widened and was less sinuous that would be expected for the landscape setting. Essentially, the stream channel has dencut and is re-establishing a new floodplain elevation within the dencut channel. This recovery process is being hampered by the combined effects of the altered streamflow and current livestock grazing. The existing condition and location of the fences within the reach are not effective in containing livestock to the designated watering areas. Re-configuration and/or maintenance of the existing fences could improve riparian condition.

Evaluation Finding – Cedar Creek Reach 15.2-15.7 is:

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

Rationale for Evaluation Finding

Cedar Creek reach 15.2-15.7 (Three Mile Crossing Pasture) was rated as FAR in 2007 due actively eroding streambanks and sedimentation in the stream channel. The width/depth ratio and sinuosity of this stream reach are not in balance with the landscape. There were high amounts of fine sediment in the stream channel, the channel was over widened and was less sinuous than would be expected for the landscape setting. Altered streamflows are primarily affecting riparian condition within the reach but livestock impacts have also contributed to streambank erosion and stream sedimentation. In addition, the existing condition and location of the fences within the reach are not effective in containing livestock to the designated watering areas. Therefore, Cedar Creek reach 15.2-15.7 is not meeting Standard 3.

Cedar Creek Stream Reach 15.7-16.7 (Three Mile Crossing and South Pigtail Butte Pastures):

The 2007 evaluation determined stream reach 15.7-16.7 to be in proper functioning condition. The only hydrology or soils erosion/deposition indicators marked “no” was item 17 (Table 29). Item 17, stream is in balance with water and sediment being supplied by the watershed, was marked “no” due to cut banks and deposition being apparent in this reach. The riparian zone had

achieved potential extent and stream attributes (sinuosity, width/depth ratio) are in balance with the landscape. Floodplain and channel characteristics are adequate to dissipate energy, and the stream is vertically stable.

Evaluation Finding – Cedar Creek Reach 15.7-16.7 is:

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

Rationale for Evaluation Finding

Cedar Creek reach 15.7-16.7 (Three Mile Crossing and South Pigtail Butte Pastures) was determined to be functioning properly in 2007. Stream attributes (i.e., sinuosity, width/depth ratio) are appropriate for the landform and are in balance with the landscape. The stream is vertically stable. Floodplain and channel characteristics are adequate to dissipate energy, although some cut banks are still present within the reach. Therefore, Cedar Creek reach 15.7-16.7 is meeting Standard 3.

Cedar Creek Stream Reach 16.7-17.3 (Three Mile Crossing, South Pigtail Butte, and NE Roseworth Reservoir Pastures):

The 2007 evaluation determined stream reach 16.7-17.3 was FAR based on a “no” response for four of the eight applicable indicators (Table 29). This stream reach was excessively wide and shallow relative to the potential condition. The riparian area has not achieved potential extent. Eroding streambanks indicate the channel characteristics are not adequate to dissipate stream energy and excessive deposition is occurring within this reach. In 2013, the reach was visited by an IDT and conditions appeared to be improving within the portion of the reach where livestock access is restricted (stream mile 16.7-17.0). Heavy livestock use continues to occur in stream mile 17.0-17.3 as it is used as a water gap for the South Pigtail Butte and Three Mile Crossing Pastures of the allotment. The riparian DMA is located at mile 17.1 in this reach. Livestock use at the DMA is not annually monitored as it occurs within a water gap.

Evaluation Finding – Cedar Creek Reach 16.7-17.3 is:

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

Rationale for Evaluation Finding

Cedar Creek reach 16.7-17.3 (Three Mile Crossing, South Pigtail Butte, and NE Roseworth Reservoir Pastures) was determined to be FAR during the 2007 assessment. Stream attributes of this reach are not appropriate as the stream is excessively wide and shallow relative to the landform. The riparian area has not achieved potential extent. Eroding streambanks indicate the channel characteristics are not adequate to dissipate stream energy and excessive deposition is occurring within this reach. Altered streamflows are primarily affecting riparian condition within the reach but livestock impacts have also contributed to streambank erosion and overwidening of the stream. Therefore, Cedar Creek reach 16.7-17.3 is not meeting Standard 3.

Cedar Creek Stream Reach 17.3-18.8 (NE and NW Roseworth Reservoir Pastures):

The 2007 evaluation determined stream reach 17.3-18.8 to be in proper functioning condition based on the “yes” responses for all but one of the applicable indicators (Table 30). The only hydrology or soils erosion/deposition item marked “no” was item 13 (due in part to the presence of cut banks within the reach). The riparian zone has achieved potential extent and stream attributes (i.e., sinuosity, gradient) appeared to be in balance with the landscape, although the width to depth ratio was not in balance with the landscape (i.e., too wide and shallow). The stream is vertically stable, although the IDT noted it may not be capable of withstanding high flow events due to the under developed floodplain and absence of woody hydric vegetation. The streamflow regime within the reach is directly influenced by the operation of the Cedar Creek reservoir at the upstream boundary of the reach.

Table 30: Condition Assessments for Hydrology and Soils/Erosion Deposition for Cedar Creek and House Creek by Stream Reach and Year

Hydrology and Soils/Erosion Deposition Indicators	Cedar Creek 17.3-18.8			House Creek 0.0-0.3	
	1998	2002	2007	1998	2007
Floodplain above bank-full inundated in "relatively frequently" events (1-3 years) (1)	Yes	Yes	Yes	Yes	Yes
Active/stable beaver dams, where present (2)	N/A	N/A	N/A	No	No
Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region) (3)	No	No	Yes	No	Yes
Riparian zone is widening or has achieved potential extent (4)	No	No	Yes	No	No
Upland watershed is not contributing to riparian-wetland degradation (5)	Yes	Yes	Yes	No	Yes
Floodplain and channel characteristics (i.e. rocks, overflow channels, coarse and/or large woody debris) are adequate to dissipate energy (13)	No	No	No	No	No
Point bars are revegetating with riparian-wetland vegetation (14)	N/A	No	Yes	Yes	N/A
Lateral stream movement is associated with natural sinuosity (15)	No	No	Yes	No	Yes
System is vertically stable (16)	Yes	Yes	Yes	Yes	No
Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion and deposition) (17)	No	No	Yes	No	Yes

Evaluation Finding – Cedar Creek Reach 17.3-18.8 is:

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

Rationale for Evaluation Finding

Cedar Creek reach 17.3-18.8 (NE and NW Roseworth Reservoir Pastures) was determined to be functioning properly in 2007. Stream attributes (i.e., sinuosity, stream gradient) are in balance with the landscape although some cut banks are present within the reach. An over widened stream channel was also observed within the reach. The stream is vertically stable and is in balance with the water and sediment being supplied by the watershed. Therefore, Cedar Creek reach 17.3-18.8 is meeting Standard 3.

House Creek Stream Reach 0.0-0.3 (NW Roseworth Reservoir Pasture):

House Creek reach 0.0-0.3 was determined to be FAR with no apparent trend during the most recent assessment based on a “no” response for four of the nine applicable indicators (Table 11). Stream attributes (i.e., sinuosity, width/depth ratio, gradient) were in balance with the landscape, and the stream is in balance with the water and sediment being supplied by the watershed. The riparian area has not achieved its potential extent. Floodplain and channel characteristics are not adequate to dissipate energy. Beaver dams were present in the reach and did not appear to be actively maintained. The presence of these dams is influencing several of the floodplain and stream channel characteristics (i.e., channel width, energy dissipation, and vertical stability) within a portion of the reach.

A riparian DMA is located at mile 0.1 in this reach and is used to assess grazing related impacts to the stream (Photo 35). When the DMA was established in 2011, photopoints were taken at the upstream and downstream boundaries and the mean greenline to greenline width was 7.1 meters. No other data was collected at the DMA in 2011. In 2012, stubble height, streambank alteration, and woody browse utilization could not be measured as the DMA was inundated by high water levels in Cedar Creek Reservoir. The riparian conditions at the DMA were assessed in 2013. The median stubble height on hydric herbaceous plants was 3.0 inches which exceeded the 4.0-6.0 inch stubble height criteria intended to result in improved riparian conditions. The streambank alteration was measured to be 37% which is more than the 20% streambank alteration criteria (10% attributed to livestock grazing) for maintaining streambank stability for fish bearing streams. The woody browse utilization of willows was 3.1% of the current year’s growth which is below the criteria for maintaining healthy riparian shrub species (50%).

Evaluation Finding –House Creek Reach 0.0-0.3 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 0.0-0.3 (NW Roseworth Reservoir Pasture) was determined to be FAR-NA during the 2007 assessment. Stream attributes of this reach are appropriate for the landscape. The riparian area is not widening and has not achieved potential extent. Floodplain and channel characteristics are not adequate to dissipate energy and streambank stability is below the appropriate level. The riparian conditions at the House Creek DMA (stream mile 0.1) were assessed in 2013. The median stubble height on hydric herbaceous plants of 3.0 inches exceeded the 4.0-6.0 inch minimum stubble height criteria intended to result in improved riparian conditions. The streambank alteration of 37% exceeded the 20% streambank alteration criteria (10% attributed to livestock grazing) for maintaining streambank stability for fish bearing streams. Altered streamflows are primarily affecting riparian condition within the reach but livestock impacts have also contributed to streambank erosion. Therefore, House Creek reach 0.0-0.3 is not meeting Standard 3.

Photo 35: House Creek Reach Mile 0.1 Designated Monitoring Area during July, 2011



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 (Tables 31 thru 33) and aerial sagebrush seedings occurred following fire over the last 20 years.

Interpreting Indicators of Rangeland Health evaluations were conducted at four locations within the allotment, all of which are HAF sites. Vegetative cover data was collected in 2012 and 2013 and is summarized in Table 31. Additional cover data was collected at other HAF and ESI sites throughout the pastures and is summarized in Tables 32 and 33. Vegetative cover data was collected at multiple layers (Cooperative Extension Service et al., 1999); however, Tables 31, 32 and 33 displays only the top cover layer to allow comparison of cover data to ESD reference sheet values.

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

Vegetation	Species	East Trailing Field IIRH Site ET (2012)	East Trailing Field IIRH Site ET_2 (2013)	Tank Field IIRH Site TF (2012)	South Pigtail Butte IIRH Site SP (2013)
Perennial Grasses	Bluebunch wheatgrass	0%	3%	3.5%	1%
	Squirreltail	4.5%	2%	2.5%	5%
	Sandberg bluegrass	14%	16%	23.5%	17%
	Thickspike wheatgrass	0%	10%	0%	20%
	Thurber's needlegrass	6%	10%	0.5%	5%
	Western wheatgrass	0%	10%	0%	0%
Annual Grasses	Cheatgrass	0%	2%	0%	1%
Perennial Forbs	Longleaf phlox	0%	3%	0%	2%
	Meadow deathcamas	0%	0%	0%	1%
	Pale agoseris	0%	2%	0%	1%
	Prickly-leaved phlox	0.5%	0%	0%	0%
	Lava aster	0%	0%	0.5%	0%
Annual Forbs	Curveseed butterwort	0%	0%	0%	1%
	Clasping pepperweed	0%	1%	0%	0%
	Spring draba	0%	1%	0%	0%
Shrubs	Wyoming Big sagebrush	28.5%	0%	34%	5%
	Yellow rabbit brush	0%	1%	0%	3%
Vegetation TOTAL		53.5%	61%	64.5%	62%
Other Cover	Biological soil crust	16.5%	4%	9%	6%
	Bare Ground	25.5%	6%	14.5%	13%
	Litter in contact with soil	2%	11%	4.5%	10%
	Litter standing	2%	17%	5%	9%
	Persistent litter	0.5%	0%	2%	0%
	Rock or Gravel	0%	1%	0.5%	0%
Grand TOTAL		100%	100%	100%	100%

Table 32: Additional Vegetative Cover Data, 2006 – Percent Cover (Top Layer Only)

Vegetation Class	Species	East Trailing Field			Tank Field		South Pigtail Butte
		RA-41a	RA-31a	RA-44a	RA-43a	RA-42a	RA-46a
Perennial Grasses	Sandberg bluegrass	36%	44%	36.0%	36%	24.0%	30.7%
	Crested wheatgrass	31.3%	0%	2.7%	0%	0%	0%
	Bluebunch wheatgrass	0%	8%	0%	2.7%	12.0%	0.7%
	Prairie junegrass	2%	0%	0%	0%	0%	0%
	Western wheatgrass	0%	0%	0%	0%	0.7%	0%
	Bottlebrush squirreltail	0%	0%	1.3%	0%	0.7%	2.7%
	Thurber's needlegrass	0%	0%	1.3%	0%	0%	9.3%
Perennial Forbs	Hood's phlox	0%	0%	0%	0%	0%	0.7%
	Lupine	0%	0.7%	0%	0%	0%	0%
Shrubs	Rabbitbrush	0%	0%	2.7%	0%	0%	0%
	Wyoming Big sagebrush	6.7%	26%	18.7%	30%	24.0%	18%
Vegetation Total		76%	78.7%	62.7%	68.7%	61.4%	62.1%
Other Cover	Bare Ground	8.7%	6%	12.7%	9.3%	15.3%	14.7%
	Biological soil crust	2%	2%	3.3%	4.7%	7.3%	2.7%
	Litter in contact with soil	10.7%	9.3%	18.0%	11.3%	10.7%	10%
	Litter standing	1.3%	4%	2.7%	6%	4.7%	10.7%
	Rock	1.3%	0%	0.7%	0%	0.7%	0%
Total		100%	100%	100%	100%	100%	100%

Table 33: Additional Vegetative Cover Data – Percent Cover (Top Layer Only)

Vegetation Class	Species	South Pigtail Butte	Tank Field
		2012	2013
Perennial Grasses	Sandberg bluegrass	23.5%	16.0%
	Bluebunch wheatgrass	1.0%	7.0%
	squirreltail	4.0%	6.0%
	Thickspike wheatgrass	0.0%	0.0%
	Western wheatgrass	0.0%	0.0%
	Thurber's needlegrass	1.0%	0.0%
Annual Grass	Cheatgrass	0.0%	1.0%
Perennial Forbs	Prickly phlox	0.0%	2.0%
	Desert parsley	0.5%	0.0%
	Speckle pod milkvetch	0.0%	1.0%
	Willow herb	0.0%	1.0%
	Pale agoseris	0.0%	5.0%
	Hood's phlox	0.0%	3.0%
	Long-leaf phlox	0.0%	0.0%
Annual Forbs	Clasping pepperweed	0.0%	3.0%
	Curveseed butterwort	0.5%	0.0%
	Spring draba	0.0%	1.0%
	Tumblemustard	0.0%	2.0%
	Yellow salsify	0.0%	2.0%
	Small blue-eyed Mary	0.0%	3.0%
Shrubs	Rabbitbrush	0.0%	0.0%
	Wyoming big sagebrush	22.0%	0.0%
Vegetation Total		62.5%	53.0%
Other Cover	Bare Ground	19.0%	10.0%
	Biological soil crust	10.5%	3.0%
	Litter in contact with soil	7.5%	8.0%
	Litter standing	6.5%	25.0%
	Persistent litter	3.0%	1.0%
	Rock	1.0%	0.0%
Total		100%	100%

East Trailing Field Pasture

IIRH site ET (Photo 36) is located in a historic crested wheatgrass seeding in a Loamy 8-12 ARTRW8/PSSPS-ACTH7 ESD. Thurber's needlegrass is the dominant deep-rooted grass species at 6 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 14 percent cover (Table 31). Squirreltail is also present at 4.5 percent cover. Wyoming big sagebrush is present as 28.5 percent cover, perennial forbs as 0.5 percent cover and desirable annual forbs as 0 percent cover.

The topography of the site is flat to gently sloped, with a generally north-northeast aspect. No soil stability test was completed at this site; however, the field notes refer to the soil test performed in the West Trailing Field Pasture. The soil stability test (Pellant et al., 2005) completed in the West Trailing Field Pasture resulted in a soil stability value of 4.3 (values should range from 4 to 6), indicating resistance to erosion. Biological crusts comprised 16.5 percent cover and bare ground was 25.5 percent cover.

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

Photo 36: East Trailing Field Pasture (IIRH Site ET) – June 26, 2013



IIRH site ET_2 (Photo 37) is located in a historic crested wheatgrass seeding in a Loamy 8-12 ARTRW8/PSSPS-ACTH7 ESD. Thurber's needlegrass, thickspike wheatgrass and western wheatgrass are co-dominant deep-rooted grass species at 10 percent cover each and Sandberg bluegrass is the dominant shallow-rooted grass species at 16 percent cover (Table 31). Wyoming big sagebrush is present as 0 percent cover, yellow rabbitbrush as 1 percent cover, perennial forbs as 5 percent cover and desirable annual forbs as 1 percent cover.

The site is located in the bottom of a draw. No soil stability test was performed completed at this site; however, the field notes refer to the soil test performed in the West Trailing Field Pasture. The soil stability test (Pellant et al., 2005) completed in the West Trailing Field Pasture resulted in a soil stability value of 4.3 (values should range from 4 to 6), indicating resistance to erosion. Biological soil crusts comprise 4 percent cover and bare ground 6 percent cover.

The 2007 Murphy Complex Fire burned 1,894 acres (59%) of the East Trailing Field Pasture. No drill seeding was prescribed; however, about 8,500 acres within the allotment were aerially seeded in strips with Wyoming big sagebrush.

The Soil Surface Loss or Degradation indicator was rated as a moderate departure. The site has lost soil following wildfire and soil organic matter is reduced in the plant interspaces. The IIRH field notes also state “areas with problems were healing.” The Functional/Structural Groups indicator was rated as a slight to moderate departure from the reference condition because the site is located within a burned area that is lacking shrubs and a reduced abundance of perennial forbs. Cheatgrass was recorded as 2 percent cover and IIRH field notes state that it is “common and can dominant in patches on south facing slopes and along the road.” The Invasive Plants indicator was rated as a moderate to extreme departure from the reference condition due to multiple invasive species observed.

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

Photo 37: East Trailing Field Pasture (IIRH Site ET_2) – May 29, 2014



Tank Field and South Pigtail Butte Pastures (Native Areas)

IIRH site TF is located in the Tank Field Pasture; however, the IDT felt that the site was also generally representative of the vegetation and soils found in the native areas of the Tank Field and the South Pigtail Butte Pastures.

IIRH site TF (Photo 38) is located in a mixture of old and newer seedings, which is comprised of crested wheatgrass and various native and native-like species. IIRH site TF is located in a Loamy 8-12 ARTRW8/PSSPS-ACTH7 ESD. Bluebunch wheatgrass is the dominant deep-rooted

grass species at 3.5 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 23.5 percent cover (Table 31). Squirreltail was also present at 2.5 percent cover and Thurber's needlegrass as 0.5 percent cover. Wyoming big sagebrush is present as 34 percent cover, perennial forbs as 0.5 percent cover and desirable annual forbs as 0 percent cover.

The site is of relatively flat topography with generally an east aspect. No soil stability test was completed at this site; however, the field notes refer to the soil test performed in the South Pigtail Butte Pasture. The soil stability test (Pellant et al., 2005) completed in the South Pigtail Butte Pasture resulted in a soil stability value of 4.7 (values should range from 4 to 6), indicating resistance to erosion. Biological crust comprised 9 percent cover and bare ground was 14.5 percent cover.

Approximately half of the Tank Pasture burned in the 2007 Murphy Complex Fire. No drill seeding was prescribed following the fire; however, about 8,500 acres within the allotment were aerially seeded in strips with Wyoming big sagebrush.

The Litter Amount indicator was rated as a slight to moderate departure from reference condition due to a slight increase in litter (23 percent cover) found at the site.

All other indicators related to the Biotic Integrity attribute was rated as a none to slight departure from the reference condition. The overall Biotic Integrity attribute was both rated as a none to slight departure.

Photo 38: Tank Field Pasture (IIRH Site TF) – June 19, 2013



South Pigtail Butte, Tank Field and Northwest Roseworth Reservoir Pastures - Burned Areas

IIRH site SP is located in the South Pigtail Butte Pasture; however, the IDT felt that the site was also generally representative of the vegetation and soils found in the burned areas of the South Pigtail Butte, Tank Field and Northwest Roseworth Reservoir Pastures.

IIRH site SP (Photo 39) is located in a seeding comprised of various perennial bunchgrasses and in a Loamy 8-12 ARTRW8/PSSPS-ACTH7 ESD. Thickspike wheatgrass is the dominant deep-rooted grass species at 20 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 17 percent cover (Table 31). Thurber's needlegrass and squirreltail is also present at 5 percent cover each and bluebunch wheatgrass as 1 percent cover. Wyoming big sagebrush was recorded as 5 percent cover, yellow rabbitbrush as 3 percent cover, perennial forbs as 4 percent cover and annual forbs as 0 percent cover.

The site is of relatively flat topography and the soil stability test (Pellant et al., 2005) resulted in a soil stability value of 4.7 (values should range from 4 to 6), indicating resistance to erosion. Biological soil crusts comprise 6 percent cover and bare ground is 13 percent cover.

Although these areas burned in the 2007 Murphy Complex Fire, no drill seeding was prescribed following the fire; however, about 8,500 acres within the allotment were aerially seeded in strips with Wyoming big sagebrush.

The Functional/Structural Groups indicator was rated as a slight to moderate departure from reference condition due to a lack of sagebrush. However, the IIRH field notes state there is a "good forb component" present. The Litter Amount indicator was rated as a moderate departure from reference condition because the litter amount was higher than expected at 42 percent. Cheatgrass was recorded as 1 percent cover and IIRH field notes state that it is "scattered throughout the site...tall tumbled mustard and curvseed butterwort was also present." The Invasive Plants indicator was rated as a moderate departure from the reference condition due to multiple invasive species observed.

All other indicators related to the Biotic Integrity attribute was rated as a none to slight departure from the reference condition. The overall Biotic Integrity attribute was both rated as a slight to moderate departure

Photo 39: South Pigtail Pasture (IIRH Site SP) – June 19, 2013



Evaluation of Standard 4

Wildfire has affected a portion of the East Trailing Field, Tank Field and South Pigtail Butte and Northwest Roseworth Reservoir Pastures. As a result of wildfire and seeding efforts, some plant communities within the pastures have been modified and are currently dominated by both native and non-native perennial grass species. Some sagebrush has reestablished as the result of post-fire seeding and planting efforts but remains sparse in areas affected by wildfire.

Although IIRH site SP was stated to be found to be representative of the “burned portions” of the Northwest Roseworth Reservoir Pasture, that pasture was evaluated by IIRH site NW, which is discussed in Standard 5. Therefore, it will not be included in the Standard 4 evaluation.

During the IIRH monitoring, the IDT evaluated the native areas within the Tank Field Pasture and felt those were also representative of the native areas within the South Pigtail Butte Pasture. The IDT also evaluated the burned areas of the South Pigtail Butte Pasture and felt those were also representative of the burned areas within the Tank Field Pasture. The 2007 Murphy Complex Fire burned 64 percent of the South Pigtail Butte Pasture and 46 percent of the Tank Field Pasture. In addition, two sites were evaluated within the East Trailing Pasture, one in a burned area and one in an unburned area; however, 59 percent of the pasture burned in the 2007 Murphy Complex Fire.

The cover data collected in 2012 and 2013 in the pastures and used in the IIRH evaluation (Table 31) 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 6.5 – 35.0 percent of the vegetative cover. Shallow rooted grasses occur as between 14 – 23.5 percent cover, forbs occur as between 0.5 – 7.0 percent cover and cheatgrass as between 0.0 – 2.0 percent cover.

The shrub component ranges from 1.0 to 34.0 percent cover; however, the lack of shrub cover is visually apparent in some of the burned areas in the West Trailing Field, Tank Field, South Pigtail Butte and East Trailing Field (IIRH site ET_2) 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 soil surface loss or degradation indicator was rated moderate at one site and none to slight at the other three sites. The functional/structural group indicator was rated as slight to moderate departure at two sites and none to slight departure from reference condition at the other two sites. The litter amount indicator was rated moderate at one site, slight to moderate at one site, and none to slight at two sites. Percentages of litter used to evaluate the litter indicator included not only detached litter in contact with soil but also standing litter.

Invasive plants were rated at none to slight departure at the ET and TF sites, moderate at the SP site and moderate to extreme at the ET_2 site. Cheatgrass was recorded in the HAF cover data at two of the four sites, as well as in two of the remaining three HAF sites where IIRH was not completed within the native plant communities. Curveseed butterwort was found in one of the four HAF cover transects where IIRH was collected and at one additional HAF site where IIRH was not collected.

The overall rating for the Biotic Integrity attribute was rated as a none to slight departure from the reference condition for the native areas of the Tank Field, South Pigtail Butte and East Trailing Pasture, as a slight to moderate departure for the burned areas within the Tank Field and South Pigtail Butte Pastures and as a moderate departure for the burned areas of the East Trailing Pasture.

Evaluation Finding – East Trailing Field, South Pigtail Butte and Tank Field Pastures are:

- 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. However, IIRH field notes indicate that deep-rooted perennial bunchgrasses were less diverse and of lower abundance across the native plant communities of the South Pigtail Butte and East Trailing Field Pastures. Deep-rooted perennial bunchgrasses 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 IIRH field notes, as well as the multiple years of cover data, indicate that some perennial forb species are present, although less abundant and diverse than expected and do not comprise the dominant functional/structural group, as described in the ESD for the reference condition. This is indicative of a shift in the relative dominance of vegetation functional/structural groups, with an increase in shallow-rooted perennial bunchgrasses, namely Sandberg bluegrass, throughout the native plant communities of the pastures. Sandberg bluegrass ranges from 14.0 – 23.5 percent cover within the pastures. Declines in deep-rooted perennial bunchgrasses can result in a modification of nutrient cycling and energy flow due to changes in above and below ground structure. Shallow-rooted grasses generally have a shorter active growth period, smaller root systems for stabilizing soils and facilitating soil moisture percolation and relatively lower potential to capture and store carbon below ground.

Shrubs are increasing within the pasture after they were removed by wildfires in 2006 and 2007, although they are currently at low densities. The shrub component ranges from 1.0 to 34.0 percent cover; however, the lack of shrub cover is visually apparent in some of the burned areas in the West Trailing Field, Tank Field, South Pigtail Butte and East Trailing Field (IIRH site ET_2) 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).

Adequate litter is present within the pastures to provide cover for site protection. The IDT determined that the litter amount was appropriate for site stability and ecological processes as shown by adequate soil moisture, as well as plant growth/annual production matching what is expected at each site.

Cheatgrass was noted as being found along roads in the TF and ET sites and was noted as scattered throughout the area at the SP site and common throughout the area at the ET_2 sites. Cheatgrass appeared to be outcompeting native deep-rooted perennial bunchgrasses, as well as perennial forbs within localized recently burned areas within both the East Trailing Field and South Pigtail Butte Pastures. No noxious weed species were noted within any of the pastures. 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 many of the native plant communities to hinder the spread or establishment of invasive or noxious plant species.

Although there are portions of the pastures that are meeting Standard 4, the overall call of meeting or not meeting the standard must be made at the pasture level. Due to acres burned within the pastures being greater than the unburned acreage, the variability of the percent cover of deep-rooted perennial bunchgrasses, perennial forbs and shrubs, as well as the consistent presence of cheatgrass and other invasives throughout the sites evaluated, 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 East Trailing Field, South Pigtail Butte and Tank Field Pastures are not meeting Standard 4.

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 some pastures of the Pigtail Butte Allotment have been modified and are therefore being evaluated under Standard 5. Past vegetation treatments to remove sagebrush and promote herbaceous forage as well as post-fire seeding has resulted in areas dominated by native and non-native seeded grass communities (Table 6, Map 5) that contain Wyoming big sagebrush populations present as a trace/minor component within the allotment, existing in small, sparse patches. While only a small percentage of the allotment is currently mapped as a seeding, more acres within each pasture have been seeded than what is shown on the vegetation community map. Some of the seeded areas may be mapped as native (bluegrass, etc.) rather than seeded because Sandberg bluegrass still comprises the dominant cover. Percent bare ground ranged from 10 – 31 percent. Total litter, including standing litter and litter in contact with the soil, ranged from 11 – 40 percent.

Interpreting Indicators of Rangeland Health evaluations were conducted at four locations within the allotment, all of which are HAF sites. Vegetative cover data was collected in 2012 and 2013 and is summarized in Table 34. Additional cover data was collected at other HAF and ESI sites throughout the pastures and is summarized in Tables 35, 36 and 37. Vegetative cover data was collected at multiple layers (Cooperative Extension Service et al., 1999); however, Tables 34 thru 37 displays only the top cover layer to allow comparison of cover data to ESD reference sheet values.

Table 34: IIRH Data – Percent Vegetative Cover (Top Layer Only)

Vegetation Class	Species	East Clark Seeding IIRH Site EC (2013)	NW Roseworth Reservoir IIRH Site NW (2013)	Three Mile Crossing IIRH Site TM (2012)	West Trailing Field IIRH Site WT (2012)
Perennial Grasses	Bluebunch wheatgrass	0%	0%	0%	0.5%
	Squirreltail	0%	0%	0%	9%
	Crested wheatgrass	5%	27%	6%	0.5%
	Sandberg bluegrass	21%	7%	20.5%	31.5%
	Thickspike wheatgrass	0%	0%	0%	0%
	Thurber’s needlegrass	0%	0%	4%	11%
Annual Grasses	Cheatgrass	0%	0%	0%	3.5%
Perennial Forbs	Longleaf phlox	2%	0%	4%	0.5%
	Lupine	0%	6%	0%	0%
	Desert parsley	0%	0%	0%	0%
	Prickly-leaved phlox	1%	0%	0%	0%
	Low pussytoes	0%	0%	0.5%	0%
	Carpet phlox	0%	0%	0.5%	0%
Annual Forbs	Curvseeded butterwort	11%	0%	0%	0%
	Small blue-eyed mary	0%	1%	0%	0%

Vegetation Class	Species	East Clark Seeding IIRH Site EC (2013)	NW Roseworth Reservoir IIRH Site NW (2013)	Three Mile Crossing IIRH Site TM (2012)	West Trailing Field IIRH Site WT (2012)
	Slender phlox	1%	0%	0%	0%
Shrubs	Wyoming big sagebrush	21%	0%	16%	0%
	Yellow rabbitbrush	0%	0%	4.5%	0%
Vegetation TOTAL		62%	41%	56%	56.5%
Other Cover	Biological soil crust	9%	0%	9.5%	1.5%
	Bare ground	19%	31%	10%	10.5%
	Litter in contact with soil	2%	11%	6.5%	4%
	Litter standing	5%	17%	8.5%	27.5%
	Persistent litter	3%	0%	2.5%	0%
	Rock or Gravel	0%	0%	7%	0%
Grand TOTAL		100%	100%	100%	100%

Table 35: 2006 ESI Data (Top Layer Only)

Vegetation Class	Species	West Trailing Field RA-45a	Pigtail Butte LH-14b	Pigtail Butte LH-20b	Pigtail Butte LH-21b	Northwest Roseworth Reservoir LH-25b
Perennial Grasses	Sandberg bluegrass	21%	38.7%	34.0%	16%	24%
	Crested wheatgrass	0%	1.3%	4.7%	42.7%	38.7%
	Bluebunch wheatgrass	0%	0%	0%	0%	2%
	Idaho fescue	0%	0%	0%	0%	0%
	Bottlebrush squirreltail	4%	0%	0%	0%	1.3%
	Indian ricegrass	0%	0%	0%	0%	0%
	Thurber's needlegrass	0%	0%	0%	0%	0%
Annual Grass	Cheatgrass	0%	0%	0%	0%	0%
Perennial Forbs	Allium spp.	0%	0%	0%	0%	1.4%
	Rockcress	0%	0%	0%	0%	0%
	Mourning milkvetch	0%	0%	0%	0.7%	0%
	Hood's phlox	0%	0%	0%	0%	0%
	Long-leaf phlox	1%	0%	0%	0.7%	0%
Annual Forbs	Curvseed butterwort	0%	0%	0%	0%	0%
Shrubs	Spiny hopsage	0%	0%	0%	0%	0%
	Rabbitbrush	0%	0%	0.7%	0%	0.7%
	Wyoming big sagebrush	29%	18.7%	19.3%	1.3%	4%
Vegetation TOTAL		55%	58.7%	58.7%	61.4%	72.1%
Other Cover	Bare Ground	13%	24%	13.3%	6.7%	14.7%
	Biological soil crust	13%	6.7%	8.7%	0%	0.7%
	Litter in contact with soil	12%	6%	6.0%	12%	10.7%
	Litter standing	5%	4.7%	13.3%	19.3%	2%
	Rock	2%	0%	0%	0.7%	0%
Grand TOTAL		100%	100%	100%	100%	100%

Table 36: 2006 ESI Data (Top Layer Only)

Vegetation Class	Species	Northeast Roseworth Reservoir LH-28b	Northeast Roseworth Reservoir LH-3b	Northeast Roseworth Reservoir LH-9b	Three Mile Crossing LH-1b	Three Mile Crossing LH-2b	Three Mile Crossing LH-5b
Perennial Grasses	Sandberg bluegrass	20.1%	22.7%	6.0%	23.3%	24.7%	18.7%
	Crested wheatgrass	23.5%	0%	27.3%	26.7%	0.7%	45.3%
	Bluebunch wheatgrass	6%	0%	0%	0%	0%	0%
	Idaho fescue	0%	0.7%	0%	0%	0%	0%
	Squirreltail	0%	6.7%	0%	0%	4.7%	1.3%
	Indian ricegrass	0%	0%	0%	0%	0.7%	0%
	Thurber's needlegrass	0%	0%	0%	0%	1.3%	1.3%
Annual Grass	Cheatgrass	0.7%	0%	0%	0%	0.7%	0%
Perennial Forbs	Allium spp.	0%	0%	0%	0%	0%	0%
	Rockcress	0%	0%	0%	0%	0%	0.7%
	Mourning milkvetch	0%	0%	0%	0%	0%	0.7%
	Hood's phlox	0%	0.7%	0%	0%	0.7%	0%
	Long-leaf phlox	0%	0.7%	0%	0%	2.0%	0%
Annual Forbs	Curveseed butterwort	0%	0.7%	0.7%	0%	0%	0%
Shrubs	Spiny hopsage	0%	0%	0%	0%	0%	1.3%
	Rabbitbrush	0%	2.0%	0%	0%	0.7%	0%
	Wyoming Big sagebrush	6%	6.7%	16.0%	7.3%	22.7%	6%
Vegetation TOTAL		56.3%	40.9%	50.0%	57.3%	58.9%	75.3%
Other Cover	Bare Ground	17.4%	20.0%	22.7%	30.7%	12.0%	6%
	Biological soil crust	0.7%	10.7%	6.0%	3.3%	1.3%	3.3%
	Litter in contact with soil	25.5%	26.0%	14.7%	5.3%	22.0%	6%
	Litter standing	0%	2.7%	3.3%	3.3%	4.0%	8.7%
	Rock	0%	0.0%	3.3%	0%	2.0%	0.7%
Grand TOTAL		100%	100%	100%	100%	100%	100%

Table 37: Additional HAF Vegetative Cover Data – Percent Cover (Top Layer Only)

Vegetation Class	Species	East Clark Seeding	NW Roseworth Reservoir	NE Roseworth Reservoir	West Clark Seeding
		2012	2012	2012	2012
Perennial Grasses	Sandberg bluegrass	28.0%	14.0%	16.5%	22.5%
	Crested wheatgrass	0.0%	0.0%	0.5%	12.5%
	Squirreltail	0.5%	7.0%	5.5%	0.0%
	Western wheatgrass	0.0%	1.5%	0.0%	0.0%
	Thurber’s needlegrass	1.5%	16.5%	0.0%	0.0%
Annual Grass	Cheatgrass	0.0%	0.0%	0.5%	0.0%
Perennial Forbs	Carpet phlox	1.0%	0.0%	1.0%	0.0%
	Lava aster	0.0%	0.5%	0.0%	0.0%
	Lupine	0.0%	0.0%	0.0%	0.0%
	Long-leaf phlox	0.0%	1.5%	2.0%	0.0%
Annual Forbs	Small blue-eyed Mary	0.0%	0.0%	0.0%	0.0%
Shrubs	Antelope bitterbrush	0.0%	0.5%	0.0%	0.0%
	Rabbitbrush	0.0%	0.0%	6.0%	0.0%
	Wyoming big sagebrush	27.0%	22.5%	17.0%	24.0%
Vegetation Total		58.0%	64.0%	49.0%	59.0%
Other Cover	Bare Ground	18.5%	11.0%	11.5%	19.0%
	Biological soil crust	8.5%	11.5%	11.5%	13.0%
	Litter in contact with soil	9.0%	4.0%	7.5%	3.0%
	Litter standing	3.5%	6.5%	11.5%	3.5%
	Persistent litter	0.0%	1.0%	5.5%	0.5%
	Rock	2.5%	2.0%	3.5%	2.0%
Total		100%	100%	100%	100%

East Clark Seeding, West Clark Seeding, Pigtail Butte, Cedar Mesa Reservoir and North Cedar Mesa Pastures

IIRH were not evaluated in the West Clark Seeding, Pigtail Butte, Cedar Mesa Reservoir, and North Cedar Mesa Pastures. However, IIRH site EC is located in the East Clark Seeding Pasture and the IDT felt that the site was generally representative of the vegetation and soils found in the West Clark Seeding, Pigtail Butte, Cedar Mesa and North Cedar Mesa Pastures; therefore, IIRH site EC will be used to evaluate all five pastures.

IIRH site EC (Photo 40) is located in an historic crested wheatgrass seeding in a Loamy 10-13 ARTRW8/PSSPS ESD. Crested wheatgrass is the dominant deep-rooted grass species at 5 percent cover and Sandberg bluegrass is the dominant shallow rooted grass species at 21 percent cover (Table 34). Wyoming big sagebrush was recorded as 21 percent cover, perennial forbs as 3 percent cover and desirable annual forbs as 1 percent cover.

The four pastures that are represented by the EC site have vegetation that was influenced by vegetation treatment projects in the 1960’s. Although many areas of these pastures currently have a significant sagebrush component, they have all undergone sagebrush reduction projects accompanied by non-native perennial grass seedings. The West Roseworth Plow and Seed Project, completed in 1964 and 1965, consisted of plowing out and discing sagebrush and drill

seeding Nordan crested wheatgrass at a rate of 6 pounds per acres in all five pastures. None of the pastures have burned in wildfire since at least 1960, with the exception of the 1990 Pigtail Fire, which burned approximately 25% of the Pigtail Butte Pasture.

The functional/structural group indicator was rated as moderate departure from reference condition due to reduced diversity and abundance of perennial forbs. Cheatgrass was not found in the cover transect and was described as “rare” in the IIRH field notes. Curveseed butterwort comprised 11 percent of the cover within the transect and was described as “being common throughout the site” in the IIRH field notes. The Invasive Plant indicator was rated as a moderate to extreme departure from the reference condition due to the presence of curveseed butterwort.

All indicators related to the Biotic Integrity attribute other than those for Functional/Structural Groups and Invasive Plants were rated as a none to slight departure from reference condition. The overall Biotic Integrity attribute was rated as a slight to moderate departure from reference condition.

Photo 40: East Clark Seeding Pasture (IIRH Site EC) – June 26, 2013



West Trailing Field Pasture

IIRH site WT (Photo 41) is located in a seeded vegetation community in a Loamy 8-12 ARTRW8/PSSPS-ACTH7 ESD. Thurber’s needlegrass is the dominant deep-rooted grass species at 11 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 31.5 percent cover (Table 34). Squirreltail was also present at 9 percent cover. Shrubs were

recorded as 0 percent cover, perennial forbs as 0.5 percent cover and desirable annual forbs as 0 percent cover.

The topography of the site is flat to rolling, with a generally north aspect. The soil stability test (Pellant et al., 2005) completed at this site resulted in a soil stability value of 4.3 (values should range from 4 to 6), indicating resistance to erosion. Biological soil crusts comprise 1.5 percent cover and bare ground 10.5 percent cover.

The 2007 Murphy Complex Fire burned 3,738 acres (92%) of the West Trailing Field Pasture. Following the fire, approximately 1,497 acres (40%) of the burned area within the West Trailing Field Pasture was drill seeded with the Thurber's seed mix consisting of 'Secar' Snake River wheatgrass, Sandberg bluegrass, 'Sherman' big bluegrass, squirreltail, Lewis flax, alfalfa and Munro's globemallow. In addition, about 8,500 acres within the allotment were aerially seeded in strips with Wyoming big sagebrush. Although the burned areas were reseeded with a native seed mix, the IDT felt these areas should be evaluated under Standard 5 because drill seeding had taken place and fire had eliminated the majority of the sagebrush.

The Functional/Structural Group indicator was rated as a slight to moderate departure from reference condition due to "shrubs lacking and invasives present" per the IIRH field notes. Cheatgrass was recorded as 3.5 percent cover; however, the IIRH field notes described invasives as being "widespread and patchy but scattered throughout." Therefore, the indicator for invasive plants was rated as a moderate departure from reference condition.

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

Photo 41: West Trailing Field Pasture (IIRH Site WT) – June 26, 2013



Three Mile Crossing and Northeast Roseworth Reservoir Pastures:

IIRH site TM (Photo 42) is located in the Three Mile Crossing Pasture; however, the IDT felt that the site was also generally representative of the vegetation and soils found in the Northeast Roseworth Reservoir Pasture. Therefore, IIRH site TM will be used to evaluate both pastures

IIRH site TM is located in an historic crested wheat seeding in a Loamy 10-13 ARTRW8/PSSPS ESD. Crested wheatgrass is the dominant deep-rooted grass species at 6 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 20.5 percent cover (Table 34). Thurber's needlegrass is also present at 4 percent cover. Wyoming big sagebrush was recorded as 16 percent cover, yellow rabbitbrush as 4.5 percent cover, perennial forbs as 5 percent cover and desirable annual forbs a 0 percent cover.

The site is of relatively flat topography with west aspect and the soil stability test (Pellant et al., 2005) completed at the site resulted in a soil stability value of 4.1 (values should range from 4 to 6), indicating resistance to erosion. Biological soil crusts comprise 9.5 percent cover and bare ground is 10 percent.

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 (25 percent) found at the site. 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." Curveseed butterwort was also noted as "some

being present” at the site. Therefore, the indicator rating 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. The overall Biotic Integrity attribute was rated as a none to slight departure.

Photo 42: Three Mile Crossing Pasture (IIRH Site TM) – June 19, 2013



Northwest Roseworth Reservoir Pasture

IIRH site NW (Photo 43) is located in a historic crested wheatgrass seeding in a Loamy 10-13 ARTRW8/PSSPS ESD. Crested wheatgrass is the dominant deep-rooted grass species at 27 percent cover and Sandberg bluegrass is the dominant shallow-rooted grass species at 7 percent cover (Table 34). Wyoming big sagebrush was recorded as 0 percent cover, perennial forbs as 6 percent cover and desirable annual forbs as 1 percent cover.

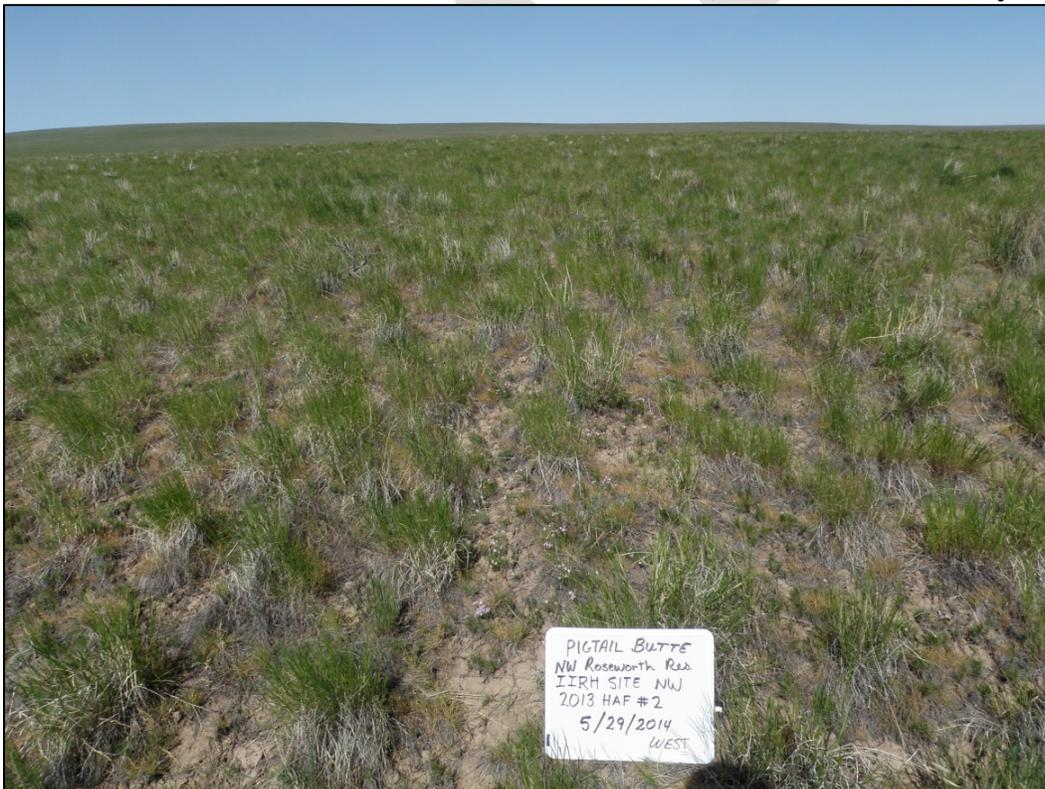
The site is of relatively flat topography with an east aspect. No soil stability test was completed at this site; however, the field notes refer to the soil tests performed in the Three Mile Crossing and South Pigtail Butte Pastures. The Three Mile Crossing Pasture soil stability test (Pellant et al., 2005) completed at the site resulted in a soil stability value of 4.1 and the South Pigtail Butte Pasture soil stability test resulted in a soil stability value of 4.7 (values should range from 4 to 6), both indicating resistance to erosion. Biological crust was 0 percent cover and bare ground was 31 percent.

The 2007 Murphy Complex Fire burned 4,544 acres (91%) of the Northwest Roseworth Reservoir Pasture. No drill seeding was prescribed following the fire; however, about 8,500 acres within the allotment were arially seeded in strips with Wyoming big sagebrush.

The Soil Surface Loss or Degradation indicator was rated a moderate departure due to “the site’s fire history; however, pedestals are limited” per the IDT notes. The Functional/Structural Groups indicator was rated as a moderate departure from the reference condition due to a “reduced abundance of perennial species, trace levels of perennial forbs and a lack of biological crusts” per the IDT notes. The IDT noted that “vigor was reduced in crested wheatgrass but (vigor is) good in alfalfa.” Therefore, the Annual Production indicator was rated as a slight to moderate departure from reference condition. Cheatgrass was record as 0 percent cover at the site. However, the Invasive Plants indicator was rated as a moderate to extreme departure from reference condition due to curvseeded butterwort, which was noted as being “common and widespread, present in numerous patches and not associated with disturbance.”

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

Photo 43: Northwest Roseworth Reservoir Pasture (IIRH Site NW) – May 29, 2014



Evaluation of Standard 5

East Clark Seeding, West Clark Seeding, Pigtail Butte, Cedar Mesa Reservoir, North Cedar Mesa, Three Mile Crossing, Northeast Roseworth Reservoir, West Trailing Field and Northwest Roseworth Reservoir Pastures:

Plant communities within the East Clark Seeding, West Clark Seeding, Pigtail Butte, Cedar Mesa Reservoir, North Cedar Mesa, Three Mile Crossing, Northeast Roseworth Reservoir, West Trailing Field and Northwest Roseworth Reservoir Pastures have been modified. In the 1960s, sagebrush was plowed out and disced to reduce cover and large areas were seeded with crested wheatgrass to provide forage for livestock use. Plant communities throughout the allotment have been modified from their native state through seeding of perennial grasses and forbs, as well as sagebrush thinning projects and aerial seedings of sagebrush following wildfire.

The cover data collected in 2012 and 2013 and used in the IIRH evaluation (Table 34) reflects a diversity of the desirable vegetation within areas that have affected by wildfire and been reseeded. Deep-rooted perennial bunchgrasses are the dominant functional/structural groups, occurring as between 5 – 27 percent of the vegetative cover. Shallow rooted grasses occur as between 7 – 31.5 percent cover, perennial forbs occur as between 0.5 – 6 percent cover and cheatgrass as between 0 – 3.5 percent cover and all species are capable of reproduction and recruitment of new seedlings.

During the 2013 and 2014 IIRH evaluation, the IDT rated the Functional/Structural group indicator as a none to slight departure at one site, as a slight to moderate departure at one site and as a moderate departure at two sites. At most of the sites, diversity of perennial forbs was reasonable but abundance was lacking; perennial grasses were abundant but less diverse. The seeded plant communities have a high abundance of deep-rooted perennial grasses, as well as Sandberg bluegrass and other desirable vegetation and biological crusts that are providing soil cover and competition to invasive species. These ratings were based on field observations documenting the presence of deep-rooted perennial bunchgrasses, shallow rooted grasses and perennial forbs. 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. The perennial species present within the seeded areas are appropriately productive and are capable of reproduction and recruitment of new seedlings and are providing soil cover and competition to invasive species.

The indicator for Soil Surface Loss or Degradation was rated moderate at IIRH site NW based on the site's fire history and an observed loss of soil; however, pedestals were uncommon at the site. The indicator for Litter Amount was rated moderate at the WT site and slight to moderate at the TM site. Adequate litter is present within the seeded plant communities to provide cover for site protection. The presence of seeded species can result in higher biomass production, resulting in more litter than is described in the ESD reference sheet. However, the IDT determined that the higher litter amount was appropriate for site stability and ecological processes as shown by adequate soil moisture, as well as plant growth/annual production matching what is expected at each site. The indicator for Invasive Plants was rated as a slight to moderate departure at IIRH site TM, as a moderate departure as IIRH site WT and as a moderate to extreme departure at IIRH sites NW and EC. However, cheatgrass was not recorded in the cover data for the IIRH

sites except at IIRH site WT, where it was recorded as 3.5%. Curveseed butterwort, an annual forb, is considered invasive and observed to be present at all the sites by the IDT. Invasive species can become a threat to biotic integrity following large scale disturbances such as wildfire. However, adequate desirable perennial species are present to hinder the further establishment or spread of cheatgrass or other invasive or noxious plant species.

The overall rating for the Biotic Integrity attribute was rated as a none to slight departure for the Threemile Crossing and Northeast Roseworth Reservoir Pastures, as a slight to moderate departure for the West Trailing Field, Pigtail Butte, East and West Clark Seeding and North Cedar Mesa Pastures and as a moderate departure for the Northwest Roseworth Reservoir Pasture.

Evaluation Finding – East Clark Seeding, West Clark Seeding, Pigtail Butte, Cedar Mesa Reservoir , North Cedar Mesa, Three Mile Crossing, Northeast Roseworth Reservoir, West Trailing Field and Northwest Roseworth Reservoir Pastures are:

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

Rationale for Evaluation Finding

Diversity of the perennial species within the East Clark Seeding, West Clark Seeding, Pigtail Butte, Cedar Mesa Reservoir , North Cedar Mesa, Three Mile Crossing, Northeast Roseworth Reservoir, West Trailing Field and Northwest Roseworth Reservoir Pastures is as expected for areas that have burned by wildfire and have been reseeded. Deep-rooted perennial bunchgrasses are the dominant functional/structural group within most areas of the seeded plant communities. Perennial species are productive and capable of reproduction and recruitment of new seedlings. 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 absent from some of the seeded plant communities and perennial forbs were present in trace amounts.

The litter amount indicator rating deviated from the reference condition found in the ESD at only one of the four sites evaluated. 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 seedlings. 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.

Cheatgrass was noted to be present in small amounts along roads in the Threemile Crossing Pasture, widespread but patchy in the West Trailing Field Pasture and limited or rare in the Northwest Roseworth Reservoir and East Clark Seeding. 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.

Although Wyoming big sagebrush was recorded as being present at two of the sites, the lack of shrub cover is visually apparent at other sites. 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 combination of the presence of large statured, deep rooted perennial bunchgrasses, shallow rooted, perennial grasses and perennial forb species, along with the limited presence of cheatgrass, all allow the seeded vegetation communities within the East Clark Seeding, West Clark Seeding, Pigtail Butte, North Cedar Mesa, Three Mile Crossing, Northeast Roseworth Reservoir, West Trailing Field and Northwest Roseworth Reservoir Pastures are 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 East Clark Seeding, West Clark Seeding, Pigtail Butte, Cedar Mesa Reservoir, North Cedar Mesa, Three Mile Crossing, Northeast Roseworth Reservoir, West Trailing Field and Northwest Roseworth Reservoir Pastures within the Pigtail 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 Pigtail 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.

See Standard 2 for a description of the water resources within the allotment.

Evaluation of Standard 7

There are approximately 3.4 miles of Cedar Creek within the Threemile Crossing, South Pigtail Butte, Northeast Roseworth Reservoir and Northwest Roseworth Reservoir Pastures of the Pigtail Butte Allotment that are within Idaho Department of Environmental Quality (IDEQ Assessment Unit (AU) ID17040213SK000_04 (IDEQ 2014). There also is a portion of Cedar Creek Reservoir (0.1 mile) (ID ID17040213SK004_0L) in the NE Roseworth Reservoir and NW Roseworth Reservoir pastures, and a 0.1 mile section of House Creek (ID17040213SK005_04) in the NW Roseworth Reservoir pasture. Therefore, Standard 7 applies to the Threemile

Crossing, South Pigtail Butte, Northeast Roseworth Reservoir and Northwest Roseworth Reservoir Pastures of the Pigtail Butte Allotment.

The designated beneficial uses for AU ID17040213SK000_04 are cold water aquatic life, primary contact recreation, and secondary contact recreation. This AU is listed as not supporting the cold water aquatic life beneficial use due to flow regime alterations, sedimentation/siltation, and elevated water temperature (IDEQ 2014). The AU has not been assessed to determine if the beneficial uses of primary and secondary contact recreation are fully supported. The AU was removed from the 303(d) list of water quality impaired streams (Category 5 streams) for sedimentation/siltation and water temperature after the Environmental Protection Agency's (EPA) approval of the Salmon Falls Subbasin Assessment and Total Maximum Daily Loads (TMDL) (IDEQ 2008). For these water quality indicators, Cedar Creek within the AU are listed as Category 4a stream (i.e., waters with an EPA approved TMDL). For flow regime alterations, the AU is listed as a Category 4c stream (i.e., waters failing to meet water quality standards due to pollution (e.g., flow alteration), not a pollutant. Water quality parameters have not been assessed recently, but conditions are likely similar to previous assessments. As the stream flows in Cedar Creek are artificially maintained and result from releases of impounded waters from Cedar Creek reservoir, water temperatures in Cedar Creek are primarily influenced by water temperature within the reservoir. Livestock grazing is also influencing water temperature where streamside vegetation is reduced and stream channel width to depth ratios are not in balance with the landscape.

Cedar Creek Reservoir is within IDEQ AU ID17040213SK004_0L and is within NE Roseworth Reservoir and NW Roseworth Reservoir Pastures. Designated beneficial uses for this AU are cold water aquatic life and primary contact recreation. Primary contact recreation is fully supported, and cold water aquatic life is not supported (IDEQ 2014). The AU is listed as not supporting the cold water aquatic life beneficial use due to total phosphorus, sedimentation/siltation, and elevated water temperature. The AU was removed from the 303(d) list of water quality impaired streams (Category 5 streams) for sedimentation/siltation, total phosphorus and water temperature after the EPA's approval of the Salmon Falls Subbasin Assessment and TMDL (IDEQ 2008). For these water quality indicators, Cedar Creek within the AU is listed as Category 4a stream (i.e., waters with and EPA approved TMDL). Water temperatures in Cedar Creek Reservoir are primarily affected by solar exposure on the impounded waters of the reservoir and not the livestock grazing that occurs in areas adjacent to the reservoir.

House Creek within the allotment is within IDEQ AU ID170402013SK005_04 (NW Roseworth Reservoir Pastures). Designated beneficial uses for the AU include cold water aquatic life, salmonid spawning, and secondary contact recreation (IDEQ 2014). The AU is listed as not supporting the cold water aquatic life and salmonid spawning beneficial uses 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 of water quality impaired streams (Category 5 streams) for total phosphorus, sedimentation/siltation, and water temperature after the EPA's approval of the Salmon Falls Subbasin Assessment and TMDL (IDEQ 2008). For these water quality indicators, Cedar Creek within the AU is listed as Category 4a stream (i.e., waters with and EPA approved

TMDL). Water quality parameters have not been assessed recently, but conditions are likely similar to those found during previous assessments. Water temperatures in the short section of House Creek within the allotment are influenced by public and private land activities in the upper watershed, by waters within the the Cedar Creek Reservoir during high water years, and livestock grazing within the allotment which allows livestock access to riparian vegetation along House Creek.

The IDEQ 2012 Integrated Report identifies approximately 0.5 mile of AU ID17040213SK003_02 in East Clark Seeding, North Cedar Mesa, and Cedar Mesa Reservoir pastures as unclassified waters for which designated beneficial uses (e.g., cold water aquatic life, primary and secondary contact recreation) have been identified but not assessed. The AU is listed as a Category 3 stream (i.e., waters with insufficient data (or no data) to determine if beneficial uses are being attained). Until IDEQ assesses the water quality within the AU, no further evaluation of water quality can be completed for these three pastures of the allotment.

Evaluation Finding – Threemile Crossing, South Pigtail Butte, Northeast Roseworth Reservoir and Northwest Roseworth Reservoir 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 Threemile Crossing, South Pigtail Butte, NE Roseworth Reservoir and NW Roseworth Reservoir Pastures based on IDEQ beneficial use support status and water quality impairment information (IDEQ 2014). Cedar Creek throughout the allotment (ID17040213SK000_04) is listed by IDEQ as not supporting the designated beneficial use of cold water aquatic life due to flow regime alterations sedimentation/siltation, and elevated water temperature. Cedar Creek Reservoir (AU ID17040213SK004_0L) is listed as not supporting the cold water aquatic life beneficial use due to total phosphorous, sedimentation/siltation, and elevated water temperature. House Creek (AU ID170402013SK005_04) is listed as not supporting the cold water aquatic life and salmonid spawning beneficial uses due to total phosphorus, sedimentation/siltation, and elevated water temperature. Because livestock have access to all of these water quality assessment units, they cannot be discounted as a factor contributing to the water quality impairment for sedimentation/siltation, elevated water temperature, and total phosphorous. Water temperatures in Cedar Creek Reservoir are primarily affected by solar exposure on the impounded waters of the reservoir and are not likely to be caused by the livestock grazing that occurs in areas adjacent to the reservoir. Therefore, Cedar Creek, Cedar Creek Reservoir and House Creek reaches within the Threemile Crossing, South Pigtail Butte, NE Roseworth Reservoir and NW Roseworth Reservoir Pastures are not meeting Standard 7.

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:

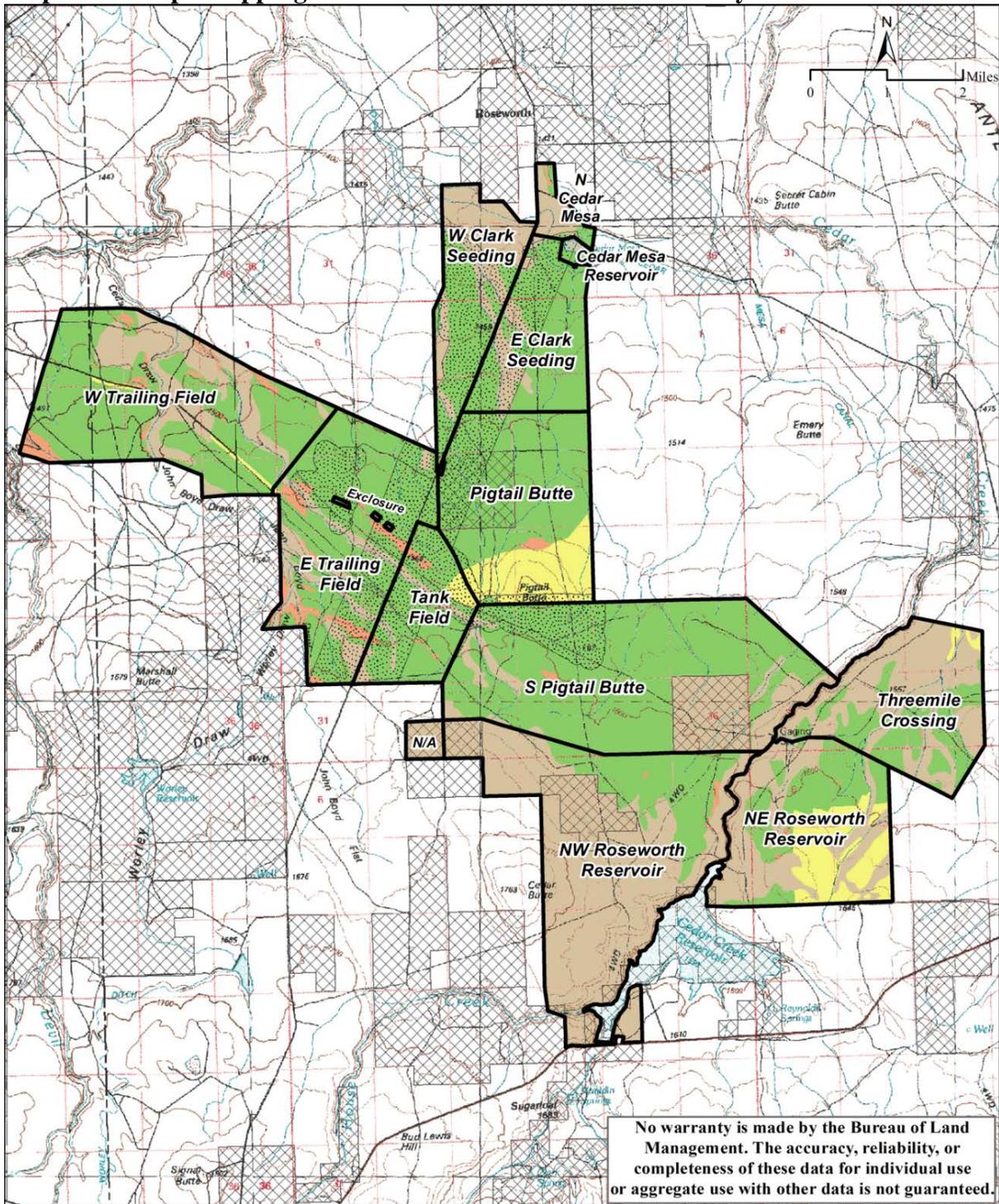
There are no known BLM sensitive plants within the allotment. In the Jarbidge Field Office special status plants are generally associated with distinct soil types that occur on scattered portions of the field office. None of these soil types occur within the allotment based on SSURGO soil data (USDA and NRCS, 2012). Potential habitat occurs for one sensitive plant species, slickspot peppergrass (*Lepidium papilliferum*; Proposed Endangered, BLM sensitive species). Approximately 4,250 acres (15% of the allotment) 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 Pigtail Butte Allotment contains 19,123 acres (67% of allotment) of potential slickspot peppergrass habitat (Map 9). 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, low, and non-habitat) that identify the potential for finding the species. The allotment contains 16,784 acres of high potential, 641 acres of medium potential, 1,698 acres of low potential, and 9,478 acres of non-habitat for slickspot peppergrass (Table 38). The nearest known occupied habitat for slickspot peppergrass is 10 miles to the west, on the west side of Clover Creek.

Table 38: Slickspot Peppergrass Potential Habitat (Acres)

Pasture	High	Medium	Low	Non-habitat
Cedar Mesa Reservoir	49	0	0	25
East Clark Seeding	1,382	0	0	272
East Trailing Field	2,438	267	4	498
Monitoring Exclosure	17	0	0	0
North Cedar Mesa	68	9	0	200
NE Roseworth Reservoir	839	26	729	1,198
NW Roseworth Reservoir	1,035	25	0	3,195
Pigtail Butte	1,527	29	767	7
South Pigtail Butte	4,111	17	3	525
Tank Field	1,034	47	69	143
Three Mile Crossing	814	5	44	1,529
West Clark Seeding	787	0	0	806
West Trailing Field	2,681	216	82	1,079

Map 11: Slickspot Peppergrass Potential Habitat and Area Surveyed



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.



Animals:

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

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

Redband trout likely inhabit the 0.3 mile of House Creek in the Northwest Reservoir Pasture since they occur upstream. Historically, redband trout were also likely found in Cedar Creek below Cedar Creek Reservoir. However, redband trout no longer exist in Cedar Creek below the dam due to dewatering that occurs during the winter months. Despite the winter dewatering, non-game fish remain in Cedar Creek. No fish or fish habitat surveys have been conducted along the 0.3 mile of House Creek or along Cedar Creek below the dam. No other threatened, endangered, or special status aquatic species are present in 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. Approximately 75% of sage-grouse hens nest within 4 miles of a lek (Holloran and Anderson, 2005; Holloran et al., 2007). 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 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, irrigated farmland, 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 fall as forbs dry up sage-grouse switch from eating forbs to 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).

Based on vegetation mapping from 2013, the Pigtail Butte Allotment contains 13,065 acres mapped as sagebrush (46% of the allotment; Map 10). Sagebrush occurs in the Cedar Mesa Reservoir Pasture (52 acres, 69% of pasture), East Clark Seeding Pasture (1,649 acres, 100% of pasture), East Trailing Field Pasture (2,059 acres, 64% of pasture), Monitoring Exclosure (17 acres, 100% of exclosure), North Cedar Mesa Pasture (271 acres, 98% of pasture), Northeast Roseworth Reservoir Pasture (1,088 acres, 39% of pasture), Northwest Roseworth Reservoir Pasture (223 acres, 5% of pasture), Pigtail Butte Pasture (1,302 acres, 56% of pasture), South Pigtail Butte Pasture (1,843 acres, 40% of pasture), Tank Field Pasture (684 acres, 53% of pasture), Three Mile Crossing Pasture (2,149 acres, 90% of pasture), West Clark Seeding Pasture (1,573 acres, 99% of pasture), and West Trailing Field Pasture (155 acres, 4% of pasture).

Sage-grouse have been observed in the adjoining allotments year round. Sage-grouse habitat extends from the Pigtail Butte Allotment to the North, South, and East (Map 12).

The Pigtail Butte Allotment contains 4 occupied and 3 undetermined (due to a lack of recent surveys) sage-grouse leks. Within five miles there are 21 occupied, 27 undetermined, 5 unoccupied, and 2 not verified (no count data associated with lek) sage-grouse leks (Map 10). Sage-grouse attendance at occupied leks within five miles of the allotment are shown in Table 39. Leks are considered occupied if there has been documented sage-grouse activity within the past five years.

Table 39: Sage-grouse Attendance at Occupied Leks within Five Miles of the Pigtail Butte Allotment, 2000-2014

Lek	Location	Survey Year ¹														
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14
2T-210	East Trailing Field Pasture															18
2T-170	Three Mile Crossing Pasture	9	2	--	--	--	16	17	24*	16	6	4	0	0	0	0
2T-164	Three Mile Crossing Pasture	4	--	4	--	0	3	4	1	0	0	2	0	0	0	0
2T-150	West Trailing Field Pasture	13	13	10	3	0	3	8	3	4	5	6	4	15	7	6
2T-162	0.3 mile N	18	5	8	--	--	18	8	11*	12	14	5	8	3	10	6
2T-021	0.3 mile E	--	--	9	13	15	22	16	12	8	8	7	13	10	15	11
2T-168	1.0 mile N	16	--	--	--	--	--	--	--	--	--	--	--	--	--	4
2T-133	2.3 miles SW	10	5	4	3	13	0	14	13	8	7	6	10	10	4	0
2T-111a	2.6 miles SE					14	25	37	19	15	0	3	0	0	1	0
2T-202	2.8 miles S	--	--	--	--	--	--	--	3	--	--	7	4	--	--	4
2T-148	3.0 miles S	--	--	--	--	--	--	--	--	--	5	0	0	0	--	2
2T-157	3.0 miles W	18	16	8	--	15	13	14	10*	9	7	5	5	8	--	2
2T-133a	3.1 miles SW	--	--	--	--	--	--	--	--	--	--	--	--	18	16	28
2T-101	3.4 miles NE	17	7	8	8	0	13	18	30	18	17	0	15	8	11	10
2T-147	3.4 miles NE	--	--	--	--	--	--	--	--	--	12	--	--	7	5	--
2T-111	3.2 miles SE	24	17	18	17	18	7	9	19	15	6	2	2	6	2	2
2O-165	3.2 miles NW	9	8	7	--	8	--	--	9*	9	4	2	4	--	0	4
2T-132	3.4 miles SE	32	25	18	17	22	16	18*	9	12	13	11	22	15	15	13
2O-697	3.6 miles NW								2*	0	0	4	1	4	0	0
2T-155	4.7 miles SW	6	0	1	--	--	--	--	--*	0	0	--	2	0	--	0
2T-013	4.9 miles NE	--	--	--	--	--	--	0	--	0	--	--	--	0	--	14

¹Where 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

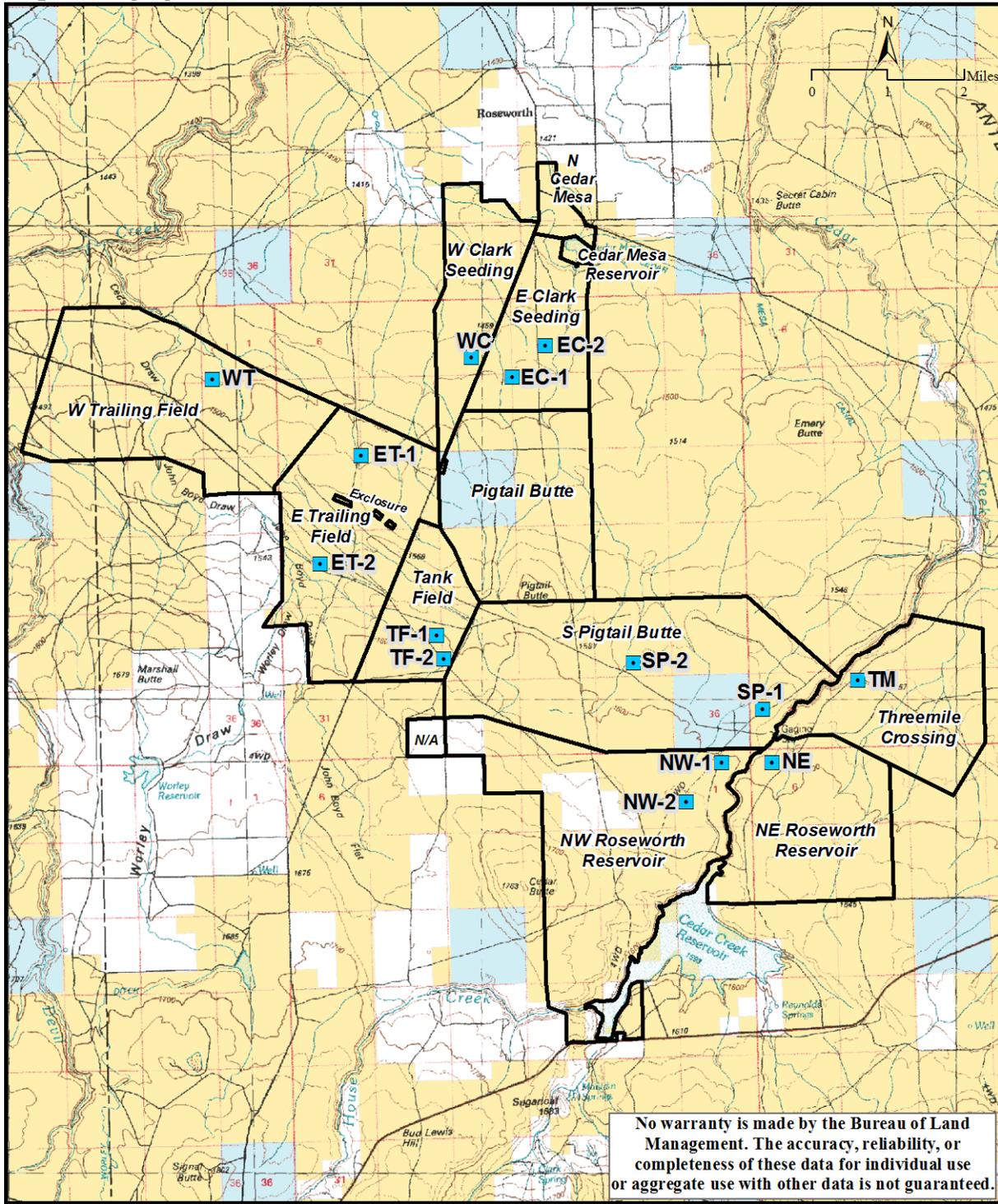
The current conditions of sage-grouse seasonal habitats were assessed following protocols outlined in the Sage-grouse Habitat Assessment Framework (Stiver et al., 2010). Sage-grouse habitat suitability assessments were conducted in 2012 at HAF sites **EC_1**- East Clark Seeding, **ET_1**- East Trailing Field, **NE**- Northeast Roseworth Reservoir, **NW_1**- Northwest Roseworth Reservoir, **SP_1**- South Pigtail Butte, **TF_1**- Tank Field, **TM**- Three Mile Crossing, **WC**- West Clark Seeding, and **WT**- West Trailing Field. Assessments were also conducted in 2013 at HAF

sites **EC_2**- East Clark Seeding, **ET_2**- East Trailing Field, **NW_2**- Northwest Roseworth Reservoir, **SP_2**- South Pigtail Butte, and **TF_2**- Tank Field. Locations of sage-grouse habitat assessment sites (HAF sites) are shown in Map 13.

Sage-grouse droppings were observed during the sage-grouse habitat assessments at HAF sites TF_2, NW_1, NE, and TM and during the IIRH field visits at HAF site TM, IIRH NW (HAF site 2), HAF site TF_1, HAF site ET_1, HAF site SP_2. In addition, four sage-grouse chicks were observed in the NW Roseworth Reservoir Pasture. Also a sage-grouse nest with broken eggs from the previous year was observed at HAF site TF_2. It was suspected the nest was depredated or abandoned prior to hatching.

Sage-grouse habitat suitability assessments are not necessarily an indication of rangeland health; they are merely indicators of habitat suitability. However, vegetation 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 40.

Map 13: Sage-grouse Habitat Assessment Framework (HAF) Sites



 Pigtail Butte Allotment & Pastures	 HAF Site	 Bureau of Land Management
		 Private; other
		 State

Table 40: Sage-grouse Habitat Assessment Worksheet for Nesting and Early Brood Rearing Habitat (Arid Site)

Habitat Indicator	Suitable Habitat	Marginal Habitat	Unsuitable Habitat
Average Sagebrush Canopy Cover	15 – 25% EC_2(21%), NE(17%), NW_1(22.5%), SP_1(22%), TM(16.5%), WC(24%)	10 - < 15% or > 25% EC_1(29%), ET_1(29%), TF_1(27.5%)	< 10% ET_2(0%), NW_2(0%), SP_2(5%), TF_2(0%), WT(0%)
Average Sagebrush Height	12 - 30" EC_1(22"), EC_2(24"), ET_1(19"), NE(20"), NW_1(23"), SP_1(24"), SP_2(15"), TF_1(25"), TM(22"), WC(22")	10 - 11" or >30"	< 10" ET_2(0"), NW_2(0"), TF_2(0"), WT(0")
Sagebrush Growth Form	Spreading EC_1, EC_2, NE, NW_1, SP_1, SP_2, TF_1	Mix of spreading and columnar ET_1, TM, WC	Columnar ET_2, NW_2, TF_2, WT
Average Grass Height	≥ 7" TM(7"), WT(7")	5 - < 7" NE(5.0"), NW_1(6.7"), NW_2(6.5"), SP_2(5.3"), TF_1(6.1"), WC(5.6")	< 5" EC_1(4.4"), EC_2(4.2"), ET_1(3.9"), ET_2(4.9"), TF_2(4.3"), SP_1(4.6")
Average Perennial Grass Canopy Cover	≥ 10% EC_1(40.5%), EC_2(46%), ET_1(33%), ET_2(74%), NE(35%), NW_1(49%), NW_2(41%), SP_1(45%), SP_2(61%), TF_1(45.5%), TF_2(49%), TM(39%), WC(52%), WT(67.5%)	5 - < 10%	< 5%
Average Forb Canopy Cover	≥ 5% ET_2(11%), NE(5.5%), NW_2(9%), SP_2(9%), TF_2(19%), TM(9%)	3 - < 5% EC_2(4%)	< 3% EC_1(1%), ET_1(1%), NW_1(2%), SP_1(1%), TF_1(1%), WC(1%), WT(1%)
Preferred Forb Abundance and Diversity	Forbs common with at least a few preferred species common ET_2, NE, NW_1, NW_2, SP_1, SP_2, TF_1, TF_2, TM, WT	Forbs common, but only 1 or 2 preferred species present EC_1, EC_2, ET_1	Forbs rare to sparsely present WC
Overall Site Evaluation	NE, NW_1, SP_1, TF_1, TM	EC_1, EC_2, ET_1, WC	ET_2, NW_2, SP_2, TF_2, WT
Pasture Evaluation	Three Mile Crossing	Cedar Mesa Reservoir, East Clark Seeding, East Trailing Field, North Cedar Mesa, Pigtail Butte, Tank Field, West Clark Seeding	Northeast Roseworth Reservoir, Northwest Roseworth Reservoir, South Pigtail Butte, West Trailing Field

The Cedar Mesa Reservoir, North Cedar Mesa, and Pigtail Butte Pastures were not assessed during the sage-grouse habitat assessments. The Cedar Mesa Reservoir Pasture is a 75 acre wildlife enclosure. The Cedar Mesa Reservoir is approximately 23 acres in size. The entire

Cedar Mesa Reservoir Pasture with the exception of the reservoir itself is mapped as a Wyoming sagebrush/ Sandberg bluegrass vegetation community. The North Cedar Mesa Pasture is 276 acres and is predominately mapped as a Wyoming sagebrush/ crested wheatgrass vegetation community. The Pigtail Butte Pasture contains 2,330 acres of BLM land. The northern half of the pasture is predominately mapped as a Wyoming sagebrush/ Sandberg bluegrass vegetation community. The southern half of the pasture burned in the Pigtail Fire of 1990 and is currently mapped as a crested wheatgrass vegetation community. In the area mapped as crested wheatgrass, sagebrush is increasing and is approaching 10% cover with most sagebrush in the 12-18" height range. Vegetation treatments in the 1960's in the Cedar Mesa Reservoir, North Cedar Mesa, and Pigtail Butte Pastures have likely limited the abundance and diversity of forbs in the uplands. The Cedar Mesa Reservoir, North Cedar Mesa, and Pigtail Butte Pastures provide marginal habitat for sage-grouse.

Two HAF sites are located in the East Clark Seeding Pasture. HAF site EC_1 is mapped as a Wyoming sagebrush/Sandberg bluegrass vegetation community. The other site, HAF site EC_2 is mapped as a Wyoming sagebrush/ crested wheatgrass vegetation community. Attributes at HAF site EC_1 were suitable for all habitat indicators except for grass height and average forb canopy cover (both unsuitable). Although average forb canopy cover was unsuitable, the site was rated suitable for preferred forb abundance and diversity with 9 species of forbs observed. Forbs occurred at low density (0.48 forbs per 0.1m²). The most common forb species were spiny phlox (*Phlox hoodii*), Nevada onion (*Allium nevadense*), and desert biscuitroot (*Lomatium foeniculaceum*). Attributes at HAF site EC_2 were suitable for sagebrush indicators and grass canopy cover, marginal for average average forb canopy cover and preferred forb abundance and diversity, and unsuitable for grass height. Only 5 species of forbs were observed and they occurred at moderate density (1.04 forbs per 0.1 m² plot). The most common forb species were longleaf phlox (*Phlox longifolia*) and sagebrush phlox (*Phlox aculeata*). Cheatgrass was not recorded along the transects at HAF sites EC_1 or EC_2. Overall, the East Clark Seeding Pasture provides marginal nesting and early brood rearing habitat for sage-grouse.

The East Trailing Field Pasture contains two HAF sites. HAF site ET_1 is mapped as a Wyoming sagebrush/Sandberg bluegrass vegetation community. The other site, HAF site ET_2 is mapped as a Sandberg bluegrass vegetation community. Sagebrush height and perennial grass cover were rated suitable. Sagebrush cover, sagebrush growth form, and preferred forb abundance and diversity were rated marginal. Grass height and forb canopy cover were rated unsuitable. All other indicators were rated unsuitable except for sagebrush growth form (marginal). Seven species of forbs were observed and they occurred at low density (0.81 forbs per 0.1 m² plot). The most common forbs species were sagebrush phlox, spiny phlox, northwestern Indian paintbrush (*Castilleja angustifolia*), longleaf phlox, and freckled milkvetch (*Astragalus lentiginosus*). Cheatgrass was not recorded along the transects. HAF site ET_2 did not contain sagebrush; however, grass and forb indicators were all rated suitable except for grass height which was rated unsuitable. Fourteen species of forbs were observed and they occurred at high density (5.62 forbs per 0.1 m² plot). The most common forb species were longleaf phlox, pale agoseris (*Agoseris glauca*), shaggy fleabane (*Erigeron pumilus*), and Nevada onion. Cheatgrass was recorded at 2% cover (all layers). Overall, the East Trailing Field Pasture provides marginal habitat for sage-grouse during nesting and early brood rearing.

One HAF site is located in the Northeast Roseworth Reservoir Pasture in the northern portion of the pasture that did not burn and still contains sagebrush. HAF site NE is mapped as a Wyoming sagebrush/Sandberg bluegrass vegetation community. All habitat indicators were rated suitable except for grass height (marginal). Fifteen species of forbs were observed and they occurred at high density (2.46 forbs per 0.1 m² plot). The most common forbs observed were longleaf phlox, spiny phlox, and low pussytoes (*Antennaria dimorpha*). Cheatgrass was recorded at 0.5% cover (all layers). Sixty-one percent of the pasture burned in 2007. In the 2013 satellite imagery of the area that burned, some sagebrush is visible but it occurs at low density and in scattered patches. Since sage-grouse rely heavily on sagebrush of adequate density and height during their life history, this pasture was rated unsuitable during nesting and early brood rearing.

The Northwest Roseworth Reservoir Pasture contains two HAF sites. The 2007 Murphy Complex Fire burned 95% of the pasture. The only remaining areas mapped as sagebrush occurs in the northeastern corner of the pasture and in the southern portions of the pasture. HAF site NW_1 is located in the northeastern corner of the pasture mapped as a Wyoming sagebrush/Sandberg bluegrass vegetation community. The other site, HAF site NW_2 is mapped as a Sandberg bluegrass vegetation community. Attributes at HAF site NW_1 were rated suitable for all habitat indicators except for 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 15 species of forbs observed. Forbs occurred at high densities (3.01 forbs per 0.1 m² plot) with the most common forbs being longleaf phlox, spiny phlox, sagebrush phlox, lava aster (*Ionactis alpina*), mourning milkvetch (*Astragalus atratus*), and Nevada onion. HAF site NW_2 did not contain sagebrush; however, grass and forb indicators were rated suitable except for grass height which was rated marginal. Six species of forbs were observed and they occurred at high density (2.84 forbs per 0.1 m² plot). The only common forb species were longleaf phlox and lupine (*Lupinus* spp.). Cheatgrass was not recorded along the transects at HAF sites NW_1 or NW_2. Without sagebrush, the Northwest Roseworth Reservoir Pasture is unsuitable as nesting and early brood rearing habitat.

Two HAF sites are located in the South Pigtail Butte Pasture. HAF site SP_1 is located on the eastern side of the pasture in an area mapped as a Wyoming sagebrush/Sandberg bluegrass vegetation community. The other site, HAF site SP_2 is located in the central portion of the pasture that burned and is mapped as a Sandberg bluegrass vegetation community. Attributes at HAF site SP_1 were suitable for all sagebrush indicators, perennial grass canopy cover, and preferred forb abundance and diversity. However, grass height and average forb canopy cover were both rated 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. Forbs occurred at high densities (2.64 forbs per 0.1 m² plot) with the most common forbs being longleaf phlox, mourning milkvetch, and lava aster. Cheatgrass was not encountered along the transects at HAF site SP_1. Attributes at HAF site SP_2 were rated suitable for all habitat indicators except for grass height (5.3”) which was rated marginal and sagebrush cover (5% cover) which was rated unsuitable. Thirteen species of forbs were observed at the site and they occurred at high densities (3.26 forbs per 0.1 m² plot). Cheatgrass was recorded at 1% cover (all layers). This area has good restoration potential. Almost all grass and forb indicators are suitable and sagebrush is increasing at the site. However, until sagebrush achieves sufficient

density for nesting, the majority of the South Pigtail Butte Pasture remains unsuitable for sage-grouse.

The Tank Field Pasture contains two HAF sites. HAF site TF_1 is located in the central portion of the pasture mapped as a Wyoming sagebrush/ Sandberg bluegrass vegetation community. HAF site TF_2 is located in the southern portion of the pasture that burned in the 2007 Murphy Complex Fire and is mapped as a Sandberg bluegrass vegetation community. Attributes at HAF site TF_1 were rated suitable for sagebrush height, sagebrush growth form, perennial grass canopy cover, and preferred forb abundance and diversity. Sagebrush canopy cover and grass height were rated marginal and average forb canopy cover was rated 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. Forbs occurred at moderate densities (1.40 forbs per 0.1 m² plot) with the most common forbs being longleaf phlox, lava aster, and spiny phlox. Cheatgrass was not observed along the transects at the site. At HAF site TF_2, no sagebrush was encountered along the transects but scattered patches of sagebrush are present in the photos. Attributes at the site were rated suitable for perennial grass cover, average forb canopy cover, and preferred forb abundance and diversity. Grass height was rated unsuitable at 4.3 inches. Seventeen species of forbs were observed and they occurred at high density (2.59 forbs per 0.1m² plot). Cheatgrass was recorded at 1% cover (all layers). Since the Tank Field Pasture contains both suitable and unsuitable areas for nesting and early brood rearing the overall rating for the pasture is marginal.

The Three Mile Crossing Pasture contains one HAF site. HAF site TM is mapped as a Wyoming sagebrush/ Thurber's needlegrass vegetation community. The majority of the pasture is mapped as this vegetation community. Attributes at HAF site TM were rated suitable for all habitat indicators except for grass height (marginal). Twelve species of forbs were observed and they occurred at high densities (3.99 forbs per 0.1 m² plot). The most common forbs were longleaf phlox, low pussytoes (*Antennaria dimorpha*), mourning milkvetch, spiny phlox, lava aster, and northwestern Indian paintbrush. Cheatgrass was observed at 0.5% cover (all layers). Overall, the Three Mile Crossing Pasture is suitable as nesting and early brood rearing habitat for sage-grouse.

The West Clark Seeding Pasture contains one HAF site. HAF site WC is mapped as a Wyoming sagebrush/ Sandberg bluegrass vegetation community. Attributes at the site were rated suitable for sagebrush cover, sagebrush height, and perennial grass canopy cover. Sagebrush canopy cover and grass height were rated marginal and average forb canopy cover and preferred forb abundance and diversity were rated unsuitable. Only 4 forb species were observed at the site but they occurred at moderate density (1.23 forbs per 0.1m² plot). No cheatgrass was observed along the transects at the site. Overall, the West Clark Seeding provides marginal nesting and early brood rearing habitat for sage-grouse due mainly to the lack of forbs.

The West Trailing Field Pasture contains one HAF site. The majority of this pasture has burned making it unsuitable for sage-grouse. HAF site WT is located in an area mapped as a Sandberg bluegrass vegetation community which represents the majority of the pasture. Attributes at HAF site WT were rated unsuitable for sagebrush indicators and average forb canopy cover. Despite this, grass height, grass cover, and preferred forb abundance were all rated suitable. Although

average forb canopy cover was unsuitable, the site was rated suitable for preferred forb abundance and diversity with 10 species of forbs observed. Forbs occurred at low densities (0.46 forbs per 0.1 m² plot) with the most common forbs being longleaf phlox and sagebrush phlox. Cheatgrass was recorded at 5% cover (all layers).

Late Brood Rearing Habitat

The Cedar Mesa Canal runs through the Cedar Mesa Reservoir (0.3 mile), East Clark Seeding (1 mile), North Cedar Mesa (1.2 mile), and West Clark Seeding (1.4 mile) Pastures. Water is present in the canal from April into October annually. The canal provides water to wildlife in these pastures. The canal also provides some late brood rearing habitat for sage-grouse since seep areas along the canal contain a higher abundance of preferred forbs such as dandelion (*Taraxacum officinale*), prostrate knotweed (*Polygonum aviculare*), and willowherb (*Epilobium* spp.). These forbs remain succulent through the summer compared to forbs in the surrounding uplands. Other plant species associated with the canal include Baltic rush (*Juncus balticus*), coyote willow (*Salix exigua*), and Kentucky bluegrass (*Poa pratensis*). Russian olives (*Elaeagnus angustifolia*) and Western juniper (*Juniperus occidentalis*) occur along the canal in the Cedar Mesa Reservoir (approx. 15 Russian olives), East Clark Seeding (approx. 45 Russian olives), North Cedar Mesa (approx. 20 Russian olives), and West Clark Seeding (3 junipers) Pastures. One drawback is that junipers and Russian olives along the canal provide nesting habitat for common ravens (*Corvus corax*) and black-billed magpies (*Pica hudsonia*) which prey on sage-grouse eggs and recently hatched chicks (Autenrieth, 1981; Coates, 2007). The presence and abundance of these trees along the canal may limit sage-grouse use along the canal.

The northern portion of the North Cedar Mesa and West Clark Seeding Pastures are adjacent to irrigated farmland in Roseworth. Irrigated farmland may be used by sage-grouse and sage-grouse broods during the summer when forbs desiccate in the surrounding uplands (Connelly et al., 1988).

Riparian areas associated with Cedar Creek or House Creek are not expected to be used by sage-grouse since they occur in the bottom of a steep canyon (Stiver et al., 2010). The area near the high water line of Cedar Creek Reservoir is also not likely to be used by sage-grouse. Water levels in the reservoir fluctuate annually, there are limited preferred sage-grouse forbs, and there is a general lack of cover near the waters edge.

Winter Habitat

The Cedar Mesa Reservoir, East Clark Seeding, East Trailing Field, North Cedar Mesa, Pigtail Butte, Tank Field, Three Mile Crossing, and West Clark Seeding Pastures contain shrub height and cover that is suitable for wintering sage-grouse. During winter snow depths are usually less than 12 inches leaving most sagebrush above the snow and available for wintering sage-grouse.

The Northeast Roseworth Reservoir and South Pigtail Butte Pastures are marginal for wintering sage-grouse since these pastures contain both suitable and unsuitable areas. In the Northeast Roseworth Reservoir Pasture, areas of sagebrush of suitable height and density that could be used as wintering habitat occur in the northern half of the pasture and in the south central portion of the pasture. The remainder of the pasture contains scattered patches of low density sagebrush that are unsuitable. In the South Pigtail Butte Pasture, areas of suitable wintering habitat occur in

the eastern third of the pasture and in the northern portion of the pasture. The remainder of the pasture contains low density sagebrush (around 5% sagebrush cover) that is unsuitable.

The Northwest Roseworth Reservoir and West Trailing Field Pastures are unsuitable for wintering sage-grouse since the majority of sagebrush in these pastures was removed in the 2007 Murphy Complex Fire. In the Northwest Roseworth Reservoir Pasture, the only areas that contain sagebrush of suitable height and cover for wintering sage-grouse occur in the northeast corner of the pasture (77 acres), the area south of House Creek (59 acres), and the portion of the pasture on the east side of Cedar Creek Reservoir (120 acres). In the West Trailing Field Pasture, the only suitable areas are in the north central (85 acres) and southeastern (70 acres) portions of the pasture.

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 smaller mammals. Prey species include ground squirrel (*Urocitellus* spp.), black-tailed jackrabbit (*Lepus californicus*), mountain cottontail (*Sylvilagus nuttalli*), and pocket 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 5 ferruginous hawk nests in the allotment (Table 41). Nests are present in the following pastures: East Clark Seeding (Nest F35), East Trailing Field (Nest F31), Three Mile Crossing (Nest F08), West Clark Seeding (Nest F47), and West Trailing Field (Nest F05). The Marshall Butte Pasture in the Cedar Butte Devil Creek Allotment has an additional nest that is 30 yards from the West Trailing Field in the Pigtail Butte Allotment (Nest F33).

Table 41: Ferruginous Hawk Nest Data

Nest	Survey Year ¹																		
	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13
F05	3	--	--	--	--	I	I	I	--	--	--	2	I	I	A	I	2	A	A
F08	3	--	--	--	--	2	1	2	--	--	--	--	1	I	--	I	I	4	A
F31		3	--	--	--	--	1	2	--	--	--	--	A	Nest tree burned in 2007					
F33		3	--	--	--	--	U	--	--	--	--	--	I	2	2	3	2	2	I
F35			2	--	--	2	I	U	--	--	--	R	I	I	LE	R	R	R T	S
F47												S	2	--	--	2	2	A	2

¹Where the table is blank the nest had not yet been identified; 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. If the nest was used by a long-eared owl (LE), common raven (R), red-tailed hawk (RT), Swainson's hawk (S), or if evidence of use was present but the species was unknown (U) that was also recorded.

Trees suitable for nesting are found in the Cedar Mesa Reservoir, East Clark Seeding, East Trailing Field, North Cedar Mesa, Northeast Roseworth Reservoir, Northwest Roseworth Reservoir, South Pigtail Butte, Three Mile Crossing, West Clark Seeding, and West Trailing Field Pasture. No trees are present in the Pigtail Butte or Tank Field Pastures. All pastures in the allotment except the Northwest Roseworth Reservoir Pasture contain native shrub and bunchgrass communities which provide suitable habitat for mammalian prey (black-tailed jackrabbit, mountain cottontail, ground squirrels, etc.) favored by ferruginous hawks. The Northwest Roseworth Reservoir Pasture provides marginal habitat for prey species since the pasture is predominately a Sandberg bluegrass vegetation community that lacks a sagebrush overstory.

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

Brewer's sparrows are typically associated with sagebrush steppe. Brewer's sparrow place nests 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 (*Purshia tridentata*) (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).

Management and conservation of habitat to provide suitable sage-grouse habitat would also benefit Brewer's sparrow (Rowland et al., 2006). Brewer's sparrows have been observed and are expected to be common in sagebrush habitats within the Pigtail Butte Allotment. At this time shrub height and density are suitable for Brewer's sparrow nesting in the Cedar Mesa Reservoir, East Clark Seeding, East Trailing Field, North Cedar Mesa, Pigtail Butte, Tank Field, Three Mile Crossing, and West Clark Seeding Pastures. These pastures are dominated by areas mapped as sagebrush.

The Northeast Roseworth Reservoir and South Pigtail Butte Pastures are marginal for Brewer's sparrow nesting since these pastures contain both suitable and unsuitable areas. In the Northeast Roseworth Reservoir Pasture, areas of sagebrush of suitable height and density that could be used for nesting occur in the northern half of the pasture and in the south central portion of the pasture. The remainder of the pasture contains scattered patches of low density sagebrush that are generally unsuitable for nesting. In the South Pigtail Butte Pasture, areas of suitable nesting habitat occur in the eastern third of the pasture and in the northern portion of the pasture. The remainder of the pasture contains low density sagebrush (around 5% sagebrush cover) that is generally unsuitable for nesting.

The Northwest Roseworth Reservoir and West Trailing Field Pastures contain limited areas of sagebrush making them unsuitable for nesting. While Brewer's sparrows are generally present in areas that are classified as suitable they may also occur in areas that are classified as marginal or unsuitable.

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

Loggerhead shrikes are associated with open grasslands and shrub-steppe habitats. In southern Idaho loggerhead shrikes place nests 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.

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.

Loggerhead shrikes have been observed on the allotment and would be expected to nest and forage on the allotment. At this time sagebrush of suitable height for nesting occurs in the Cedar Mesa Reservoir, East Clark Seeding, East Trailing Field, North Cedar Mesa, Pigtail Butte, Tank Field, Three Mile Crossing, and West Clark Seeding Pastures. Additionally, all these pastures except the Pigtail Butte Pasture also contain juniper and/or Russian olives that could be used for nesting.

The majority of the Northwest Roseworth Reservoir Pasture burned in the 2007 Murphy Complex Fire making it unsuitable for loggerhead shrike nesting. While the majority of the West Trailing Field Pasture also burned in the fire, scattered islands of sagebrush and over a hundred junipers along Cedar Draw provide some nesting habitat in the pasture. Therefore, the West Trailing Field Pasture was rated marginal for loggerhead shrike nesting. The Northeast Roseworth Reservoir and South Pigtail Butte Pastures provide marginal habitat for nesting since they contain both suitable and unsuitable areas.

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

Sagebrush sparrows are sagebrush obligates that are typically common in shrub-steppe habitats (Martin and Carlson, 1998). Sagebrush sparrow 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).

Management and conservation that provides suitable sage-grouse habitat would also benefit sagebrush sparrow (Rowland et al., 2006). Sagebrush sparrows have been observed and are expected to be common in the Cedar Mesa Reservoir, East Clark Seeding, East Trailing Field, North Cedar Mesa, Pigtail Butte, Tank Field, Three Mile Crossing, and West Clark Seeding Pastures. The Northeast Roseworth Reservoir and South Pigtail Butte Pastures provide marginal habitat for nesting since they contain both suitable and unsuitable areas. The Northwest Roseworth Reservoir and West Trailing Field Pastures contain limited areas of sagebrush making them unsuitable for nesting.

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 Laundré, 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.

Management and conservation of habitat to provide suitable sage-grouse habitat would also benefit pygmy rabbit (Rowland et al., 2006).

Surveys for pygmy rabbits have occurred in the following pastures: East Clark Seeding (30 acres), East Trailing Field (260 acres), South Pigtail Butte (50 acres), Tank Field (100 acres), West Clark Seeding (100 acres), and West Trailing Field (200 acres). Other pastures have not been surveyed. Pygmy rabbits were documented during surveys in the East Trailing Field, Tank Field, and West Clark Seeding Pastures and the habitat in these areas remains suitable. Pygmy rabbits were also documented in the South Pigtail Butte and West Trailing Field Pastures; however, areas where rabbits were documented burned in the 2007 Murphy Complex Fire.

Pygmy rabbit habitat was rated marginal in the Cedar Mesa Reservoir, East Clark Seeding, East Trailing Field, North Cedar Mesa, Northeast Roseworth Reservoir, Pigtail Butte, South Pigtail Butte, Tank Field, Three Mile Crossing, and West Clark Seeding Pastures. Due to past vegetation treatments in the 1960's, portions of each pasture within the allotment lack the sagebrush density preferred by pygmy rabbits. Although sagebrush has increased in the areas

treated in the 1960s, shrub density is not adequate in most of the treated areas to support pygmy rabbits. Relic native sagebrush steppe has both the density and height for pygmy rabbit burrows. However, the relic areas are generally less than half the pastures. The vegetation map does not reflect habitat suitability or some of the historic seedings. In addition to vegetation treatments, wildfires have reduced the amount of sagebrush in the southern portion of the Northeast Roseworth Reservoir, Pigtail Butte, South Pigtail Butte, Tank Field Pastures and in the southern and western portions of the East Trailing Field Pasture.

The Northwest Roseworth Reservoir and West Trailing Field Pastures were rated unsuitable for pygmy rabbits since the majority of sagebrush in these pastures has been removed by wildfire.

Piute ground squirrel (*Uroditellus 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. Sagebrush and grassland habitats in the Cedar Mesa Reservoir, East Clark Seeding, East Trailing Field, North Cedar Mesa, Northeast Roseworth Reservoir, Pigtail Butte, South Pigtail Butte, Tank Field, Three Mile Crossing, and West Clark Seeding Pastures are suitable to maintain a relatively stable Piute ground squirrel population (Steenhof et al., 2006). Because shrub habitats provide more favorable environments for ground squirrels than grass habitats (Yensen et al., 1992; Van Horne et al., 1997) the Northwest Roseworth Reservoir and West Trailing Field Pastures were 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 Cedar Creek Canyon in the Northeast Roseworth Reservoir, Northwest Roseworth Reservoir, South Pigtail Butte, and Three Mile Crossing Pastures. The Cedar Mesa Reservoir, East Clark Seeding, East Trailing Field, North Cedar Mesa, Pigtail Butte, Tank Field, West Clark Seeding, and West Trailing Field Pastures do not contain cliffs for roosting. Spotted bats may forage over the allotment and drink

and forage along Cedar Creek, Cedar Creek Reservoir, Cedar Mesa Canal, Cedar Mesa Reservoir, and House Creek.

Additional information

The Cedar Creek Reservoir and Cedar Mesa Reservoir provide habitat for waterfowl and shorebirds during the spring migration. White-faced ibis (*Plegadis chihi*; BLM sensitive species) have been observed in the fall at Cedar Mesa Reservoir and feeding in the mud flats at Cedar Creek Reservoir. In general, nesting habitat (e.g., large marshes with reeds, bulrush and/or willows) is lacking at Cedar Mesa Reservoir and at Cedar Creek Reservoir. Bulrush was planted at Cedar Mesa Reservoir but has not established well. The fluctuating water levels at Cedar Creek Reservoir as well as high use by livestock have limited the establishment of bulrush in the backwater area.

Bald eagle (*Haliaeetus leucocephalus*; BLM sensitive species) have also been observed at Cedar Creek Reservoir.

Evaluation for Standard 8

There are no known BLM sensitive or federally listed plants within the Pigtail Butte Allotment. Approximately 4,250 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 16,784 acres of high potential, 641 acres of medium potential, and 1,698 acres of low potential habitat for slickspot peppergrass. The nearest known occupied habitat for slickspot peppergrass is 10 miles to the west, on the west side of Clover Creek.

A 0.3 mile section of House Creek occurs in the Northwest Reservoir Pasture. This reach of House Creek is listed by IDEQ as not supporting the beneficial uses of cold water aquatic life and salmonid spawning due to total phosphorous, sediment/siltation and water temperature. No water quality monitoring has been completed recently within the reach, but BLM did collect water temperature data from 1995-1998 and 2000-2002. In each of the years for which water temperature data is available, temperatures exceeded IDEQ standards for cold water aquatic life during some portion of the summer months (June, July, and August). During periods of the year when water temperature in House Creek exceed Idaho water temperature criteria for cold water aquatic life, this reach of House Creek in the Northwest Reservoir Pasture is likely unsuitable for redband trout.

No fish habitat surveys have been conducted on this short reach of House Creek, so it is not known if substrate size within the reach is suitable for redband trout spawning. If substrate size suitable for redband trout spawning is present in the reach, the IDEQ listing for sedimentation/siltation indicates impacts may be occurring to redband trout. Excessive amounts of fine sediment can result in reduce spawning success and recruitment due to suffocation of salmonid eggs during incubation.

Other habitat needs of redband trout are likely met within House Creek in the Northwest Reservoir Pasture. Stream attributes (width/depth ratio, pool/riffle frequency) are appropriate for the stream type. Riparian vegetation is providing cover. Other than the sedimentation/siltation

and water temperature issues, habitat along House Creek in the Northwest Reservoir Pasture 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 42.

Table 42: Overall Habitat Suitability for BLM Sensitive Wildlife Species by Pasture

Species Name and Type of Habitat	Cedar Mesa Reservoir	East Clark Seeding	East Trailing Field	North Cedar Mesa	NE Roseworth Reservoir	NW Roseworth Reservoir	Pigtail Butte	South Pigtail Butte	Tank Field	Three Mile Crossing	West Clark Seeding	West Trailing Field
Sage-grouse (nesting & early brood rearing)	M	M	M	M	U	U	M	U	M	S	M	U
(late brood rearing)	S	S	U	S	U	U	U	U	U	U	S	U
(winter)	S	S	S	S	M	U	S	M	S	S	S	U
Ferruginous hawk (nesting)	S	S	S	S	S	S	U	S	U	S	S	S
(foraging)	S	S	S	S	S	M	S	S	S	S	S	S
Brewer's sparrow (nesting)	S	S	S	S	M	U	S	M	S	S	S	U
Sagebrush sparrow (nesting)	S	S	S	S	M	U	S	M	S	S	S	U
Loggerhead shrike (nesting)	S	S	S	S	M	U	S	M	S	S	S	M
Pygmy rabbit (year round)	M	M	M	M	M	U	M	M	M	M	M	U
Piute ground squirrel (year round)	S	S	S	S	M	S	S	S	S	S	S	M
Spotted bat (roosting)	U	U	U	U	S	S	U	S	U	S	U	U
(foraging)	S	S	S	S	S	S	S	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).

Sage-grouse nesting and early brood rearing habitat is suitable in the Three Mile Crossing Pasture. The Three Mile Crossing Pasture contains extensive areas with favorable shrub height, shrub cover, residual herbaceous height and cover, residual herbaceous height and cover, and abundance and diversity of sage-grouse preferred forbs. Sage-grouse nesting and early brood rearing habitat is marginal in the Cedar Mesa Reservoir, East Clark Seeding, East Trailing Field, North Cedar Mesa, Pigtail Butte, Tank Field, and West Clark Seeding Pastures. The Northeast Roseworth Reservoir, Northwest Roseworth Reservoir, South Pigtail Butte, and West Trailing Field were rated as unsuitable since large areas in these pastures have burned. Sagebrush has been aerially reseeded in strips across areas that burned in the South Pigtail Butte and West Trailing Field Pastures. Areas that burned in the Northeast Roseworth Reservoir were not seeded to sagebrush. In Northwest Roseworth Reservoir Pasture, sagebrush was only seeded along the northern portion of the pasture. The Cedar Mesa Canal provides some late brood rearing habitat for sage-grouse in the Cedar Mesa Reservoir, East Clark Seeding, North Cedar Mesa, and West Clark Seeding Pastures. In addition, the North Cedar Mesa, and West Clark

Seeding Pastures are adjacent to irrigated farmland that may be used by sage-grouse during late brood rearing. Other pastures do not contain late brood rearing habitat for sage-grouse. Sagebrush of sufficient height and cover to provide suitable winter habitat for sage-grouse is found in the Cedar Mesa Reservoir, East Clark Seeding, East Trailing Field, North Cedar Mesa, Pigtail Butte, Tank Field, Three Mile Crossing, and West Clark Seeding Pastures. The Northeast Roseworth Reservoir and South Pigtail Butte Pastures were rated marginal as wintering habitat and the Northwest Roseworth Reservoir and West Trailing Field were rated as unsuitable.

Trees for ferruginous hawk nesting are found in all pastures in the allotment except for the Pigtail Butte and Tank Field Pastures. All pastures in the allotment except the Northwest Roseworth Reservoir Pasture contain suitable habitat for prey species such as mountain cottontail, black-tailed jackrabbit and ground squirrels usually hunted by ferruginous hawk. The Northwest Roseworth Reservoir Pasture contains marginal habitat for prey species since the pasture is predominately a Sandberg bluegrass vegetation community that lacks a sagebrush overstory.

Shrub height and cover is suitable for Brewer's sparrow, loggerhead shrike, and sagebrush sparrow nesting in the Cedar Mesa Reservoir, East Clark Seeding, East Trailing Field, North Cedar Mesa, Pigtail Butte, Tank Field, Three Mile Crossing, and West Clark Seeding Pastures. The Northeast Roseworth Reservoir and South Pigtail Butte Pastures are marginal for nesting by these species and the Northwest Roseworth Reservoir Pasture is unsuitable. The West Trailing Field Pasture is unsuitable for Brewer's sparrow and sagebrush sparrow nesting. However, the West Trailing Field Pasture was rated marginal for loggerhead shrike nesting since the pasture contains an abundance of junipers along Cedar Draw and some scattered islands of sagebrush.

Pygmy rabbit habitat was rated marginal in the Cedar Mesa Reservoir, East Clark Seeding, East Trailing Field, North Cedar Mesa, Northeast Roseworth Reservoir, Pigtail Butte, South Pigtail Butte, Tank Field, Three Mile Crossing, and West Clark Seeding Pastures. Although sagebrush has increased in the areas treated in the 1960s, shrub density is not adequate in most of the treated area to support pygmy rabbits. Relic native sagebrush steppe has both the density and height for pygmy rabbit burrows. However, the relic areas are generally less than half the pastures. The Northwest Roseworth Reservoir and West Trailing Field Pastures were rated unsuitable for pygmy rabbits since the majority of sagebrush in these pastures has been removed by wildfire.

The Cedar Mesa Reservoir, East Clark Seeding, East Trailing Field, North Cedar Mesa, Northeast Roseworth Reservoir, Pigtail Butte, South Pigtail Butte, Tank Field, Three Mile Crossing, and West Clark Seeding Pastures contain suitable habitat to maintain a stable population of Piute ground squirrels due to adequate shrub and grass cover. The Northwest Roseworth Reservoir and West Trailing Field Pastures were rated marginal for Piute ground squirrels.

Cliffs along Cedar Creek provide suitable spotted bat roosting habitat in the Northeast Roseworth Reservoir, Northwest Roseworth Reservoir, South Pigtail Butte, and Three Mile Crossing Pastures. The allotment was rated suitable for spotted bat foraging due to its proximity to roosting habitat and the presence of grassland, sagebrush, and riparian habitats that support

insects eaten by spotted bats. Cedar Creek, Cedar Creek Reservoir, Cedar Mesa Canal, Cedar Mesa Reservoir, and House Creek provide watering locations for spotted bats within the allotment.

Evaluation Finding – Cedar Mesa Reservoir, East Clark Seeding, North Cedar Mesa, Three Mile Crossing, and West Clark Seeding Pastures are:

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

Rationale for Evaluation Finding

The Cedar Mesa Reservoir, East Clark Seeding, North Cedar Mesa, Three Mile Crossing and West Clark Seeding Pastures are almost entirely vegetated by sagebrush that provides habitat for sage-grouse and other sagebrush dependent species. However, vegetation treatments in the 1960's in portions of the Cedar Mesa Reservoir, East Clark Seeding, North Cedar Mesa and West Clark Seeding Pastures have likely limited the abundance and diversity of forbs in the uplands. The Cedar Mesa Canal provides late brood rearing sage-grouse in all these pastures except the Three Mile Crossing Pasture. Exotic invasive annual grasses are largely absent in these pastures. Therefore, Cedar Mesa Reservoir, East Clark Seeding, North Cedar Mesa and West Clark Seeding Pastures of the Pigtail Butte Allotment are meeting Standard 8 for special status wildlife species.

Evaluation Finding – East Trailing Field, Northeast Roseworth Reservoir, Pigtail Butte, South Pigtail Butte, and Tank Field Pastures are:

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

Rationale for Evaluation Finding

Areas mapped as sagebrush in the East Trailing Field, Northeast Roseworth Reservoir, Pigtail Butte, South Pigtail Butte, and Tank Field Pastures provide habitat for sage-grouse and other sagebrush dependent species. However, portions of these pastures have all burned in the 2007 Murphy Complex Fire. Following the fire, sagebrush was aerially reseeded in strips in all these pastures except the Northeast Roseworth Reservoir Pasture. In the 2013 satellite imagery, patches of sagebrush and low-moderate density sagebrush are evident throughout these pastures (including in the area that was not seeded in the Northeast Roseworth Reservoir Pasture). Until sagebrush achieves sufficient height and density for nesting the areas that have burned remain unsuitable for sage-grouse. Therefore, these pastures are not meeting Standard 8, but are making significant progress towards meeting.

Evaluation Finding – Northwest Roseworth Reservoir and West Trailing Field Pastures are:

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

Rationale for Evaluation Finding

House Creek within the Northwest Reservoir Pasture is listed by IDEQ as not supporting the beneficial use of cold water aquatic life and salmonid spawning due to total phosphorous, sedimentation/siltation, and water temperature. The elevated water temperatures during June, July and August render the House Creek reach marginal or unsuitable for redband trout during the summer. Recruitment and spawning success are likely reduced due to the amount of fine sediment present in the House Creek reach. Physical habitat requirements of adult and juvenile redband trout are likely met within the reach. Due to the water quality conditions, House Creek within the Northwest Reservoir Pasture is not likely to support a viable population of redband trout throughout the year. Therefore, the Northwest Reservoir Pasture is not meeting Standard 8 for redband trout.

The Northwest Roseworth Reservoir and West Trailing Field Pastures burned in the 2007 Murphy Complex Fire which eliminated the majority of sagebrush in these pastures making them unsuitable for sage-grouse and other sagebrush dependent species. In the Northwest Roseworth Reservoir Pasture, the only areas mapped as sagebrush occur in the northeast corner of the pasture (77 acres), the area south of House Creek (59 acres), and the portion of the pasture on the east side of Cedar Creek Reservoir (120 acres). In the West Trailing Field Pasture, the only areas are in the north central (85 acres) and southeastern (70 acres) portions of the pasture.

Sagebrush has been aerially reseeded in strips across the majority of the West Trailing Field and across the northern portion of the Northwest Roseworth Reservoir Pasture. While sagebrush has been reseeded, sagebrush remains very limited in these pastures. Therefore, these pastures are not meeting Standard 8 for special status wildlife species.

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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
Perennial Grasses			
<i>Achnatherum hymenoides</i>	Indian ricegrass	Native	EC_2, ET_1, WT
<i>Achnatherum thurberianum</i>	Thurber's needlegrass	Native	EC_1, ET_1, ET_2, NW_1, SP_1, SP_2, TF_1, TM, WT
<i>Agropyron cristatum</i>	Crested wheatgrass	Exotic, Seeded	EC_1, ET_1, NW_2, TM, WC, WT
<i>Elymus elymoides</i>	Bottlebrush squirreltail	Native	EC_1, ET_1, ET_2, NE, NW_1, SP_1, SP_2, TF_1, TF_2, TM, WC, WT
<i>Elymus lanceolatus</i>	Thickspike wheatgrass	Native	ET_1, SP_1, SP_2
<i>Pascopyrum smithii</i>	Western wheatgrass	Native	ET_2, NW_1
<i>Poa secunda</i>	Sandberg bluegrass	Native	EC_1, EC_2, ET_1, ET_2, NE, NW_1, NW_2, SP_1, SP_2, TF_1, TF_2, TM, WC, WT
<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass	Native, Seeded	ET_2, SP_1, SP_2, TF_1, TF_2, WT
Annual Grasses			
<i>Bromus tectorum</i>	Cheatgrass	Exotic, Invasive	EC_1, ET_1, ET_2, NE, SP_1, SP_2, TF_1, TF_2, TM, WT
Perennial Forbs			
<i>Achillea millefolium</i>	Western yarrow	Native, Sage-grouse Preferred	WT
<i>Allium acuminatum</i>	Tapertip onion	Native	ET_2, NE, SP_1, SP_2, TF_1
<i>Allium nevadense</i>	Nevada onion	Native	EC_1, ET_1, ET_2, NW_1, NW_2, SP_2, TF_1, TF_2, TM
<i>Antennaria dimorpha</i>	Low pussytoes	Native, Sage-grouse Preferred	EC_1, ET_2, NE, NW_1, SP_1, TM
<i>Arabis</i> spp.	Rockcress	Native	ET_1, TF_1
<i>Aster</i> spp.	Aster	Native	TF_2
<i>Astragalus atratus</i>	Mourning milkvetch	Native	NE, NW_1, NW_2, SP_1, TF_1, TF_2, TM
<i>Astragalus lentiginosus</i>	Freckled milkvetch	Native	EC_1, EC_2, ET_1, ET_2, SP_1, SP_2, TF_1, TF_2, WT
<i>Astragalus purshii</i>	Woollypod milkvetch	Native	ET_1, NE, NW_1, SP_1, SP_2, TF_1, TF_2, TM
<i>Balsamorhiza hookeri</i>	Hooker's balsamroot	Native	NW_1, TF_2, TM
<i>Castilleja angustifolia</i>	Northwestern Indian paintbrush	Native	EC_1, ET_1, NE, NW_1, SP_1, SP_2, TF_1, TM, WC
<i>Crepis acuminata</i>	Tapertip hawksbeard	Native, Sage-grouse Preferred	ET_1, NE, SP_1, SP_2, TF_1, TF_2
<i>Crepis atriobarba</i>	Slender hawksbeard	Native, Sage-grouse Preferred	NE, TM
<i>Delphinium andersonii</i>	Anderson's larkspur	Native	EC_1, NE, NW_1, SP_1,

Scientific Name	Common Name	Species Type	Site(s) where species occurred
			SP_2, TF_1, TM
<i>Erigeron aphanactis</i>	Rayless shaggy fleabane	Native, Sage-grouse Preferred	NE, TM
<i>Erigeron pumilus</i>	Shaggy fleabane	Native, Sage-grouse Preferred	EC_1, ET_1, ET_2, NW_1, SP_1, SP_2, TF_1, TM, WC, WT
<i>Eriogonum microthecum</i>	Slender buckwheat	Native	TF_2
<i>Eriogonum ovalifolium</i>	Cushion buckwheat	Native	NW_1, SP_1, TM
<i>Fritillaria</i> spp.	Fritillary	Native	TF_2
<i>Ionactis alpina</i>	Lava aster	Native, Sage-grouse Preferred	EC_1, ET_2, NE, NW_1, SP_1, SP_2, TF_1, TM
<i>Linanthus pungens</i>	Granite prickly phlox	Native	ET_2
<i>Lomatium foeniculaceum</i>	Desert biscuitroot	Native, Sage-grouse Preferred	EC_1, EC_2, ET_2, NW_1, SP_1, TF_1, TF_2, TM, WT
<i>Lupinus</i> spp.	Lupine	Native	NW_2
<i>Machaeranthera canescens</i>	Hoary tansyaster	Native	SP_2, TF_2, WT
<i>Medicago sativa</i>	Alfalfa	Exotic, Sage-grouse Preferred	NW_2
<i>Mertensia oblongifolia</i>	Oblongleaf bluebells	Native	TM
<i>Opuntia polyacantha</i>	Plains pricklypear	Native	EC_1
<i>Penstemon</i> spp.	Penstemon	Native	ET_2, SP_2
<i>Penstemon speciosus</i>	Royal penstemon	Native	EC_1, WT
<i>Phlox aculeata</i>	Sagebrush phlox	Native, Sage-grouse Preferred	EC_1, EC_2, ET_1, NE, NW_1, NW_2, SP_1, SP_2, TF_1, TF_2, TM, WT
<i>Phlox hoodii</i>	Spiny phlox	Native, Sage-grouse Preferred	EC_1, EC_2, ET_1, ET_2, NE, NW_1, SP_1, SP_2, TF_1, TF_2, TM, WC, WT
<i>Phlox longifolia</i>	Longleaf phlox	Native, Sage-grouse Preferred	EC_2, ET_1, ET_2, NE, NW_1, SP_1, SP_2, TF_1, TF_2, TM, WC, WT
<i>Senecio integerrimus</i>	Lambstongue ragwort	Native	ET_1, SP_2, TF_2
<i>Taraxacum officinale</i>	Common dandelion	Exotic, Sage-grouse Preferred	WT
<i>Tragopogon dubius</i>	Yellow salsify	Exotic, Sage-grouse Preferred	NE, NW_1, SP_1, SP_2, TF_1, TF_2, WT
<i>Zigadenus venenosus</i>	Meadow deathcamas	Native	EC_1, ET_1, ET_2, SP_1, SP_2, TF_1, TF_2, WT
Annual Forbs			
<i>Agoseris glauca</i>	Pale agoseris	Native, Sage-grouse Preferred	ET_1, ET_2, NW_1, SP_1, SP_2, TF_1, TF_2, WT
<i>Agoseris heterophylla</i>	Annual agoseris	Native	WT
<i>Cerastium nutans</i>	Nodding chickweed	Native	ET_1, ET_2, NE, NW_1, SP_1, TF_1, WT
<i>Ceratocephala testiculata</i>	Curveseed butterwort	Exotic	EC_1, EC_2, ET_1, NE, NW_1, NW_2, SP_1, SP_2, TF_2, TM, WC,

Scientific Name	Common Name	Species Type	Site(s) where species occurred
			WT
<i>Collinsia parviflora</i>	Maiden blue eyed Mary	Native	ET_1, ET_2, NW_2, SP_1, SP_2, TF_1, TF_2, WT
<i>Descurainia incana</i>	Mountain tansymustard	Native	NW_2, SP_2
<i>Descurainia pinnata</i>	Western tansymustard	Native	EC_1, WT
<i>Draba verna</i>	Spring draba	Exotic	ET_2, TF_2
<i>Epilobium brachycarpum</i>	Tall annual willowherb	Native, Sage-grouse Preferred	ET_1, ET_2, SP_1, SP_2, TF_1, WT
<i>Gayophytum</i> spp.	Groundsmoke	Native	SP_1, SP_2, TF_1
<i>Halogeton glomeratus</i>	Saltlover	Exotic	WT
<i>Lactuca serriola</i>	Prickly lettuce	Exotic, Sage-grouse Preferred	WT
<i>Lepidium perfoliatum</i>	Clasping pepperweed	Exotic	ET_2, SP_1, SP_2, TF_2, WT
<i>Microsteris gracilis</i>	Slender phlox	Native, Sage-grouse Preferred	EC_2, NE, SP_1, WC, WT
<i>Salsola kali</i>	Russian thistle	Exotic	WT
<i>Sisymbrium altissimum</i>	Tall tumbled mustard	Exotic	EC_1, SP_1, SP_2, TF_2, WT
<i>Townsendia florifer</i>	Showy townsend daisy	Native, Sage-grouse Preferred	ET_1, WT
Noxious Weeds			
<i>Chondrilla juncea</i>	Rush skeletonweed	Exotic, Invasive	WT
Shrubs			
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming big sagebrush	Native	EC_1, EC_2, ET_1, NE, NW_1, SP_1, SP_2, TF_1, TF_2, TM, WC, WT
<i>Chrysothamnus viscidiflorus</i>	Yellow rabbitbrush	Native	EC_2, ET_2, NE, SP_2, TM, WT
<i>Ericameria nauseosa</i>	Rubber rabbitbrush	Native	SP_1, SP_2, WT
<i>Grayia spinosa</i>	Spiny hopsage	Native	TM
<i>Purshia tridentata</i>	Antelope bitterbrush	Native	NW_1

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